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Scientist's & Engineer's Journal for Intelligent Scientific Innovation (JISI)

Department of Electronics and Communication Engineering

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Aim and Scope:

- This journal is aimed to enrich the knowledge of the students as well as the academicians interested in science and technology.
- We invite unpublished research works from students and teachers.
- We encourage innovative ideas from college students and teachers as well as school students and teachers.
- Publication of research work enhances the students' as well as teachers' technical skills.

- After getting the revised version of the manuscript, it will be sent to the reviewer again. If the reviewer is satisfied then it will be accepted for publication.

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- Imaginative Education
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- Health Education

Contents

	Aim and Scope		i
	Details of Chief Patron, Advisory Committee, Mentors, and Editorial members of the Journal		i
	Journal Policy		ii
	Instruction for Authors		iii
	Topic of Interest		iv
	Table of contents		v
Paper ID	Paper Title	Name of the Authors	
JISI-22-23	Simulation Based Real Time Data Monitoring System Using 'Mini Health Detector'	Suchandana Roy (Saha), Soumyendu Bhattacharjee, Debraj Modak, Sounak Banerjee, Prateeq Kishore Choudhury, Akash Sharma	1-6
JISI-22-30	Design and Implementation of Electronic Infrastructure for Academic Establishment	Aniruddha Ghosh, Mainuck Das	7-22
JISI-22-22	Tutorial for Designing Webpage using HTML and JAVASCRIPT	Arindam Banerjee	23-36
JISI-22-29	An efficient approach for industrial application and data monitoring using IoT	Debraj Modak, Suchandana Roy (Saha), Soumyendu Bhattacharjee, Sounak Banerjee, Shahid Mondal,Soumya Mondal	37-42
JISI-22-24	Dual Port MIMO antenna for Wide band applications	Raju Pandey, Ashim Kumar Biswas	43-51
JISI-22-27	8051 Microcontroller Based Wireless Pulse Rate Watcher	Anirban Patra, Anirban Ghosal	53-56
JISI-22-37	Project on Smart and Safety Window	Sougata Bhowmick, Priyam Ghosh, Tanmoy Kundu	57-62
JISI-22-31	A State of Art Review on wearable antenna	Amit Roy	63-66
JISI-22-42	Voice Controlled Robotic Vehicle	Ranjana Ray, Ragini Giri, Disha Tiwari, Oyshee Choudhury, Monisha Roy, Moumita Pal	67-69
JISI-22-44	Steganography Analysis of Medical Images	Anirban Patra1, Aniruddha Ghosh, Barsha Bose, Anupam Sengupta	71-75
JISI-22-28	Plant Leaf Disease Detection using Support Vector Machine	Golam Masum Rosul	77-84

Simulation Based Real Time Data Monitoring System Using 'Mini Health Detector'

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Abstract- This research work aims towards the designing of 'Mini Health Detector' using a data monitoring system. It is observed that, many companies manufacture wrist watches that keep track of the health data such as heart rate, SPO-2 level etc. They also keep in track with the mobile application. At the same time it notifies man with the calls, message etc. But the major drawback is that it does not warn about fatigue which is a major and vital factor for the person concerned. The present study relates and develops such device which additionally provides such data to the users and put caution on prohibition.

Keywords- Real Time Data, Monitoring System, Sensitivity, EMG Signal, Muscle Fatigue.

I. NOMENCLATURE SECTION:

In this section the entire abbreviations and notation used throughout the article is tabulated in the following table 1. The unit of notation is also given in this same table.

Table 1: Meaning and unit of the used Notation in this article.

Notation	Meaning
EMG	Electromyography
HRS	Heart Rate Sensor
TS	Temperature Sensor
RTDMS	Real Time Data Monitoring System
HRV	Heart Rate Variability
DMC	Dynamic Muscle Contraction
LMF	Localized Muscle Fatigue
MF	Muscle Fatigue
MHD	Mini Health Detector

II. INTRODUCTION

After particular muscular activities always fatigue come within the any kind of muscle of human being due to which 'HRV' may increase and ultimately causes different types of disease. There are several types of medical instruments by which muscle's fatigue can be measured. But due to the loading effect of the instruments, the measurement may not be accurate. A healthy person must know the

amount of the fatigue to keep his health good. There are so many medical instruments designed by various companies that invented instrument related to the measurement of blood pressure, electrocardiogram signal, but till today no perfect instrument related to the measurement of the muscle fatigue. Hence the discovery of these types of instrument is very much required to improve the domain of medical science.

III. LITERATURE REVIEW:

The demand of wearable device is increasing day by day. A step by step designing procedure of IC based multi-parameter healthcare instrument is described by the researcher Prawiro, A.P.J et. al. [1],[2] that helps to understand the basic needs of the human being. In a research article [3]. Liu, S. et. al, the concept of 'HRV' is discussed in detail. A patch type structure is given in a beautiful manner. Chang, K. et. al. [4] describes the working principle of 'EMG Recording system' and the detection of muscle fatigue is observed is a simplest way. Kaikkonen, A et. al.[5] explains the effects of medical surgery in the domain of lower limbs point wise which is very much beneficial for the future research works. How maximum output power can be obtained from a human being when he/she is in moving condition is clearly explained by the author Beelen, A et. al. [6]. Abdominal muscle fatigue is depicted by the researcher Morris, S.L et. al.[7]. Expected force from the fatigue muscle has also been explained in detail. Non-invasive applications are cited in [8].Molinari, Fet. al. [9] depicted the fatigue under the 'DMC'. The comparison between the 'LMC' and kinematics is given in the paper cited in [10]. Not only that, the relation between them has also been established. Wavelet analysis of 'EMG Signal' shows the difference between muscle fatigue and muscle stress that is given by the researcher Tscharner,V. et. al.[11]. Talebinejad, M. et. al.[12] demonstrate the complexity occurs within the 'MF' under the dynamic condition. Designing of the 'Fuzzy approximated entropy' is calculated by the researcher Xie, B[13].Gonzalez-Izal, M. et. al. [14] did a research work related to the assess of the muscle fatigue. Isezaki, T.et. al. [15] designed a sensor that is related to the activities of the lower leg of a human being. Xi, X.et. al. [16] demonstrates the process of active monitoring. Liu, S. et. al. [17] demonstrated the estimated the high frequency component under fatigue condition. The procedure to remove the DC current offset is explained in the article [18]. All the recent trained related to the healthcare technique is described in the reference cited [19].

A. Novelty of this work

Many companies like Xiaomi, Apple manufacture wrist watches that keep track of the health data such as heart-rate,SPO2 level etc. They also keep in track with the mobile application. They on the same time notify you with the calls, messageetc.Therefore we can't call it complete health monitoring device. Developing our "MINI HEALTH DETECTOR" will only provide the real-time data of the necessary health parameter i.e. BP,heart rate,SPO2,temperature level. Fitness bands / Health monitoring bands are common nowadays. Many companies like Xiaomi, Apple and many more produce this type of devices. Each of them have something in common i.e. B.P tracker, Heart rate tracker etc. They also keep in track with the mobile applications and notifies with calls, messages etc. All these do not make it a proper health detector band as it has many non-medical facilities too. Our this particular "MINI HEALTH DETECTOR" will only be used for tracking the real time data and provides the output in form of digital and in form of graphs .One can be updated with their personal health related updates like SPO2 level, Heart rate, Temperature and B.P . Amongst these the new feature added is the tracking of the muscle activity whether it is healthy or unhealthy i.e. it will monitor the muscle fatigue by providing us the resultant output in form of graphs(EMG SIGNALS).This "MINI HEALTH DETECTOR" will be the best band for the sportsperson's for getting their real time data of their physical body condition.

B. Types of Sensors used for RTDMS

These are the core elements of a wearable Fitness band / Health monitoring bands. These sensors differ from other sensors used in the mobile phones. These offers distinct features like the Heart rate monitoring, B.P monitoring, SPO2 level, Temperature and the EMG sensor [20]. Apart from that, the component used for the designing of RTDMS is listed below.

1. Integrated LEDs, Photo Sensor
2. Pulse Oximeter
3. High Performance 'Analog Front-End Fast driver'
4. MAX30100: It is a fitness assistance devices as well as medical monitoring device.

C. Heart Rate Sensor (HRS)

It is a very much useful device as it is recording the electrical signal from cardiovascular muscle. It is used to track the pulse rate continuously.

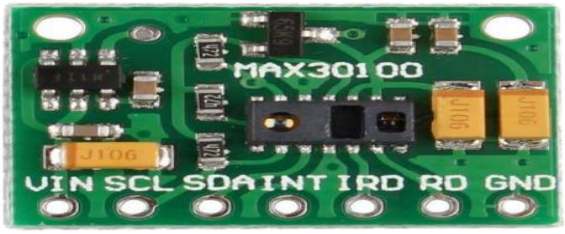

Figure 1: IC configuration of HRS

Figure 1 shows an IC level designing of heart rate sensor. The specification of this IC is MAX301 00.

D. Temperature Sensor (TS)

Temperature Sensors are the most commonly used sensors for biomedical instrument. The common type of this sensor includes 'Thermostat' [21].

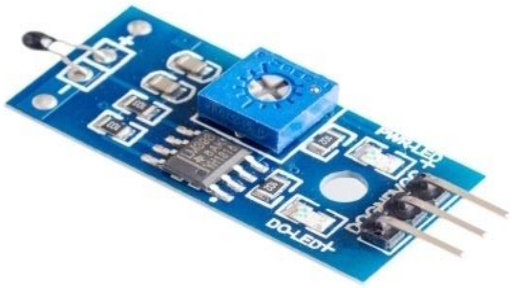

Figure 2: A Top view of Temperature Sensing IC

Figure 2 is depicting the 'Temperature Sensor' which is the most important device for our proposed design.

E. EMG Sensors

When a person is in moving condition, the 'EMG Sensor' is used measure the electrical signal which is generated the cardiovascular muscle.

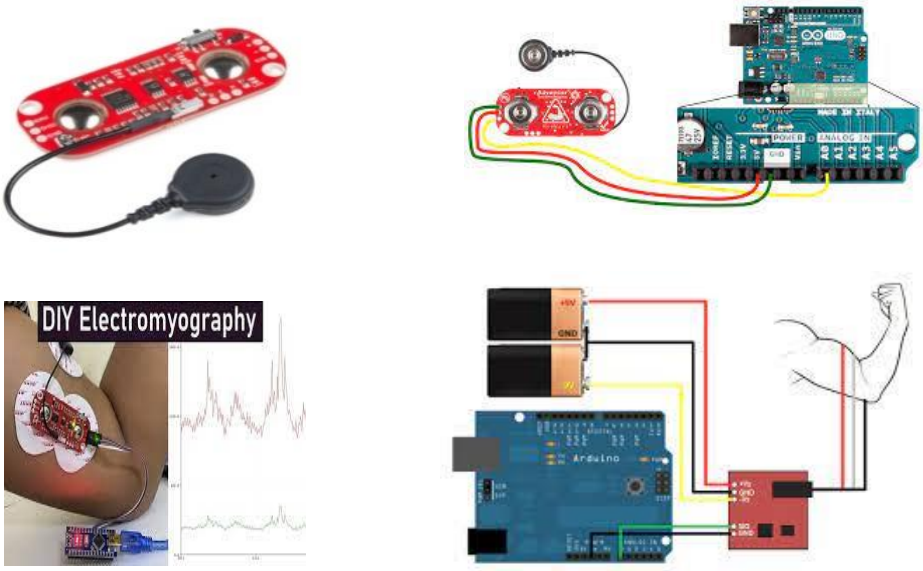

Figure 3 : Top View and Side View of EMG Sensor.

Figure 3 is describing the top View and side View of EMG Sensor.

IV. SIMULATION RESULT

All the experimental simulation result is depicted in this section in figure (4-6).

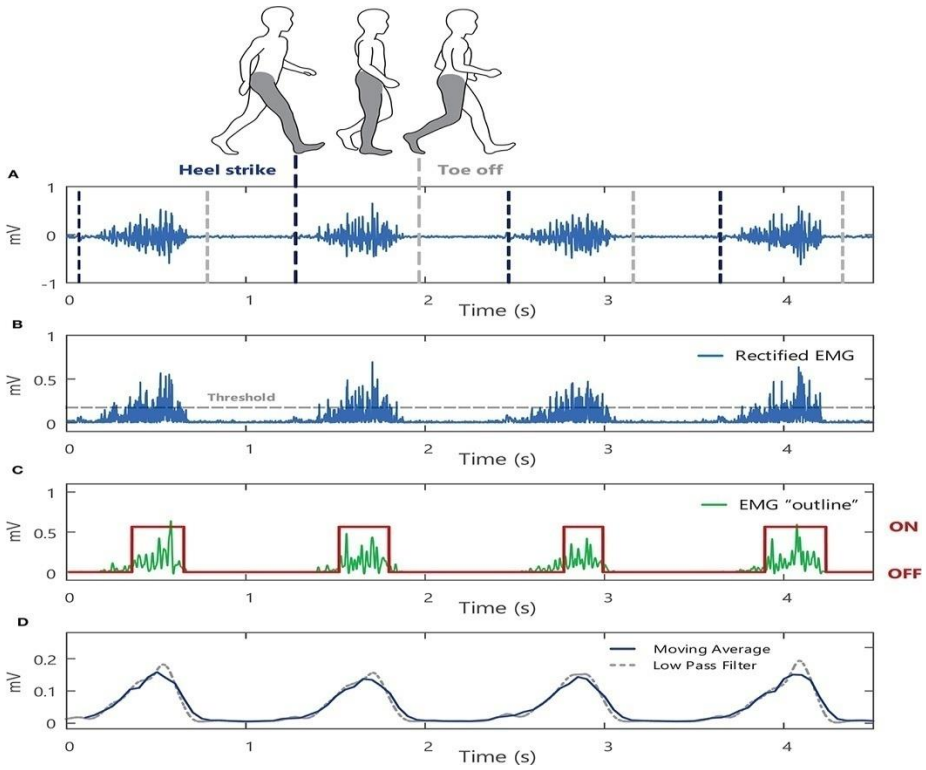

Figure 4 : Recorded EMG signal from a person.

In the above figure 4, the EMG signal is taken from a running person where our proposed design based 'Mini Health Detector' is connected directly to the hand or leg which measure the fatigue of the corresponding muscle. In all the simulation based experimental result, 'X' axis represents the time and 'Y' axis is denoting the voltage. In the last section of the above figure it is clearly observed that the fatigue comes within the muscle for the person who is in running condition.

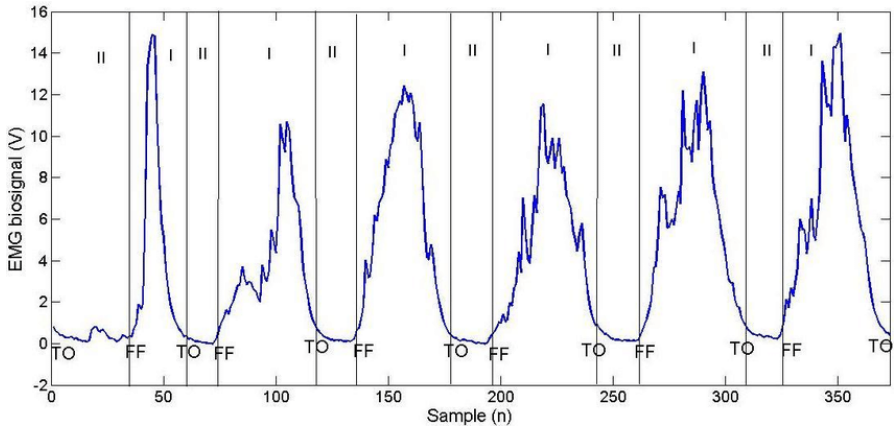

Figure 5: Plot of Sample versus Voltage of Bio-signal.

Figure 5 given above is nothing but the plot of voltages with respect to the sampled version of the bio-signal related to the EMG. From the above diagram it is observed that, peak point comes when the fatigue is maximum. It means impulsive function comes when the fatigue occurs.

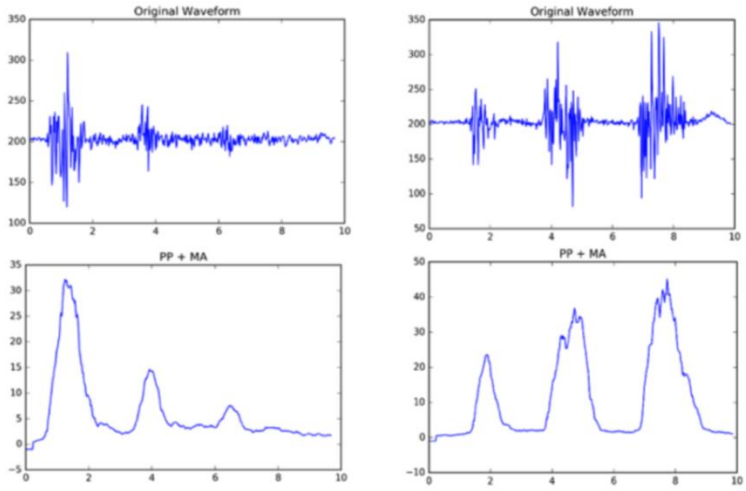

Figure 6 : Plot of Output of Mini health Detector

Figure 6 given above represents the output of our proposed design or mini-health detector. The upper section of the above figure shows the output of the EMG Signal. The lower section of the figure shows the impulse when the maximum peaks occur in the EMG section. It proves the accuracy of our proposed design.

V. CONCLUSION

The entire design is a simplest way to track the fatigue of a human muscle when a person is involving with some dynamic activities. The proposed design is very much helpful for the future research work as its accuracy is very higher. Not only that, the impulsive function in the simulation result shows that the loading effect never occurs when this type of instrument is connected with human being. Finally it can be concluded that, the overall design is much better than the previously used device related to the muscle fatigue detection of human being.

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Design and Implementation of Electronic Infrastructure For Academic Establishment

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Abstract- Most establishments, including academic institutions, undergoes the lengthy process of paper-based document handling such as direct mailing, indexing and tracking. This daily task is time consuming and resource-intensive. Using a private network dedicated for such document management would benefit the establishment increasing operational efficiency. In this paper, the Information and Communication Engineering [ICE] department was used as a model to determine the requirements needed to build the Intranet network. A Packet Tracer simulator was used to build a virtual intranet architecture. Then the simulation report was examined to ensure optimum functionality. Upon establishing a stable behavior, an intranet infrastructure building commenced using the available hardware components and software. The system architecture was based on Windows 2012 R2 server to manage three separated sub-networks connected to three switches and one router. Running the intranet for one semester proved its success in providing a fast, cheap and simplified service for all department needs. The accomplished system is a step forward to achieve a full electronic department in scientific establishments.

Keywords- intranet, computer network, network design, network simulation

I. INTRODUCTION

The manual handling of documents can exhaust the establishment's resources which could be otherwise used in a more productive manner, not to mention the increased possibility for human error, leading to document loss or improper indexing. Moreover, with the numerous usage of email as a communication tool, institutions have turned on themselves to further set of problems. According to the aforementioned motivations, large establishments are gradually detecting the worth of private electronic services, the intranet, in their missions. Additionally using a local network is more secure and less susceptible to such problems (Averweg 2012) (Barraclough et al. 2009). Essentially, the idea of Intranet is introduced to provide the requirement for communication between the workers of an establishment (Boutaba et al. 1997). Intranet is a special purpose computer network that make use of internet protocols and the available technologies to share information and communicate people through the entire connected networks of the same organization. In addition, it is intended for collaborating the activities of the work of all persons involved in that foundation (Rockley 1998).
Formerly, a number of researchers claim to have invented the idiom "intranet" that defines the growth of an internal computer network with client/server mode and based on web technology. However, around 1994, Steve Telleen (an expert in Amdahl Company) introduced the methodology of Intra Network in one of his papers. This idea, then, realized truly in Amdahl's intranet (Telleen 1996). In April 1995, the term of intranet was commercially appeared for the first time in an article, authored by Stephen Lawton (Lawton 1995). Stephen Lawton stated the pioneer international companies that have web pages and utilizing the FTP and TELNET services. Forrester Report (T. Pincince, D. Goodtree 1996) defined the term "full-service intranet" as the internal network that provides the standards-based services: e-mail, print, file, and network management. Netscape Corporation gives more details on this notion and suggests two categories of the full intranet services: network services and user services (Andreessen 1996). Network services fragmented into security, replication, directory, and management. User services involve communication and collaboration, navigation, information sharing and management, and application access. D. F. Dakhlan, et. al. (Dakhlan et al. 2015) designed and implemented an intranet structure for phasor measurement units (PMU). This intranet optimized for analysing the monitored power system stability; but with high delay. Y. Hongyin and Q. Xuelei (Yan & Qi 2011) study the implementation and key technologies of the search engine of an intranet system. They implemented a search engine for intranet depending on Apache Lucene. Experiments show that the system has a good indexing and retrieval efficiency and performance. Y. Gadallah (Gadallah et al. 2015), thought that the IoT (Internet of Thing) can be imagined as a combination of many intranets of Things (ioT). Each (ioT) belong to an association and may contain several applications. He presented a framework for the administration of existing static and mobile wireless sensor network (WSN) applications. There are few scientific literatures on the practice of intranet implementation. In spite of the big number of researches on information systems in establishments exists, approximately all of these researches are involved with methods and structures targeted the software-based management strategies. A little amount of papers and searches methods of Information Systems management linked to implementation. (Averweg 2012)

However, one of the possible Intranet network applications is supporting course related events at academic institutions. In this context, the academic establishments need to address some issues like the information flow and the communication among the staff themselves or between instructors and the students. The current ways of communication (Martínez et al. 2006) had students complaining on the information and communication that they were given. By starting an Intranet containing information about courses such as schedules, syllabuses, exercises etc., among other things, these problem can be mitigated. It is expected that Intranet networks are gradually substituting old conventional mailing systems such as document processing systems and Bulletin Board Systems (BBS). (Kuang et al. 2013) (Lin et al. 2014)

Thus, the aim of this research is to design and implement an intranet infrastructure based on the existing technologies and using the available structure in the Information and Communication Engineering (ICE) department at Baghdad University. The implemented intranet is used to perform most of the administrative activities in the ICE dept. Consequently, by providing the computer based system, less manual labour will be needed and the speed rate of information exchange will increase. Additionally, an easy and secure communication will be achieved.

II. INTRANET REQUIREMENTS AND DESIGN

Probably the briefest definition of an intranet would be the employment of Internet tools to meet the demands of a certain group or organization (Norris et al. 1999). Therefore, the interest in this research encompasses all the academic and administrative issues for course-related events inside the ICE department. These activities can be classified into the following parts:

- Information authoring and sharing,
- Audio / Video (AV) real-time communication,
- Browsing and file/text indexing,
- E-mail,
- Different directories (of staff, courses, students, etc.)

The first step was to gather the requirements and information to find the correct approach to design the intranet network. A plan was then created showing the process and expected challenges and how it can be best tackled. Finally, the packet tracer package will be used to prepare the simulation of the intranet.

The collected requirements of the ICE dept. were:

A) Infrastructure requirements: the intranet service coverage should include the entire three sections of the ICE Dept. These sections are:

1. The long corridor containing the Head of the department, secretary, library, classrooms and instructors' rooms.
2. The laboratories complex (Programming and Networking laboratories).
3. The Electronics and Communications laboratories (located near but in separated building).

B) Students Requirements: includes the updated week course schedule, examination announcements, tutorial sheet manuals, finance and administration affairs related to students, lecture notes, text books … etc.

C) Staff requirements: includes the replacement of most paper-based administration works and the manual transfer of official circulars.

Based on the requirement, the research was divided into three main parts or sub-networks according to the location of the connection as shown in figure (1).

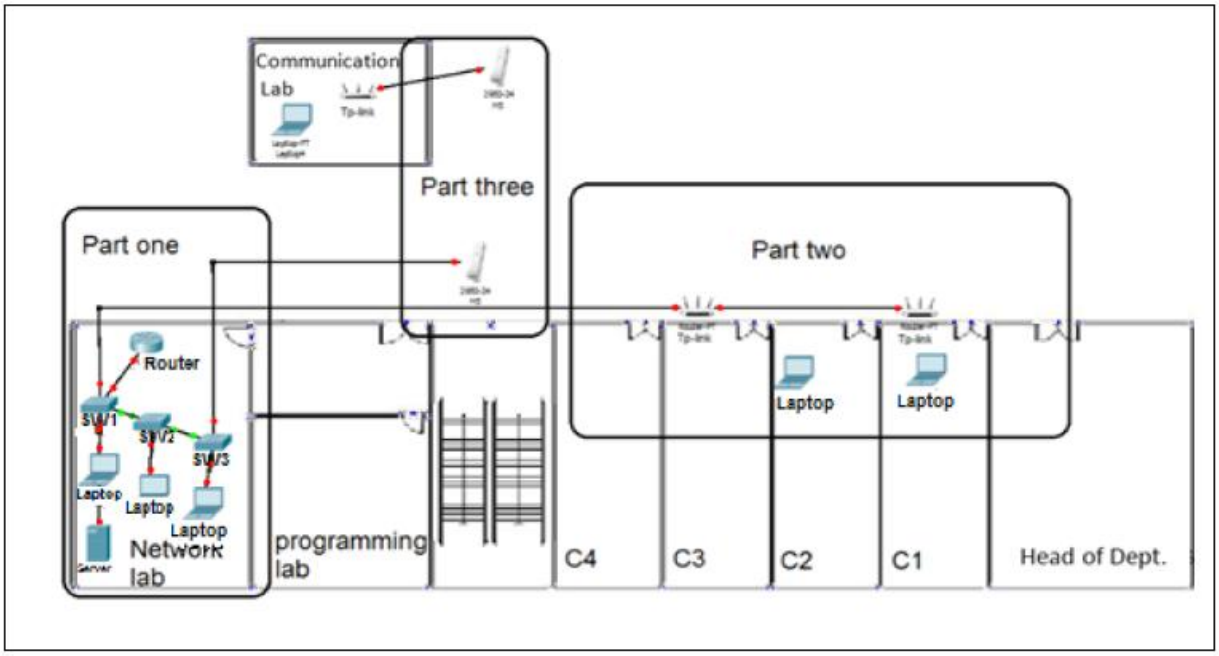


Figure (1): the general architecture of the designed Intranet

The following is an outline of the main parts and sub-networks of the work:

• The first part (Part I) is inside the network lab (it is considered the data center of the Intranet) which has a router, three switchs, laptop as a server, and several laptops as Intranet clients. these devices were connect by Ethernet cables.

• The second part (Part II) is located in pathway of the department. Two TP-Link wireless routers are used to provide coverage of the Intranet services in the pathway and classroom for students, employees, and lecture rooms and offices of the ICE department.

• The third part (Part III) is point-to-point connection to provide the intranet service to the communication lab by using two nano station transceivers.

III. System Simulation

The aim of intranet simulation is the preciseness investigation of all connections, sub-netting and addressing of the planned network. The simulation was also used to test the operation of some intranet services, like email and FTP web page. In addition, the simulator gives an excellent overview of all hardware and software components necessary to fulfill the specified system requirements. Finally, the simulation facilitates discovering the technical problems that may appear in the actual operation of the network.

III.1 Part I:

To achieve the collected intranet requirements, Part I should consist of a central server, three switches and a router. Each switch has been divided into virtual local area networks (VLANS). The purpose of using VLAN is to separate users into individual network segments for security and to provide them with their own virtual network switch. By using this technique, a lot of extra work of giving each user a separate cable for upstream or backhauling between offices were avoided. VLANs, enable us to connect a single interface on the router to a Trunk mode port on each switch, which allows the router to internally route between virtual VLAN interfaces, this is called logical interface. Trunk ports are also used to link between switches.

The following steps are used to set up the VLANs and to automate the process of propagating the VLAN information among the CISCO switches. The command line interface of the switch was utilized to enter the following code:

```
Switch>enable
Switch#configure terminal
Switch(config)#vlan VLAN-ID
Switch(config-vlan)#name VLAN-NAME
Switch(config-vlan)#end
```

Each VLAN must have IP address, which is given by using this code:

```
Switch(config)#int vlan VLAN-ID
Switch(config-if)#ip add VLAN-IP VLAN-SUBNET MASK
```

Although VLANs operate on layer 2, passing traffic from one VLAN to another VLAN involves the use of a Layer 3 router. To setup the logical interface in the router, the following code which is written in the command line interface of the router:

```
ISR(config)#int f0/0
```

ISR(config-if)#ip address IP SUBNET MASK
ISR(config-if)#no shutdown
ISR(config-if)#int f0/0.VLAN-ID
ISR(config-subif)#encapsulation dot1q VLAN-ID
ISR(config-subif)#ip address IP SUBNET MASK
Trunk port configuration in a switch:
Switch>enable
Switch#configure terminal
Switch (config)#int NUMBER OF INTERFACE
Switch (config-if)#switchport mode trunk
The next step is setting up the IP configuration for each laptop. This network has a private IP because it is an intranet network. For now, the required is only 23 hosts for each VLAN. To cope with the demand of possible future expansion of the ICE department, class C addressing was used, which provides 254 hosts. The remaining IP addresses can be used in the future to provide the service to more users. Figure 2 shows the IP configuration process.

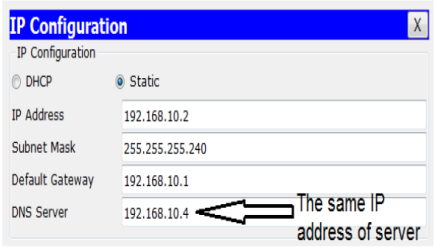


Figure (2): IP addresses given for PCs

These configurations were used for each laptop but with different IP address and different VLAN which depends on the location of each laptop. the same DNS IP address in the configuration was written for all the laptops in the network. Part I was finished by setting VLANs, trunks for the switch and logical interface for the router. Figure 3 shows the final design of part I (data center); and each laptop was labeled with its IP address.

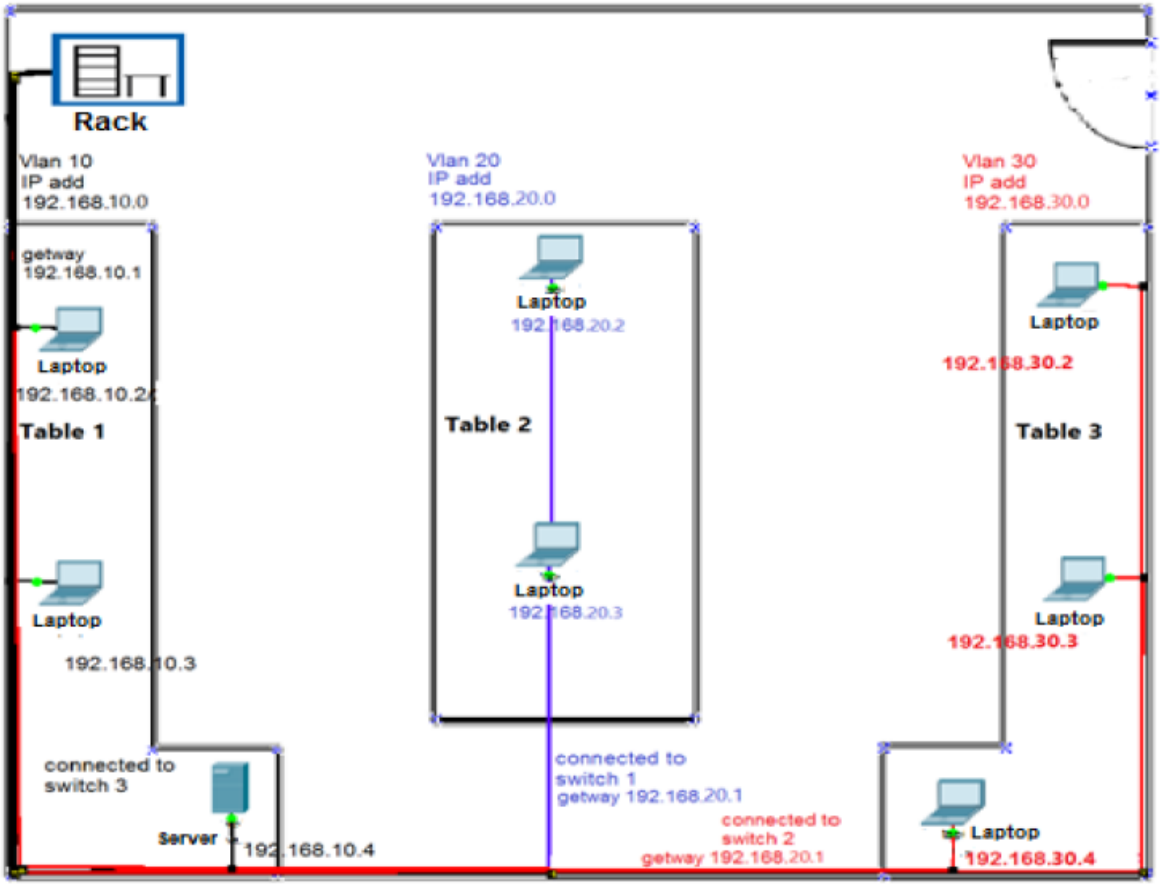
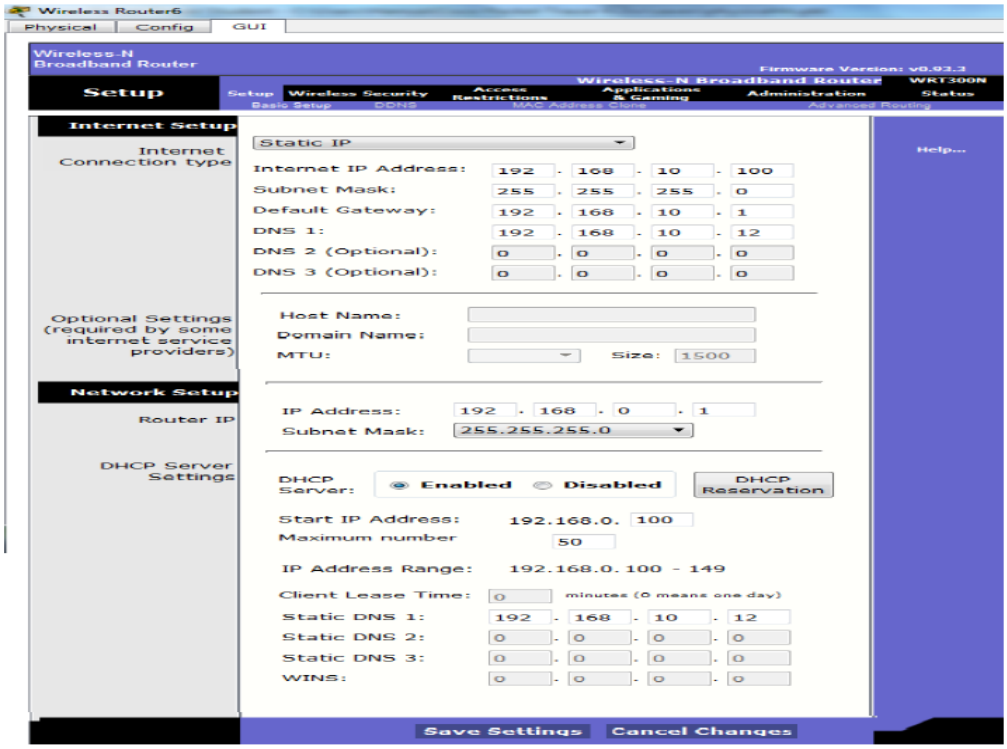


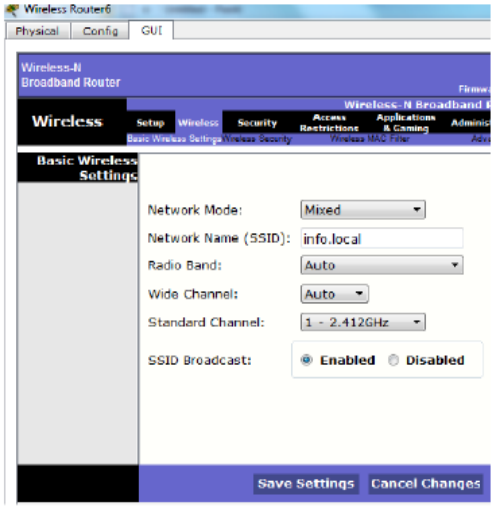
Figure (3): the Network lab (Part I) design

III.2 Part II :

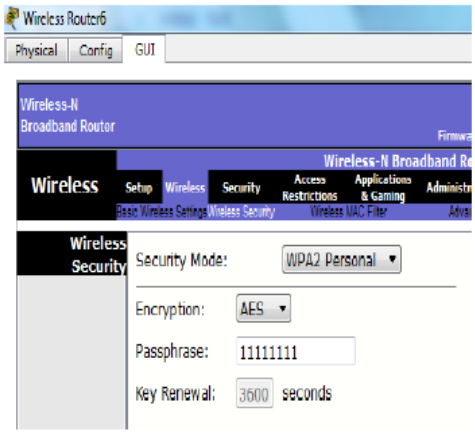
This part provides the service to the users in the pathway and offices, a wireless router is connected to the switch VLAN10 which is located in the data center (the Network lab in part I). The router was configured as a DHCP server in order to provide all clients with an IP address. A cable is connected from VLAN10 switch port to the internet port of the wireless router. Then, another wireless router was used to extend the wireless coverage for more users in the area as an access point. The two wireless routers were conneced by using an Ethernet cable; connected from the Ethernet port of the first wireless router to the internet port of the second wireless router. The IP addresses range is 192.168.1.100 to 192.168.1.149. The DNS was configured to be 192.168.10.12. Finally, the wireless network was renamed to be (info.local) and password was set. The configuration steps for the wireless router are shown in figure 4.



Basic setup



Basic wireless setting



Wireless security

Figure (4) the wireless router setting

III.3 Part III :

This part provides the intranet service to the communication lab by using two Ubiquiti NanoStation's transceivers connected using point-to-point topology. One of the NanoStations was connected to the VLAN10 switch by using Ethernet Cable. This NanoStation was configured to be an access point. The other NanoStation, which is located at the communication lab building, is configured as a station to communicate with the access point. Then, the station was connected to a wireless router to provide a wireless covarge to the communications lab. The station is connected to the router using the LAN port in order to use the same Network ID of the VLAN10. In this wireless router, the DHCP and DNS configurations are similar to that configurations used in the first wireless router (in Part II).

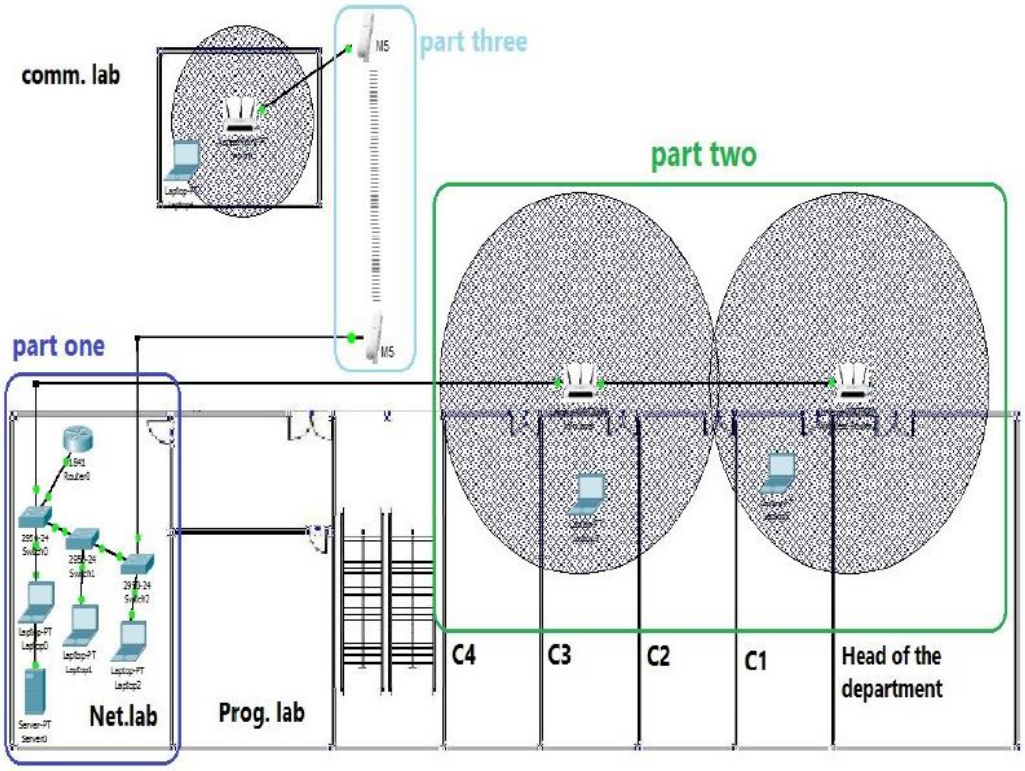


Figure (5): The final design for the simulated intranet in ICE department.

IV. SYSTEM IMPLEMENTATION

The IV.1 System Setup

As has been mentioned in the previous section, the work was divided into three main parts. The first part is the intranet core. The second part is the lecture rooms and the offices. The third part is the communication lab. Below is a brief explanation of the implementation of each part

A. The Implementation of the Intranet Core (Part I): The intranet core is the data center, which is located in the network lab at ICE dept. This data center consists of: one server, three switches, one router, Ethernet cables, and twenty-three laptops, as shown in figure 6. The work started by setting and installing the network. Three Cisco 2950 switches that have twenty-four ports on each one of them was connected. Each switch was divided into three VLANS (VLAN10, VLAN20, and VLAN30). Then, the server and all the laptops were connected to the three switches by using the Ethernet cable. The switches were connected to each other by a cross cable using the trunk mode port. One of the switches is connected to 2821 Cisco Router by using the sub interface.

B. The implementation of the Lecture rooms and the offices (Part II): In this part, A TP-Link router was connected to the VLAN10 by using Ethernet cable. Then, a second TP-Link router was connected to the first router using Ethernet cable too.

.

Figure (6) intranet installation of data center (Part I)

C. The implementation of the communication lab (Part III): a NanoStation was also connected to the VLAN10 using an Ethernet cable. This NanoStation was linked wirelessly to other NanoStation located at the communication lab building using point-to-point mode. Then, the second NanoStation was joined to a wireless TP-Link router using an Ethernet cable.

IV.2 Software Setting and Programming

In this subsection, the software installation and the programming that were applied to the intranet hardware; namely, to the server, Cisco router, Cisco switches, TP-Link router, NanoStation, and clients' laptops are clarified here. In the following subdivisions, the programming of each one of the hardware are listed briefly.

A. The Cisco Router Catalyst 2821

Before the operation of the intranet, the router was configured using the flowchart shown in fig 8.

B. The Cisco Switches Catalyst 2950

Like the router, the switch was configured using the flowchart shown in fig 9. The configurations of the second and third switches are similar to the first switch but with changing the range of IP addresses attached to interfaces for each VLAN.

C. The TP-Link WR941N wireless router

As explained previously in section IV.1, the implementation consists of three TP-Link wireless routers; two of them are in the ICE dept. corridor (part II) and the third is located in the communications lab (part III). Each wireless router was prepared as in the following:

C.1- The default IP address replaced by a suitable one; such that it matches the sub-netting of intranet switches.

C.2- The DHCP service was enabled, and the range of IP addresses offered by each router was precisely inserted.

C.3- The IP address of the primary and secondary name servers of DNS service were set.

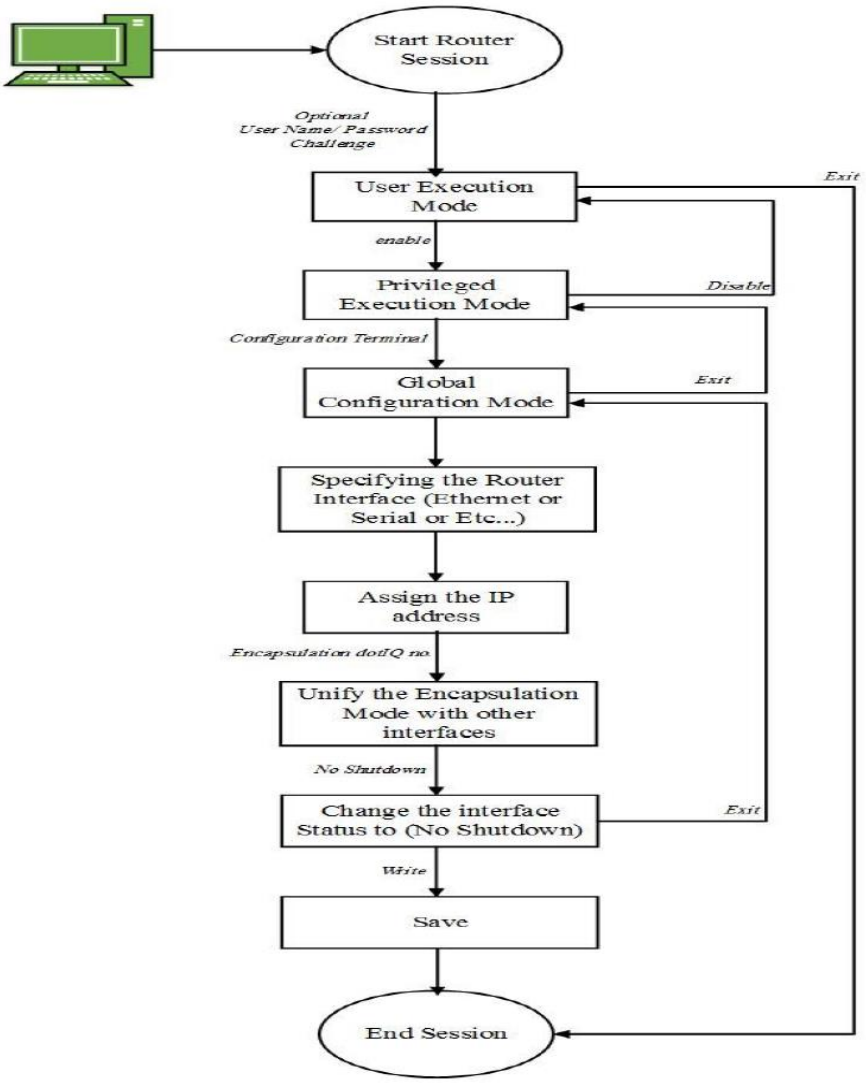


Figure 8 Router configuration flow chart

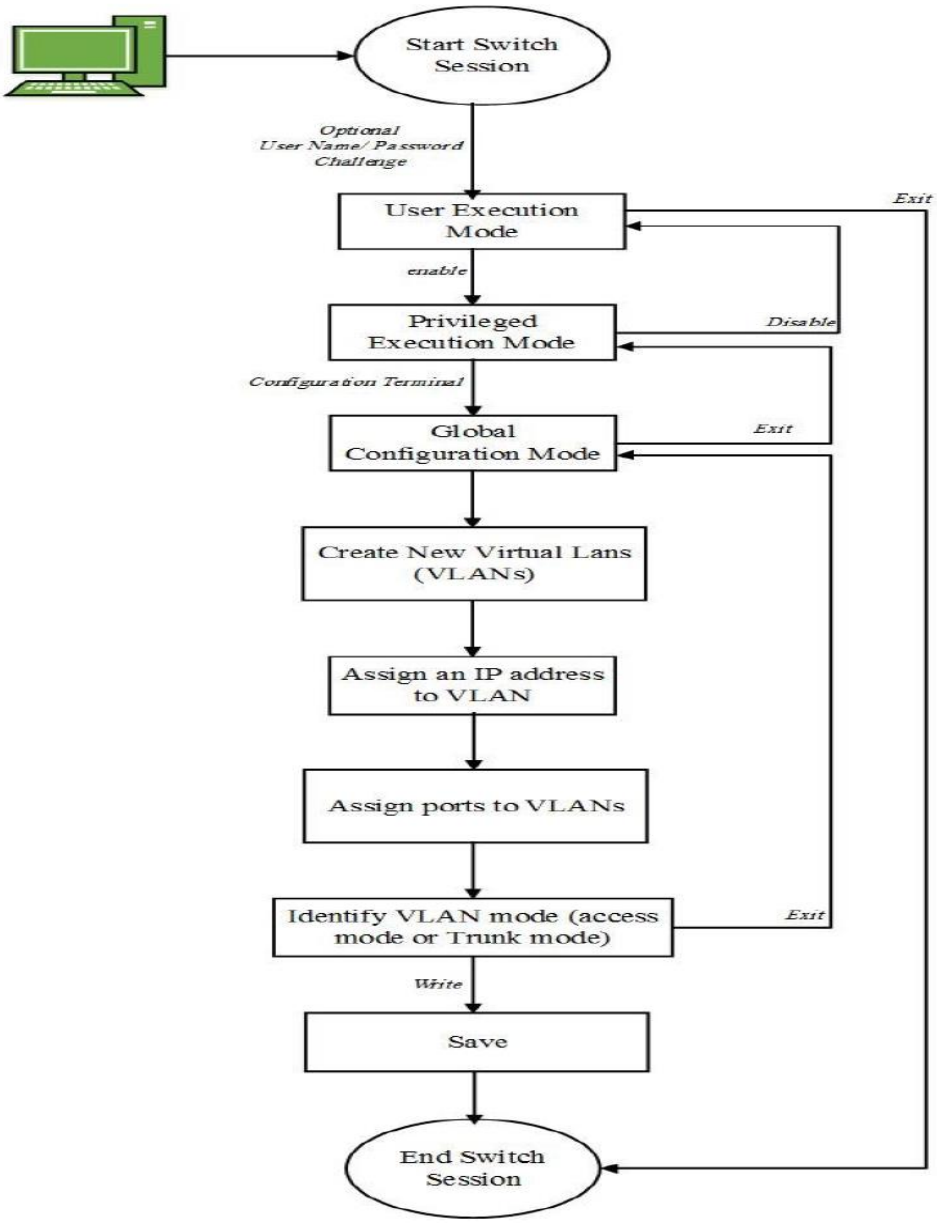


Figure 9 Switch configuration flow chart

C.4- Setting the default gateway IP address to coincide with the ICE dept. ISP gateway.
C.5- Defining the SSID (Service Set IDentifier) network name to be info.local.
Due to space limitations, only some of the configuration steps of one of the three devices are shown in figure 10.

Figure (10) some of the configuration steps of TP-Link router

D. The NanoStations M5

The first step was installing the two NanoStations at the roofs of the network lab building and the communications lab building. The mode of the first NanoStations was configured as an access point; whereas the second as a station with bridge network mode for both devices. The SSID of both NanoStations were changed to info.comm to distinguish it from indoor network (info.local). The IP addresses of both NanoStations were selected to be static IP 192.168.10.50 which matches the intranet switch sub-netting. Figure 11 summarizes the NanoStations configuration of the wireless station when linked to the access point.

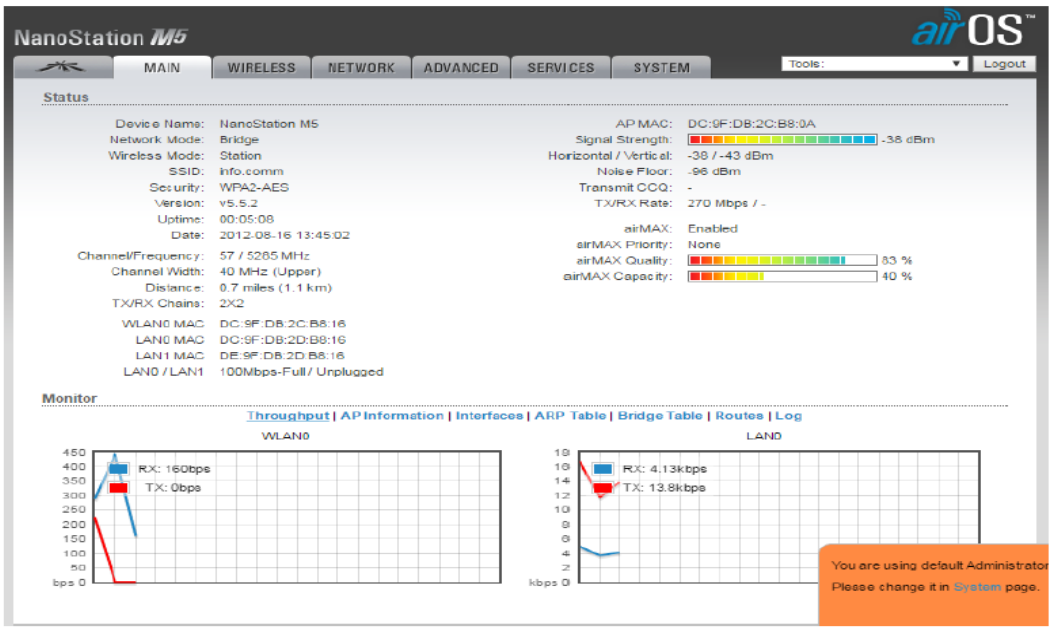


Figure (11) status of connecting the two NanoStations

E. The Intranet Server

The server computer of the implemented intranet is located in the network lab. (Part I). Windows server 2012R2 is used as a platform. The services enabled in this network were:

E.1 HTTP service: the HTTP service is needed for providing the web page of the intranet. This ICE dept. web site was built as part of the intranet work and it will be displayed in any client as soon as requested by its URL.

E.2 DNS service: DNS server is enabled for the intranet web server (local.info) such that the clients can reach the ICE web site using name domain instead of IP address.

E.3 Mail service: mail server is enabled and the Microsoft Outlook software is used as a platform. After that, the domain name of the mail was inserted to the server (mail.info.local) and then added (this mail domain and its IP address) to the DNS server so it can be resolved easily. Then, an email account in the server (user name and password) has been created for each user.

E.4 FTP service: the FTP server is enabled by adding a name and password for the account that will be shared to the users. Only the authorized users can upload files. FTP service is used for providing lecture notes, text books, laboratory manuals …etc., for students.

E.5 The Active Directory Domain service (ADDS) is very important to administrate the users and distribute roles for each network member. ADDS in Windows 2012 R2 is very complicated and exhaustive. However, it is used in this work to create intranet users and classify them into four groups: Students, Lectures, Employers and administrator. Each group given the suitable role through certain authorization procedure such that the requirements stated in section 2 were fulfilled. All Intranet users are given a username and password, and inserted in the ADDS. Then, the students in each studying stage rearranged into small sub-groups under the Student Group. Some of configuration steps are shown in figures 12 and 13. In this extent, the ADDS advanced tool called "Group Policy Management" is employed to manage the role for each group and sub-group, as shown in figure 14.

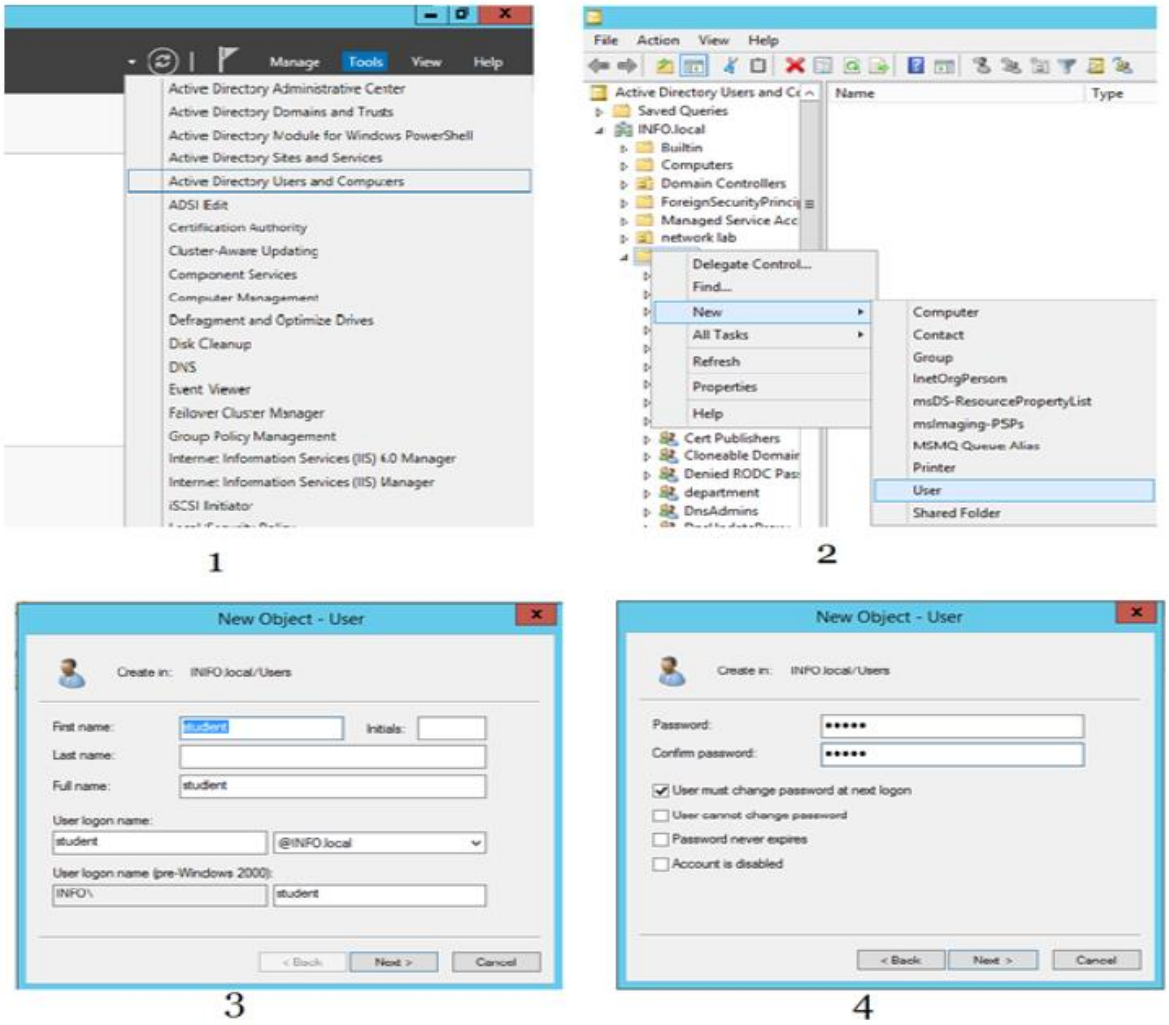


Figure (12) steps of creating users

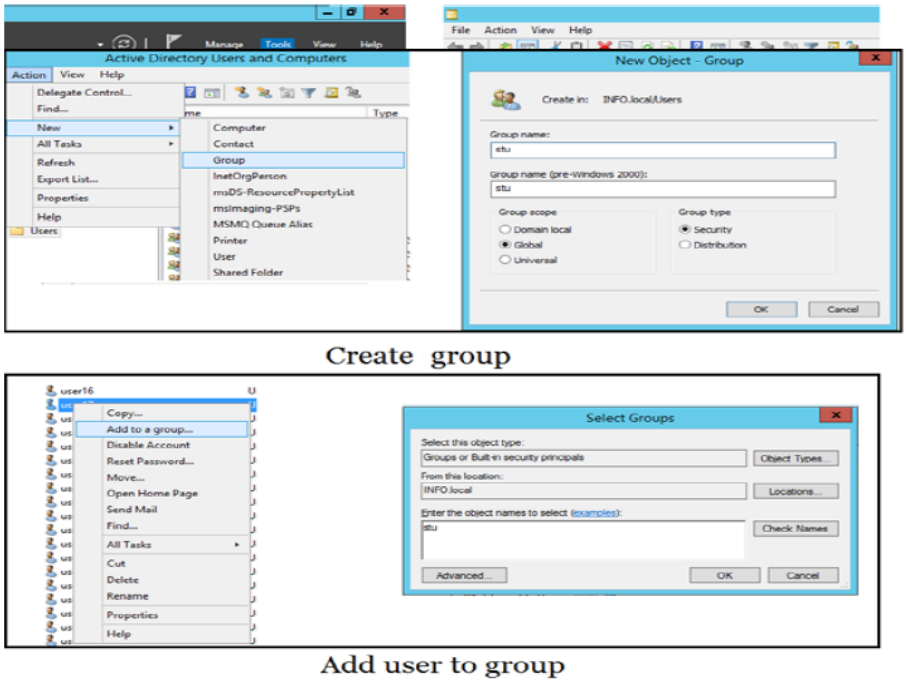


Figure (13) steps of creating groups

V. Discussion and Conclusions

The implemented intranet was operating for one semester through which the network proved its resilience, high availability and simplified service for all department members. During operation, the network had the capability of integrating devices and processes with people to ensure a highly efficient and sustainable use of resources. Using off-the-shelf equipment available at the department's stock resulted in making an affordable and simple solution. The network was capable of combining and indexing all types of information (internal and external) in one unified and accessible portal for increased ease of use.

Furthermore, the intranet proved to be a quicker information retrieval tool than the use of conventional methods. With effective search engines and its flexible management tools, users were able to quickly manipulate significant amounts of data avoiding long paper-based processes of indexing and listing. Sensitive information and circulars can be circulated instantly and securely, and a prompt feedback can be requested speeding up the process. Consequently, reaching highly optimal use of resources, which is one step closer to achieve the department's vision of creating a fully-fledged electronic department [E-Department]. However, the implemented scheme in this research is a preliminary model; hence, there is a lot of opportunities for enhancement to be able to meet any future requirements creating a future-proof and reliable intranet.

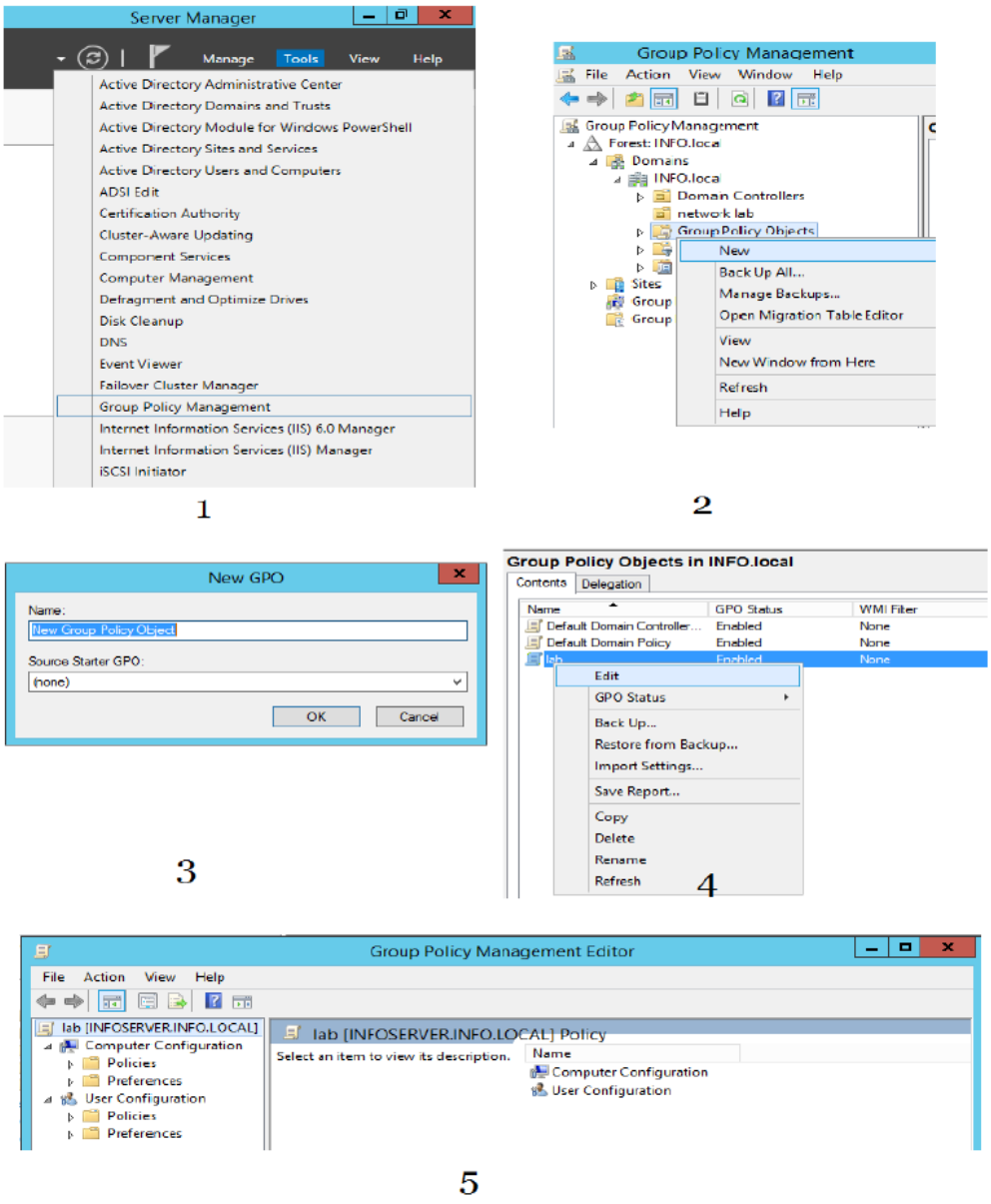


Figure (14) creating and editing group policy

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Tutorial for Designing Webpage using HTML and JAVASCRIPT

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Abstract- This is a tutorial paper where the author has shown some techniques for webpage development. In this tutorial paper, HTML and JAVASCRIPT code has been shown to design the webpage.

Keywords- HTML, JAVASCRIPT

I. INTRODUCTION

There are so many tutorials for developing webpage using HTML, CSS and JAVASCRIPT. Now a days, there are many technologies related to webpage development. But here the author has tried to develop some idea about the webpage development lucidly in this paper.

II. HTML SCRIPT FOR WEBPAGE DEVELOPMENT

For webpage development, HTML is the key language which means Hyper Text Markup Language which is a simple script for webpage development. In every web document, there are some headings which can be easily designed using HTML. HTML script can be written using visual studio code window or in a simple text window. The following codes can be written to design the blank webpage.

<!DOCTYPE HTML>
<html>

</html>

When the user wants to save the document then he or she must save it by "file_name.html" and file type must be selected as "All files". Fig. 1 shows the blank webpage.

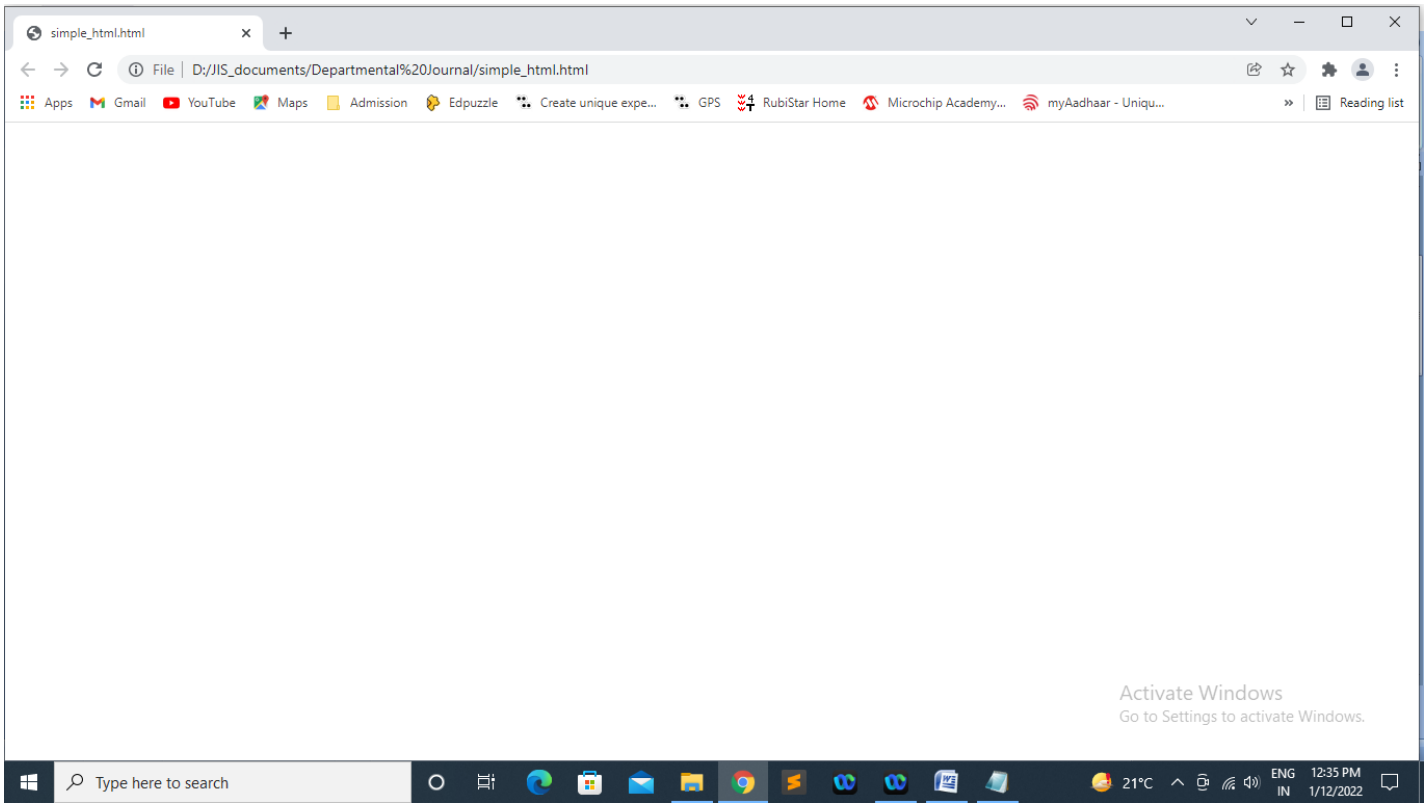

Fig. 1 Blank webpage

In html document, there is a "<head></head>" tag where page title and also page style can be set. To write the page title, title should be written in the "<title></title>" tag which exists in the "<head></head>" tag. The following codes can be written to set the page title.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
</head>
</html>
```

Fig. 2 shows the page title which replaces the file name.

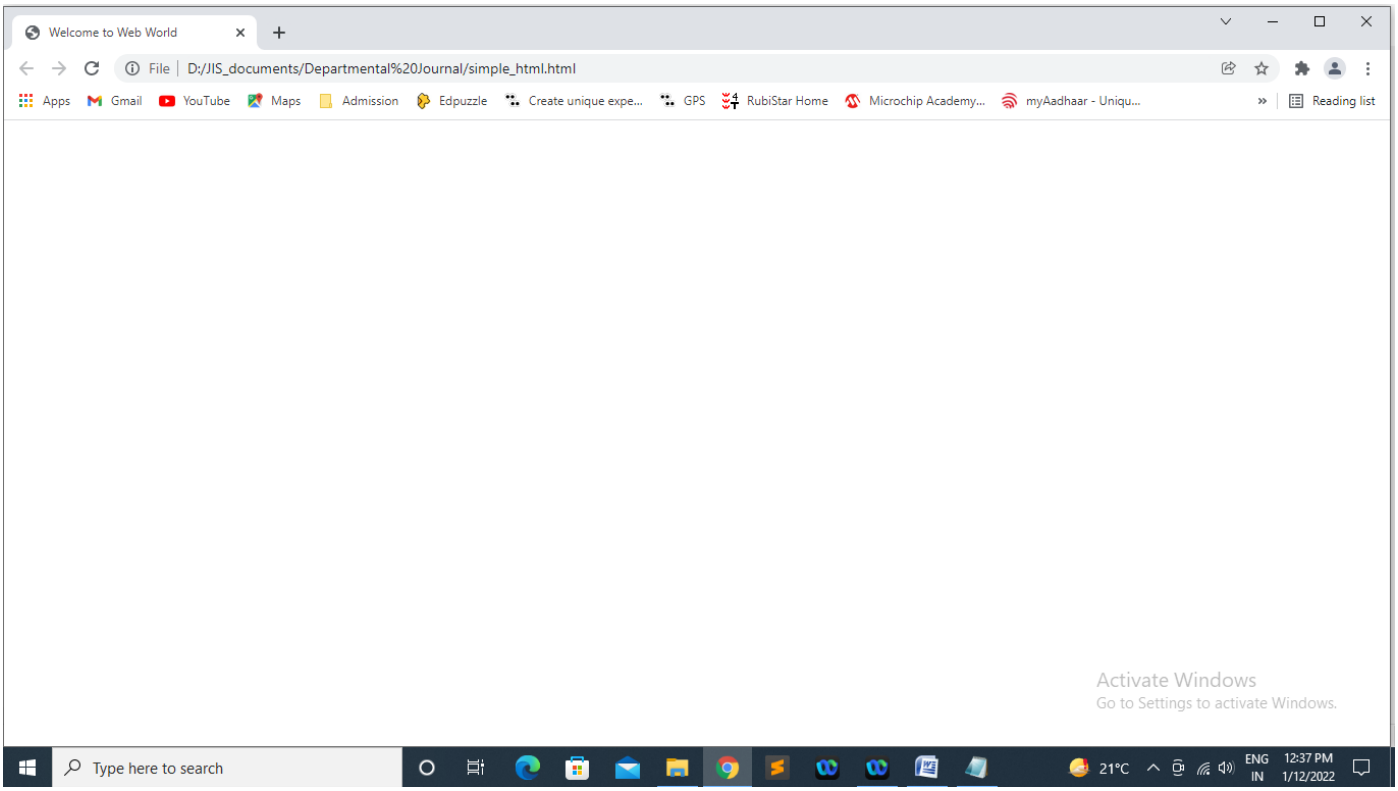

Fig. 2 Setting page title

The main script for designing the web page is written in the "<body></body>" tag. In the body tag, First heading can be written with the help of "<h1></h1>" tag. The following code is for the first heading the body of the web page.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
</head>
<body>
<h1>HTML TUTORIAL</h1>
</body>
</html>
```

Fig. 3 shows the first heading in the webpage.

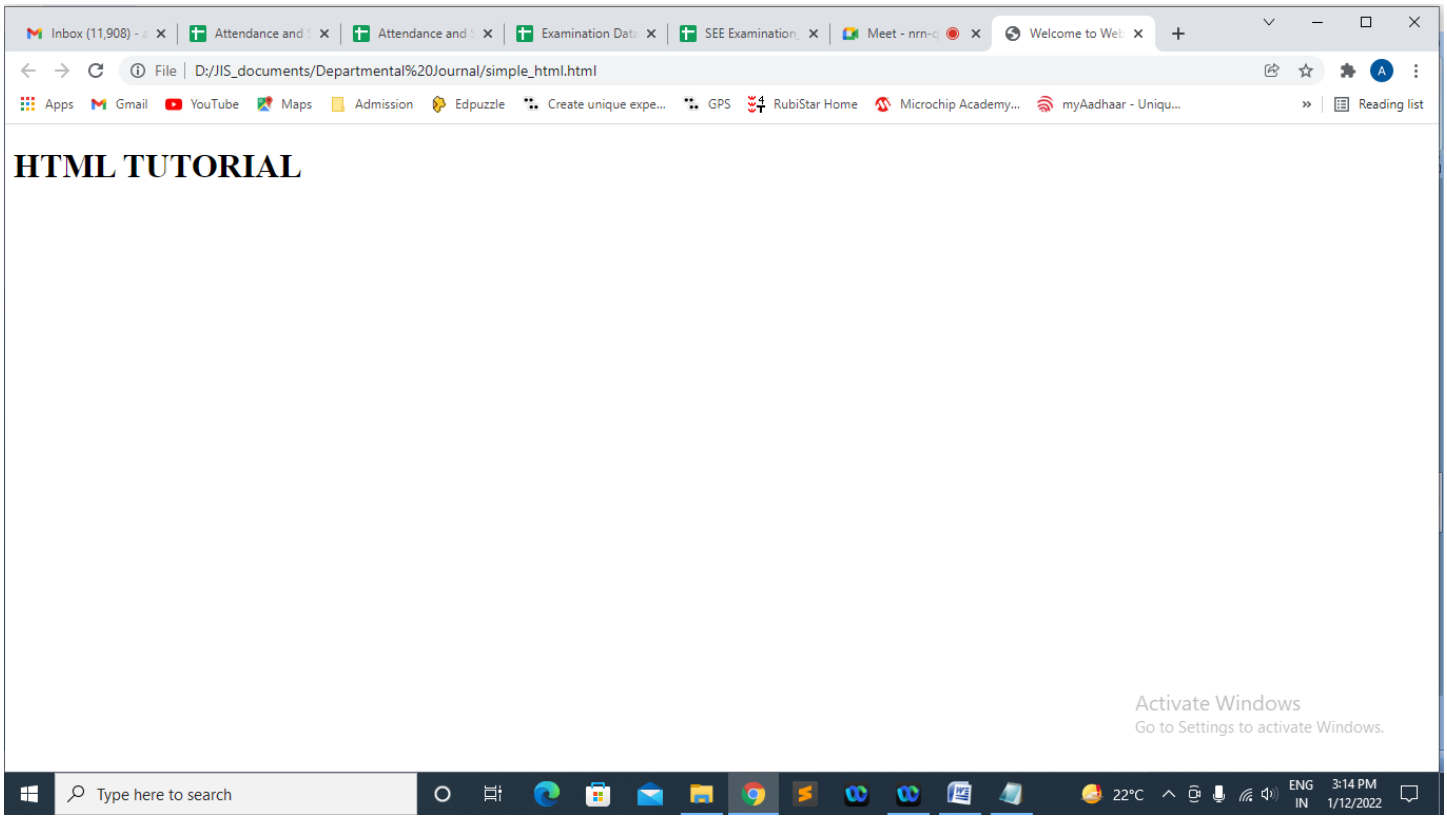

Fig. 3 Setting the first heading in the web page

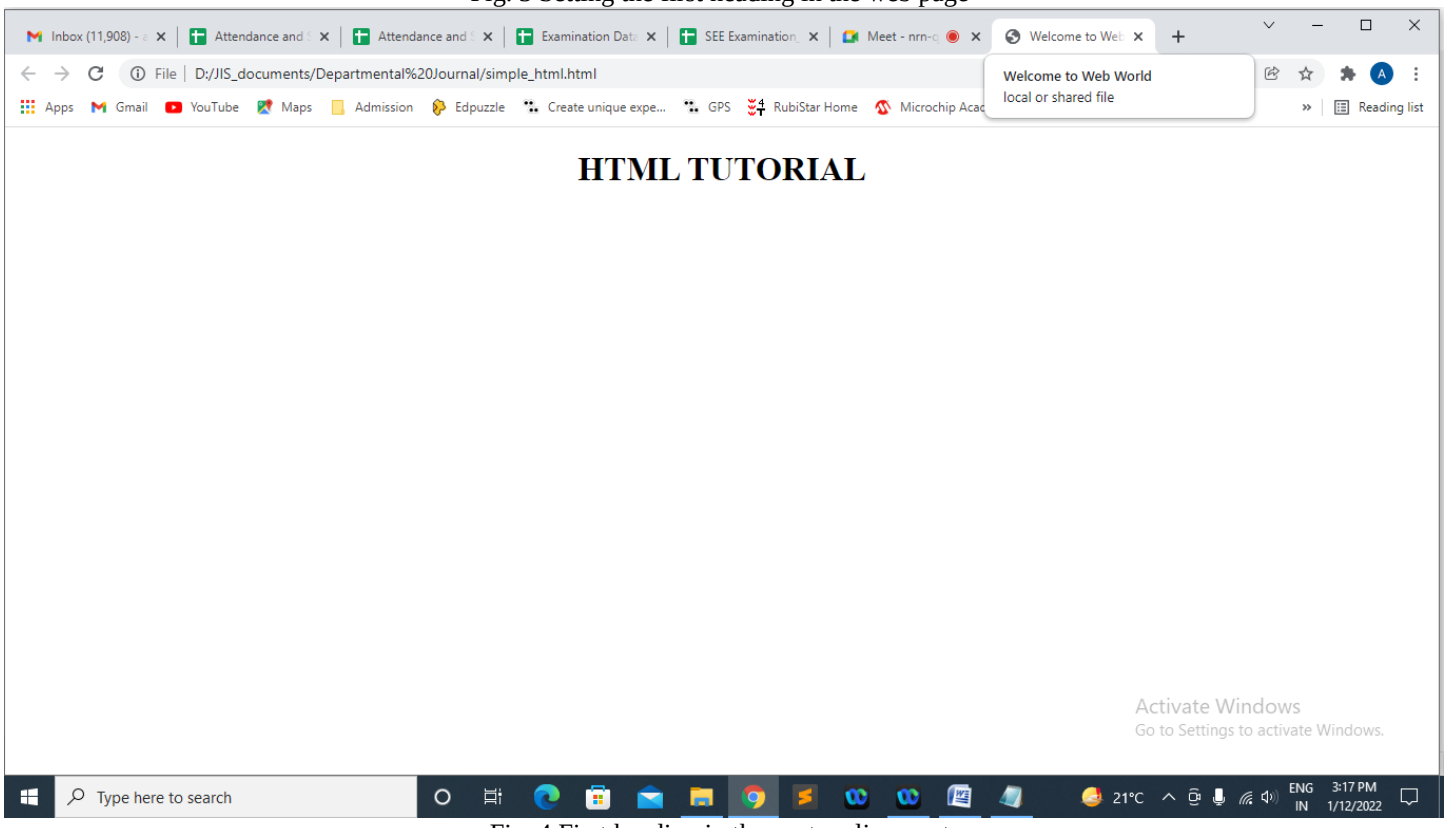

Fig. 4 First heading in the center alignment

To set the first heading centrally aligned, in the “<h1></h1>” tag, style=”text-align:center;” is written in the “<h1>” tag. To set the background color of the page, in the “<head></head>” tag, a “<style></style>” tag can be created where the body properties can be changed. The following code changes the body color.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
    }
</style>
</head>
<body>
<h1 style="text-align:center;">HTML TUTORIAL</h1>
</body>
</html>
```

Fig. 4 shows the change in the body color.

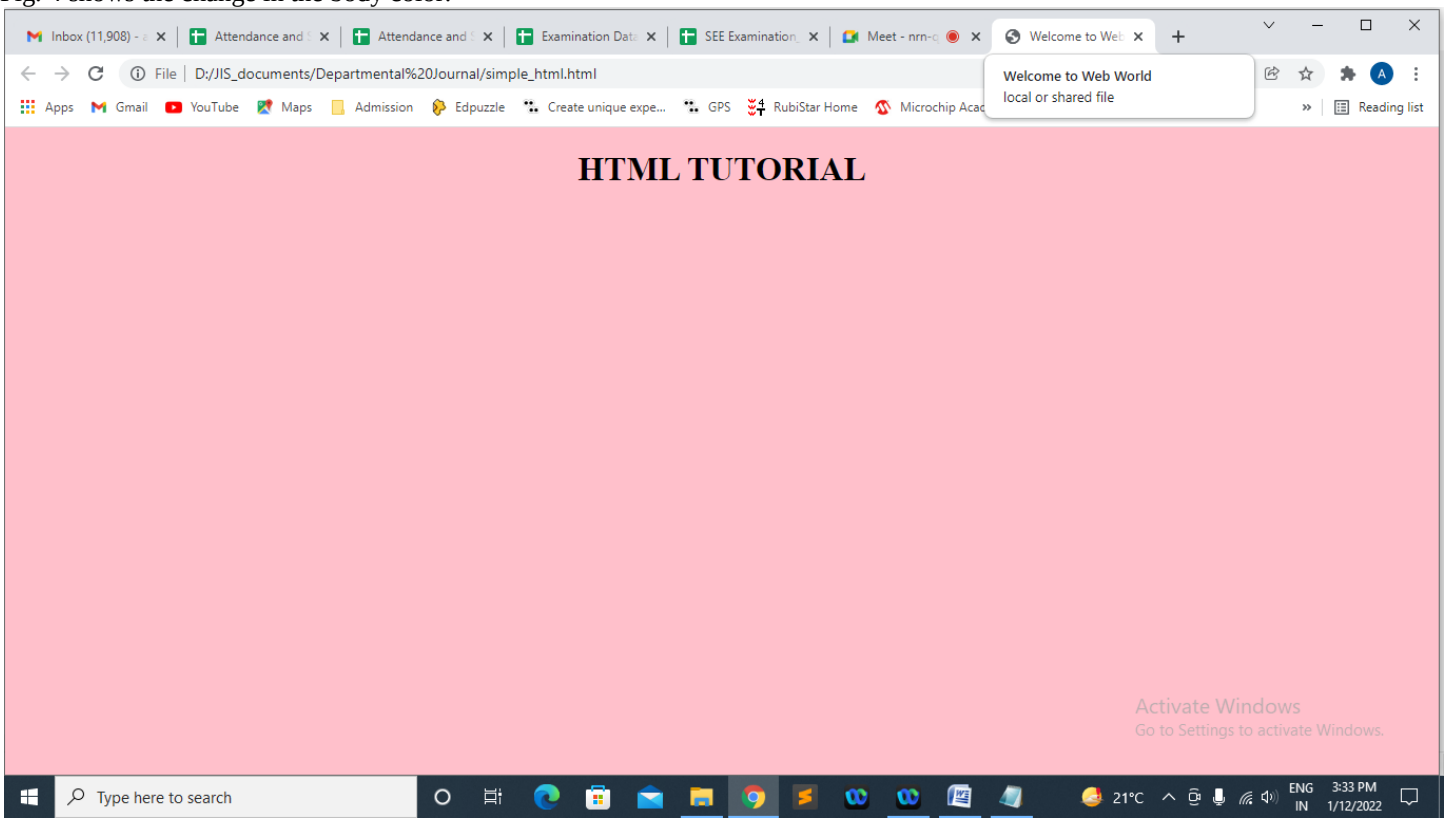

Fig. 5 Changing body color

If the first heading color is required to change then in the "<h1>" tag in the "style" property "color:color name;" is to be given. The following code shows the color change of the first heading.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
    }
</style>
</head>
<body>
<h1 style="text-align:center;color:blue;">HTML TUTORIAL</h1>
</body>
</html>
```

Fig. 6 shows the change of heading color that is the text color.

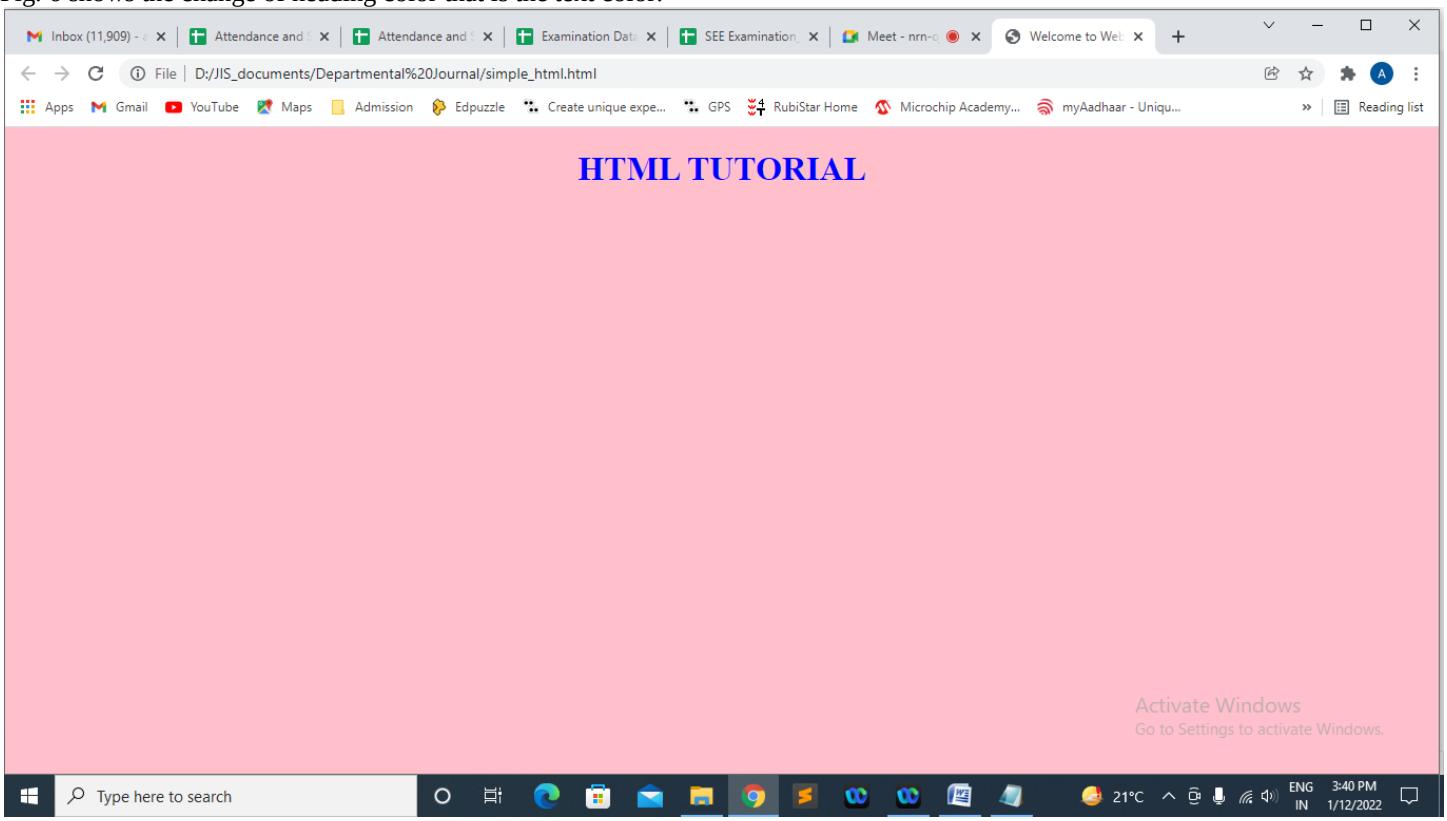

Fig. 6 Changing heading color

III. WIDGET CREATION USING HTML AND JAVASCRIPT

In the earlier section simple web page development has been shown. Now in this section, creation of widgets like label, text box, combobox etc. is shown. Let us start with the creation of label.

Label creation: The following codes can be written to create a label.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
   }
</style>
</head>
<body>
<h1 style="text-align:center;color:blue;">HTML TUTORIAL</h1>
<label><b>Enter Your Name</b></label>
</body>
</html>
```

To create a label, “<label></label>” tag is used and to make the label text in bold font, the label text is written in “” tag. Fig. 7 shows the creation of a label.

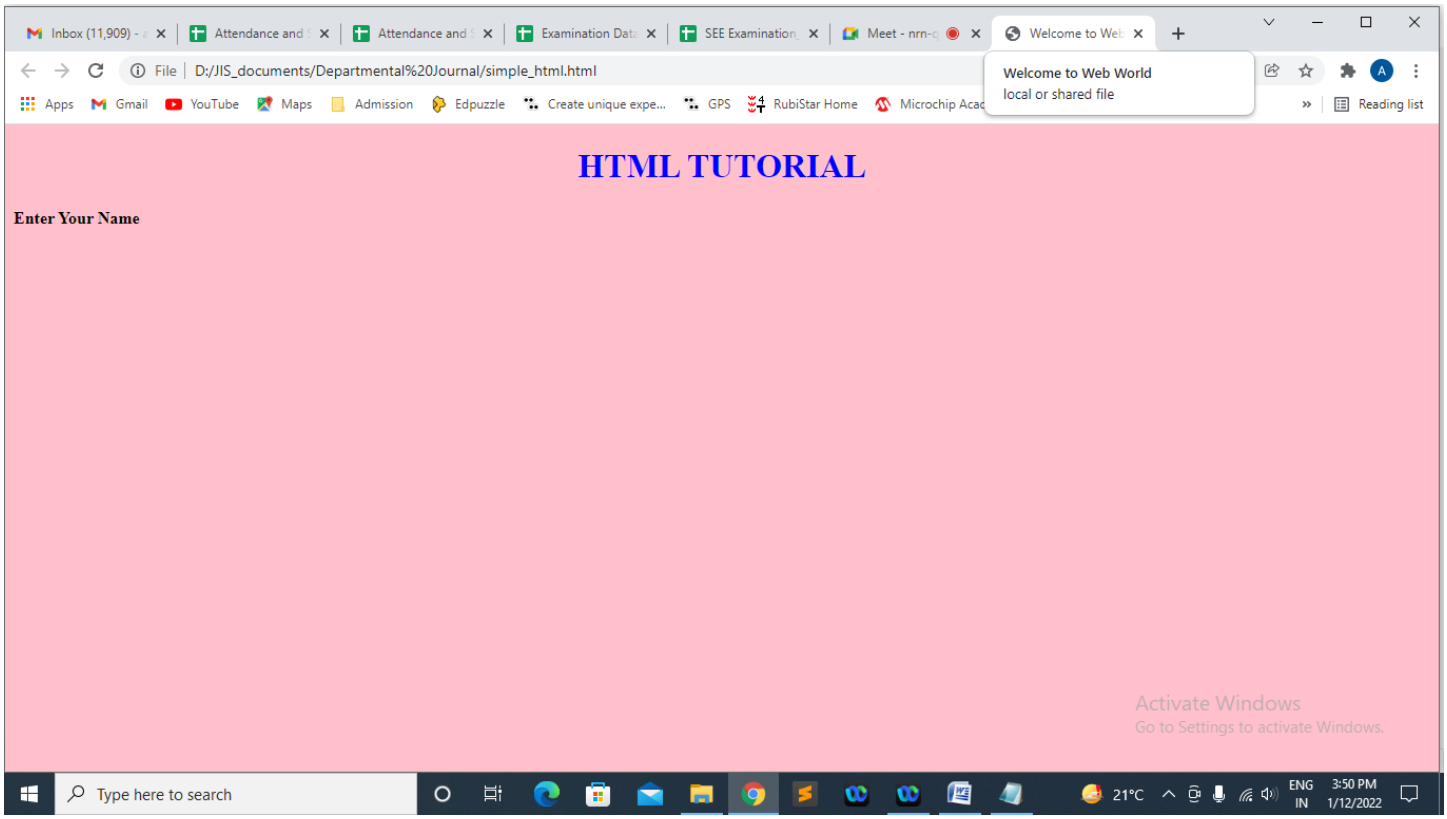

Fig. 7 Label creation

Text-Box Creation: For text-box creation, "***<input type="text" id="txt">***" is written. To create password, put ***type="password"***. Figs. 8 and 9 show the creation of text-box and password text-box respectively.

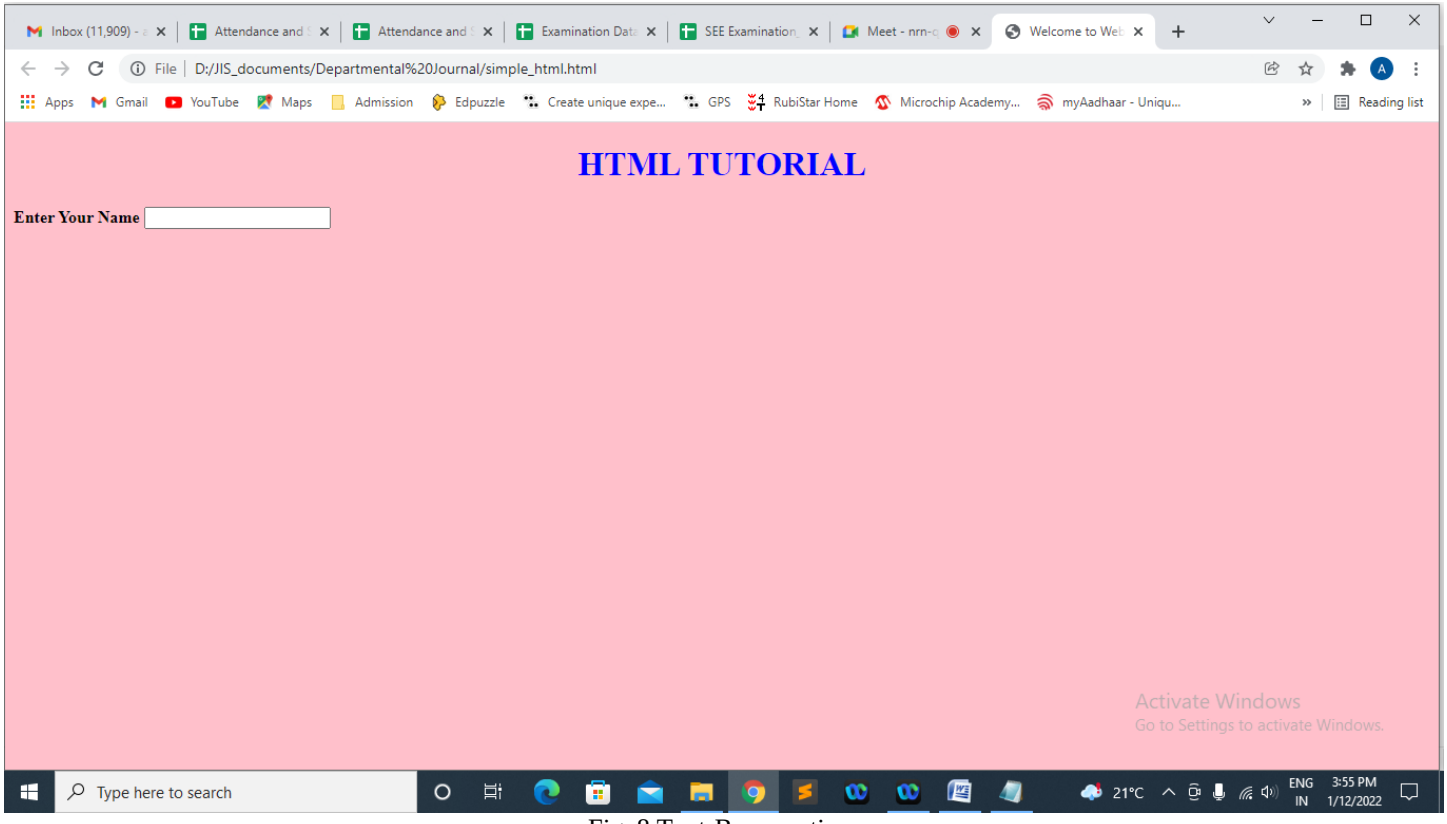

Fig. 8 Text-Box creation

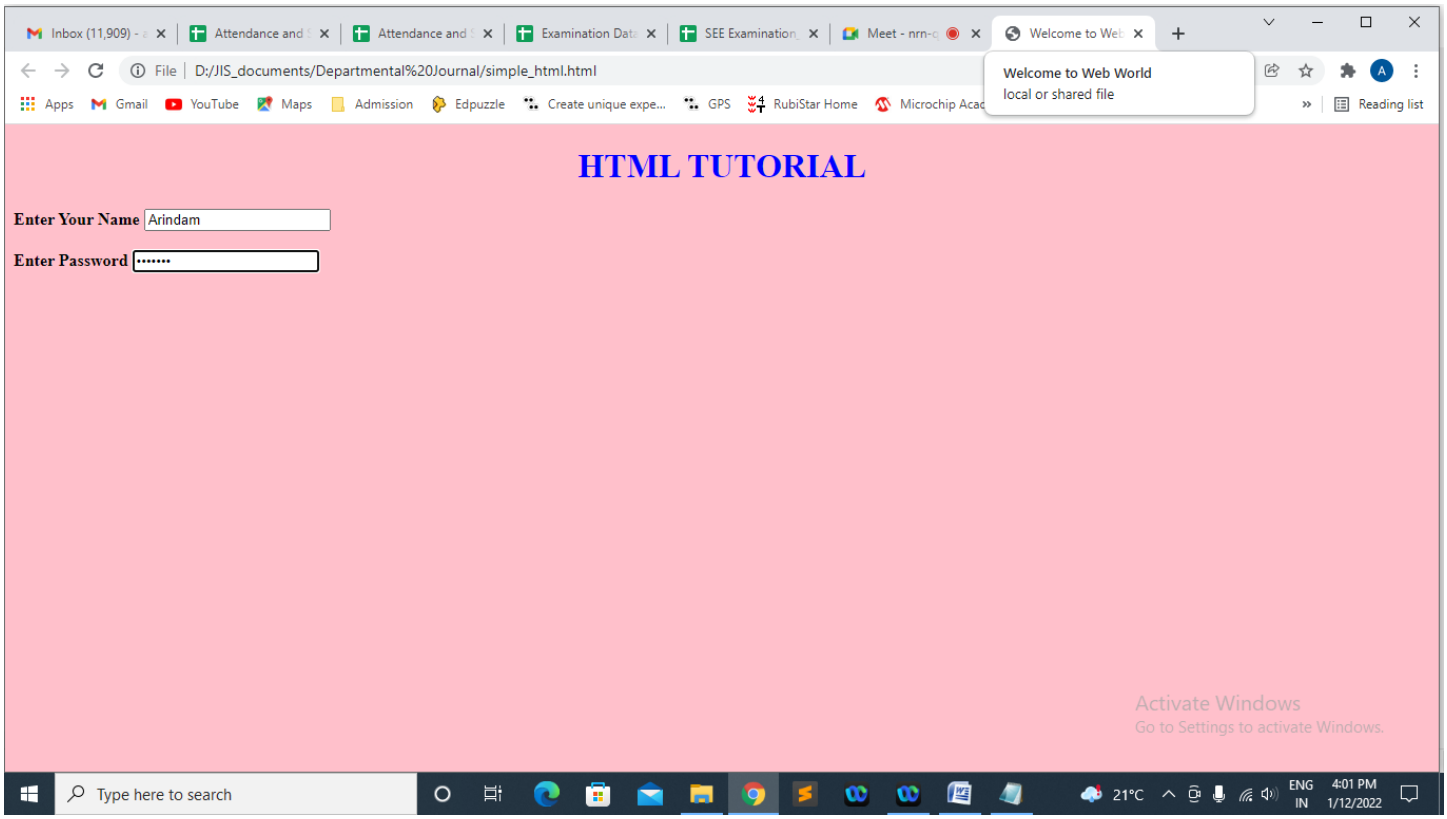

Fig. 9 Text-box for password creation

Button Creation: To create a button, "<button></button>" tag can be used. "id" property is used to identify the widget globally for required change in the property. Like here the button color has been changed using the "id" property in the "head" tag. Fig. 10 shows the creation of button in the web page.

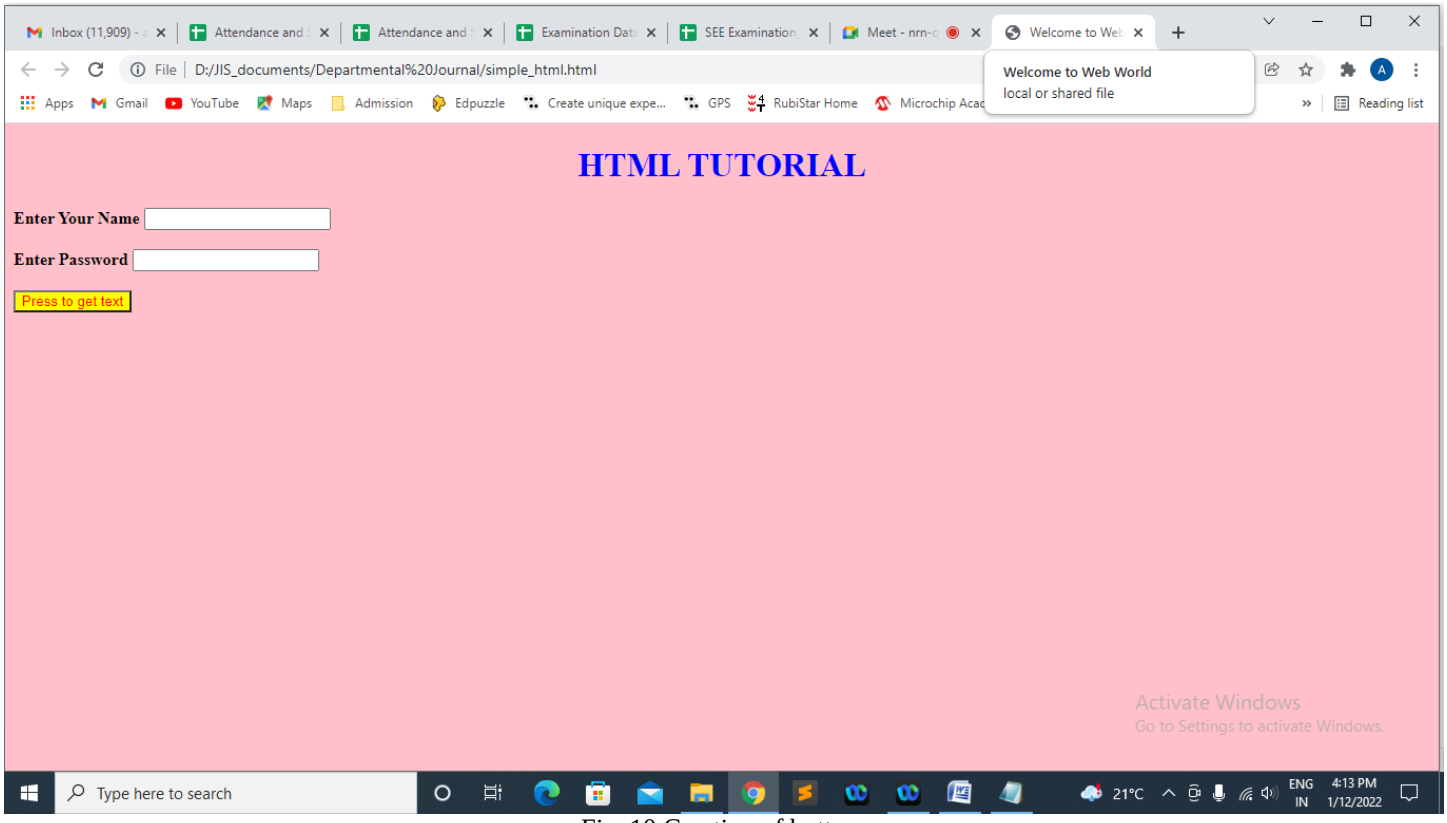

Fig. 10 Creation of button

Creation of Paragraph: A paragraph can be created using " " tag.

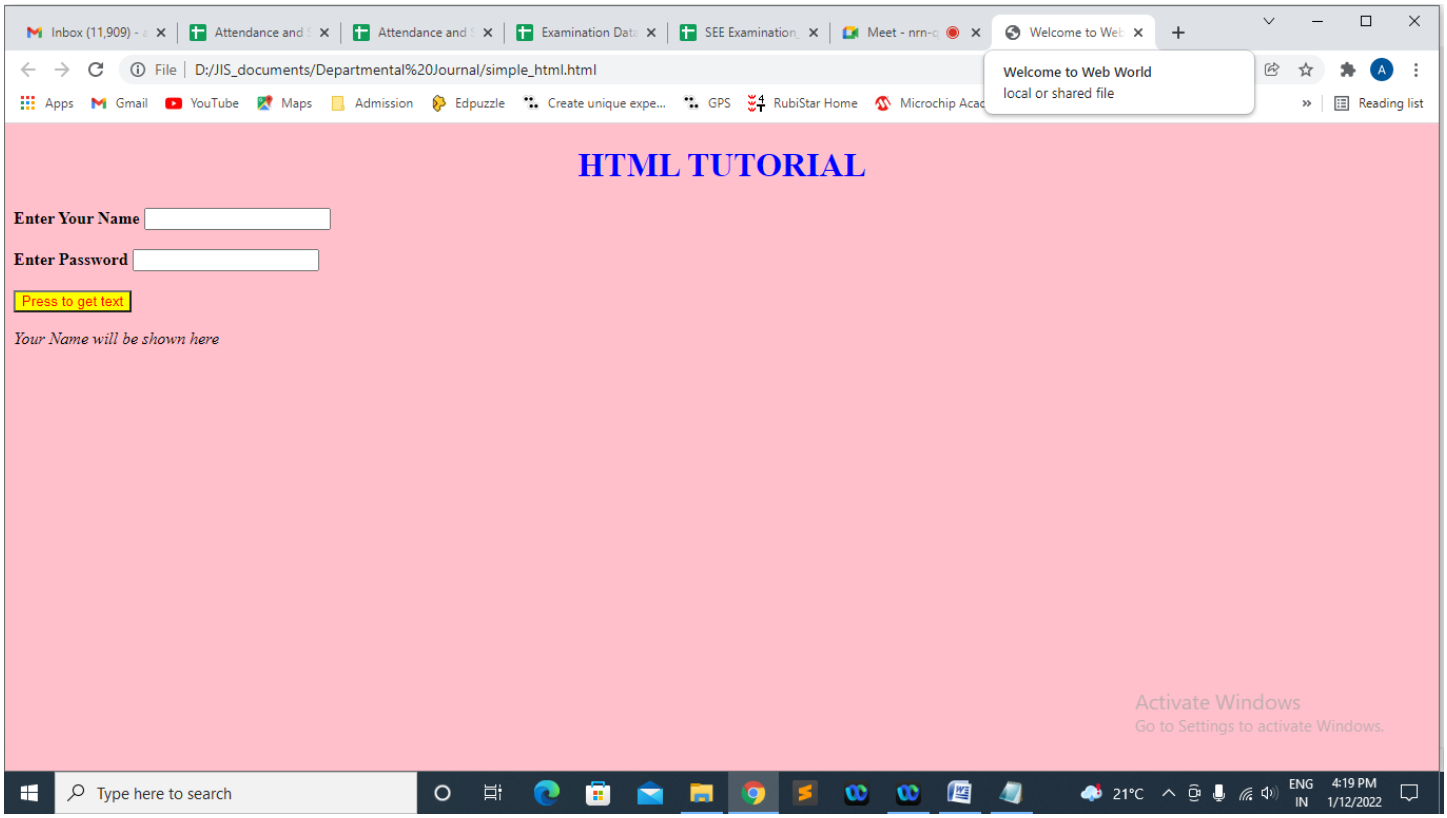

Fig. 11 Paragraph Creation

Now to edit the paragraph by the text of the first text box on button click, a click even is created in the "button" tag shown as follows ***<button id="btn" onclick="clickme()">Press to get text</button>***. "clickme()" is a function which is triggered when the button is clicked. In the body, "<script></script>" tag is written where the JAVASCRIPT code is entered. The body of the function is written inside the "<script>" tag. In the JAVASCRIPT code, each element (widget) is called either by its id or by name. "***document.getElementById("id of the text-box").value***" code is used to read the value given in the widget (here text-box). This value is put to the text area of the paragraph by the code as follows "***document.getElementById("id of the paragraph").innerHTML***". The following codes are written to get the web page as shown in Fig. 12.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
   }
#btn {
        background-color:yellow;
        color:red;
   }
</style>
</head>
<body>
<h1 style="text-align:center;color:blue;">HTML TUTORIAL</h1>
<label><b>Enter Your Name</b></label>
<input type="text" id="txt"><br><br>
<label><b>Enter Password</b></label>
<input type="password" id="txt1"><br><br>
<button id="btn" onclick="clickme()">Press to get text</button>
<p id="para"><i>Your Name will be shown here</i></p>
```

```
<script>
function clickme()
{
        var x=document.getElementById("txt").value;
        document.getElementById("para").innerHTML=x;
}
</script>
</body>
</html>
```

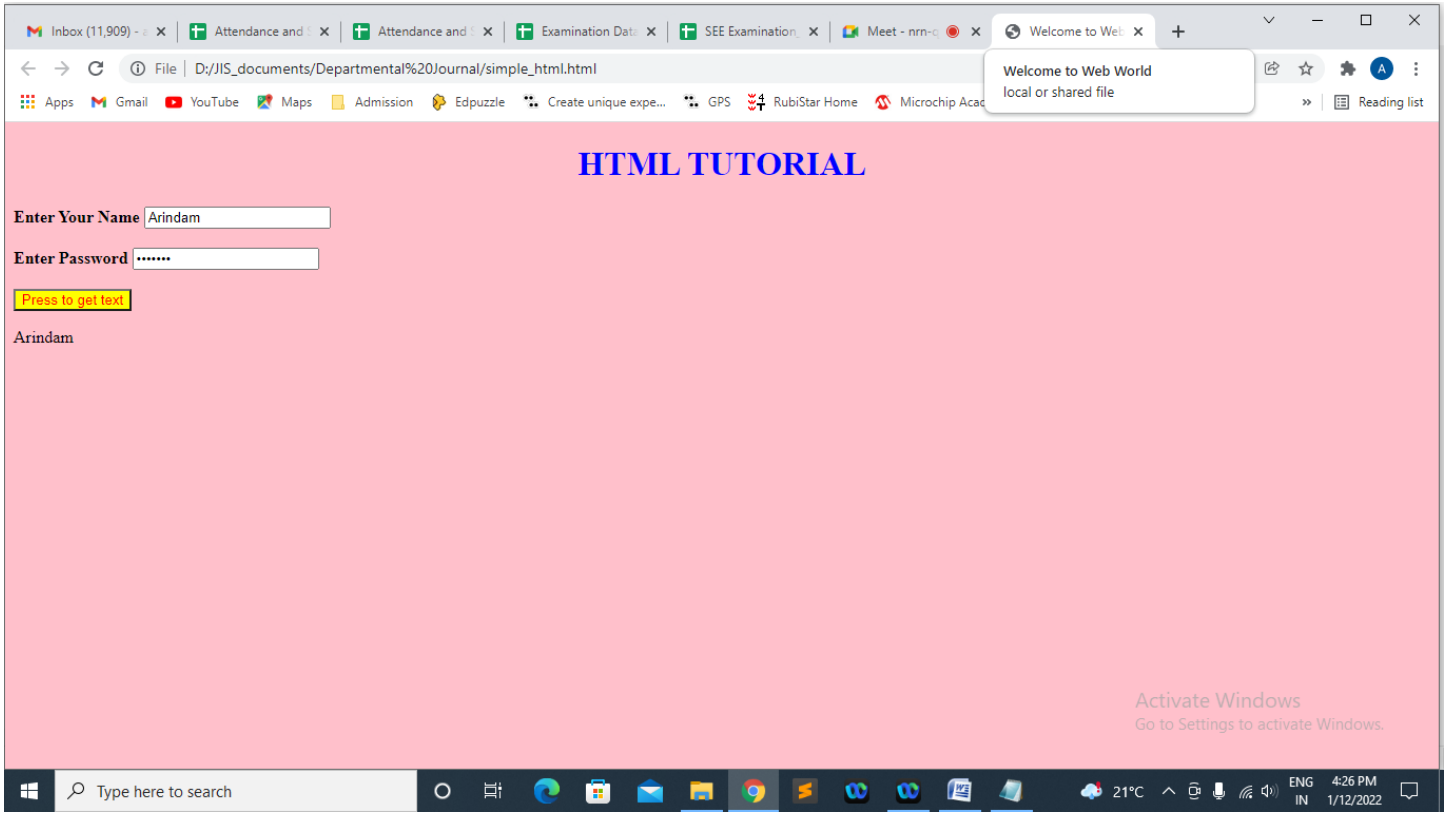

Fig. 12 Paragraph text is being changed by the text given in the text box

Suppose if both the name and the password are verified then some text is written in the paragraph. This can be done using the following codes.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
    }
#btn {
        background-color:yellow;
        color:red;
    }
</style>
</head>
<body>
<h1 style="text-align:center;color:blue;">HTML TUTORIAL</h1>
<label><b>Enter Your Name</b></label>
<input type="text" id="txt"><br><br>
<label><b>Enter Password</b></label>
```

```
<input type="password" id="txt1"><br><br>
<button id="btn" onclick="clickme()">Press to get text</button>
<p id="para"><i>Your Name will be shown here</i></p>
<script>
function clickme()
{
	var x=document.getElementById("txt").value;
	var y=document.getElementById("txt1").value;
	if((x=="Arindam") && (y=="arindam"))
	{
		document.getElementById("para").innerHTML="You are the right person";
	}
	else
	{
		document.getElementById("para").innerHTML="You may not be the right person. Try again.";
	}
}
</script>
</body>
</html>
```

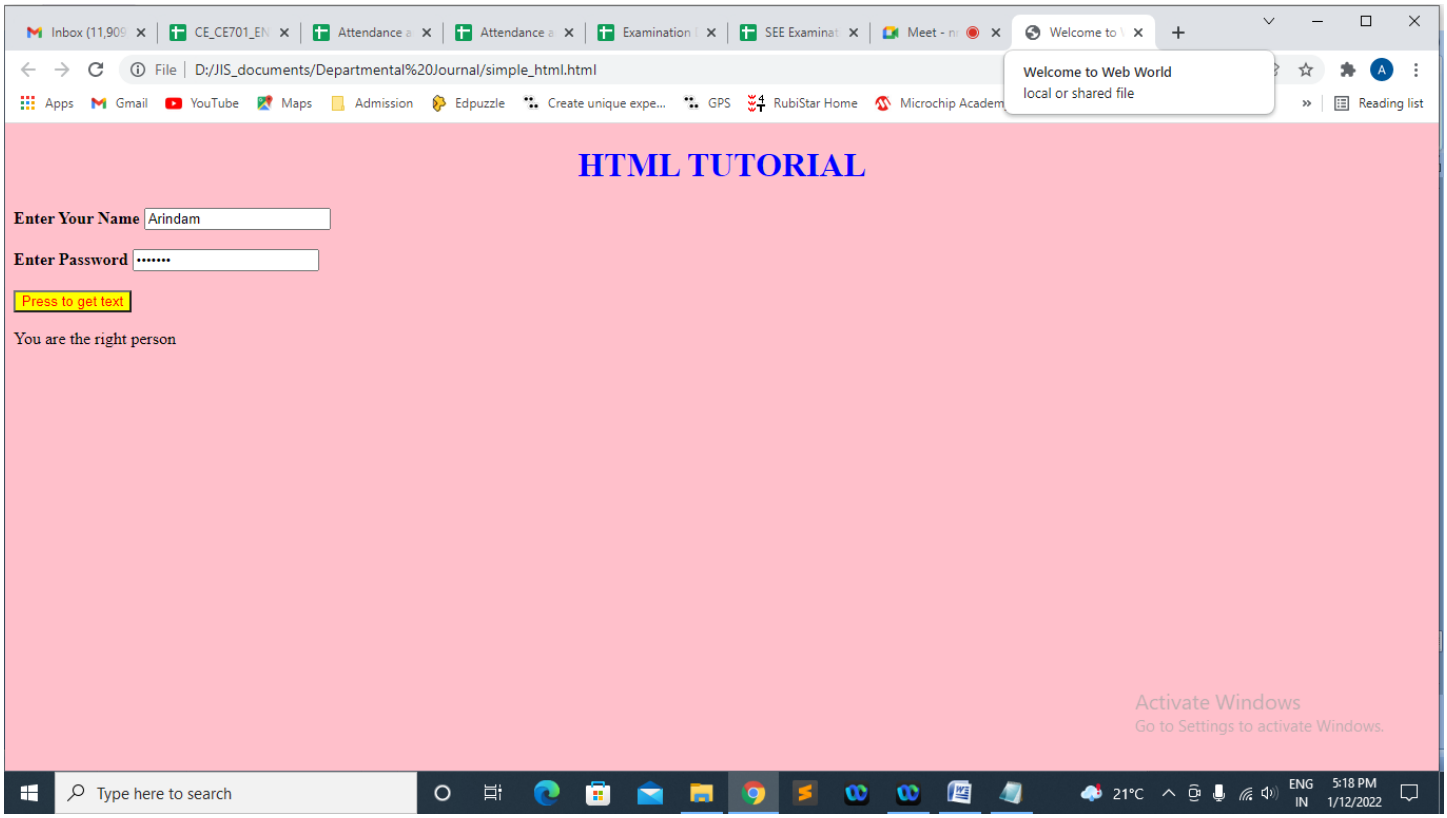

Fig. 13 Both Name and Password is matched, the paragraph is showing the confirmation text

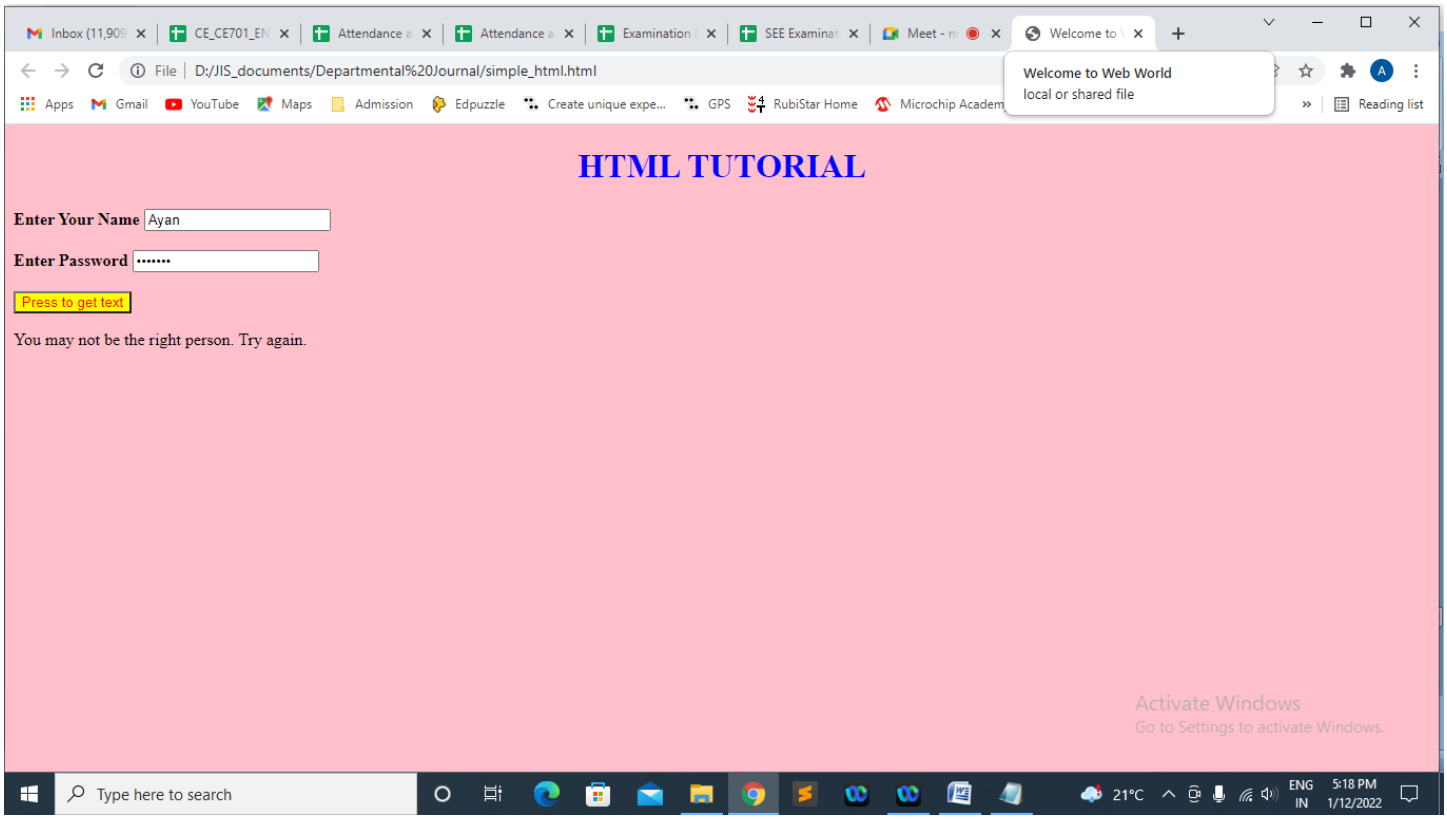

Fig. 14 The name is not matched, the paragraph is showing the alert text

Creation of Combobox: For combobox creation, "<select></select>" tab is used and inside this tab the elements are inserted using "<option></option>" tag. It also has an id. There is another paragraph which shows the selected item. This can be done by a function "changeme()". When the options are selected then the function is triggered and the selected text is shown in the paragraph. The following codes are used to design the whole page.

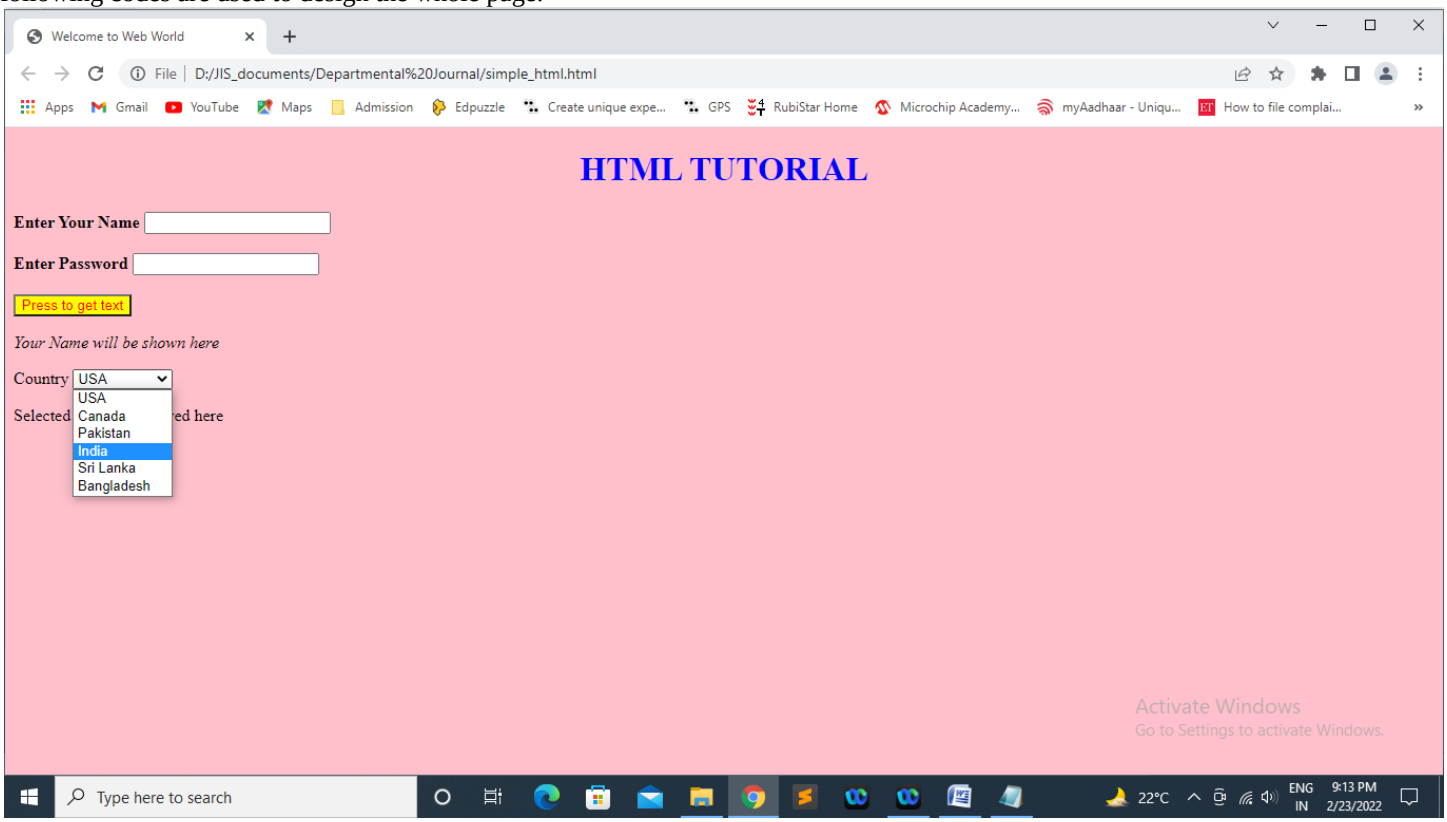

Fig. 15 The creation of Combobox

Fig. 15 shows the combobox and its items and Fig. 16 shows the change event of the combobox when the item is selected.

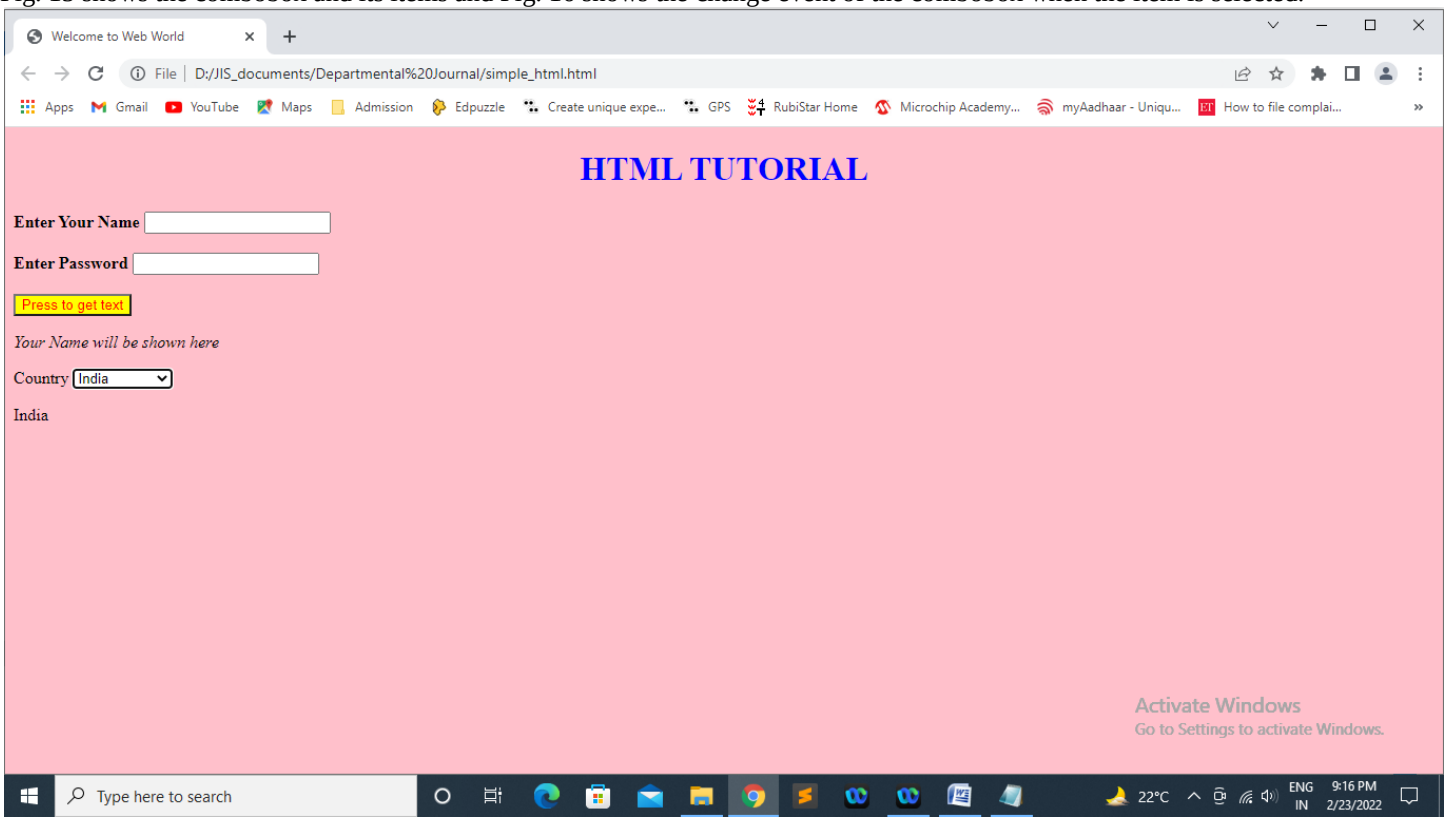

Fig. 16 The item is shown in the paragraph when the item is selected from the combobox

The following block of codes show the overall design of the page.

```
<!DOCTYPE HTML>
<html>
<head>
<title>Welcome to Web World</title>
<style>
body {
        background-color:pink;
    }
#btn {
        background-color:yellow;
        color:red;
    }
</style>
</head>
<body>
<h1 style="text-align:center;color:blue;">HTML TUTORIAL</h1>
<label><b>Enter Your Name</b></label>
<input type="text" id="txt"><br><br>
<label><b>Enter Password</b></label>
<input type="password" id="txt1"><br><br>
<button id="btn" onclick="clickme()">Press to get text</button>
<p id="para"><i>Your Name will be shown here</i></p>
<label>Country</label>
<select id="sel" onchange="changeme()">
        <option>USA</option>
        <option>Canada</option>
        <option>Pakistan</option>
        <option>India</option>
        <option>Sri Lanka</option>
```

```
        <option>Bangladesh</option>
</select>
<p id="para1">Selected Item is displayed here</p>
<script>
function clickme()
{
        var x=document.getElementById("txt").value;
        var y=document.getElementById("txt1").value;
        if((x=="Arindam") && (y=="arindam"))
        {
                document.getElementById("para").innerHTML="You are the right person";
        }
        else
        {
                document.getElementById("para").innerHTML="You may not be the right person. Try again.";
        }
}
function changeme()
{
        var x=document.getElementById("sel").value;
        document.getElementById("para1").innerHTML=x;
}
</script>
</body>
</html>
```

IV. CONCLUSION

In this paper, the author tried to show some lucid techniques to create simple web page design using HTML and JAVASCRIPT. The techniques shown here were not comparable because the techniques were included in HTML-5 and here they were described in a lucid manner.

ACKNOWLEDGMENT (IF ANYONE OR ANY INSTITUTE GIVE SUPPORT TO THIS WORK)

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An efficient approach for industrial application and data monitoring using IoT

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Abstract- In this paper the Authors analyzes the industrial application and data monitoring over the internet of things (IoT). The features of IOT are product-based data, electronic device identifier, standard monitoring and uploading real data information. In industrial field application, temperature monitoring is one of the important parameters for every situation. In the controlling room, where observing every periodic temperature through the internet, delivers information while varying the temperature in every time span. It monitors and measures every pulse and continuously sending information by the proposed system over the cloud for monitoring the exact data from anyplace. This paper basically designs for industrial machine control and surveillance system using Bolt IoT described by Zhou J, Sfar, ARet.al. [1][2]. If any changes occurred, Temperature sensor is activated and system triggers and raising alarm. The system is giving a clear view on a exactitude measurement for monitoring and saved it into any data or information storage block and sent it to internet cloud zone described by Ruslan Hj et. al.[3]. Besides that, these data can be seen by the users through the internet either user's mobile phone or any personal device where systems were linked up. The research approach is to be ensure the person can observe the fluctuation happens at own place without necessary move anywhere.

Keywords- IoT, Bolt IoT, Surveillance, Internet Cloud, Temperature Sensor, Trigger

I. INTRODUCTION

Now a days industries have been familiarized to a broad range of manufacturing processes to ease deployment and improve their flexibility while retentive the high materialistic output of the quality of products Varela M.et al.[4]. In the wireless sensor network the applications of IoT are used, such as medical field, distribute chain management, defense system, agriculture field and many versatile industrial fields depicted by Gaona-Garcia P et.al.[5]. Such systems provide real time-based data procurement, enabling the exact data monitoring of the manufacturing process described by Ismail et. al.[6]. In this paper, we basically focused on Bolt IoT. This platform has the maximum capability for controlling your devices and collect data in very safely & securely from anywhere anytime. This platform interface with machine learning (ML) algorithms with detected of sensor values. This IOT platform provides this real time data monitoring and optimization of the constructing systems, time span reducing by instantaneously and taking essential exact measurement Khairi et.al.[7]. Real time-based data updated continuously with low latency. Internet of Things uses smart devices. Across the world, it provides innovative solutions in the industrial field application, various business, public sector and also private industries. Other features of IoT, Smart real time-based data monitoring system. It incorporates tiny smart and intelligent smart devices and equipment to support ML algorithm described by Lianos et. al.[8]. In many industrial operations, temperature is one of the most important parameters. in today's industrial hub, temperature measurement incorporates with every variety of application and needs. Temperature Measurement is the common technique in versatile industry field, like automotive industry, agricultural zone and other industry depicted by Li, B.A. et. al. [9]. Sensor senses the temperature periodically, when temperature rises above the threshold then it alert. The module placed at any industrial storage place where temperature needs to be maintained and it was monitored through internet using internet of things (IoT). It is monitoring not only temperature, also capacity, flow rate, pressure, acceleration, calibration and so on. Every place different temperature will be obtained. As author observes that, a server room kept temperature in between 15 to 20 degrees Celsius, if temperature increases than threshold value, then some problem can be occurred. So always temperature should be adjusted, if any fluctuation can be happened. Management always keeps a note about that temperature. So, the author developed an unmanned device which always notice and monitor the temperature and if any fluctuation occurs then immediately alert to the user through internet cloud using IOT.

II. METHODOLOGY

Internet of Things signifies that all the devices which are exist in the world, all are connected to the Internet. The objectives of Internet of Things is to collect data and share it from one end to another end device using internet. Now a days proved that, it is also drastically uses in real time application, describes by Yinghui et. al.[10].

A. Circuit Construction

The experimented design of the circuit applied for monitoring the server room temperature using Bolt IoT. It is aided with a LM35 Analog Temperature Sensor.

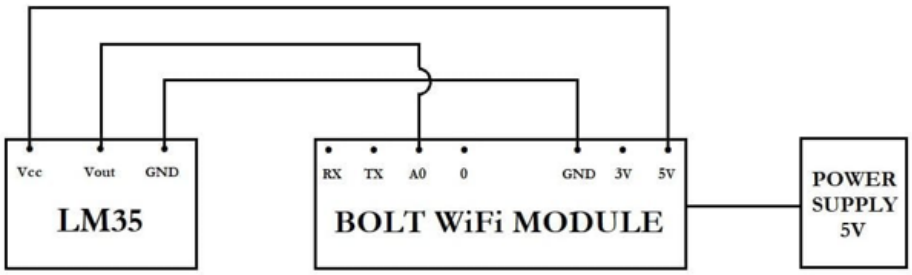

Figure 1: Block Diagram for the proposed model

The Block Diagram of the experimented system is elaborated in figure1.From the block diagram, author demonstrated that the input voltage produced by the LM35. In the proposed system, LM35 sensor senses the exact temperature of its placed area and according to it's measuring value. It generates an analog voltage as an output. From Bolt A0 pin system got the input voltage and it converts analog data to 10-digit digital data which varies from 0-1023. Then these digital bits sent to cloud system via Bolt devices.

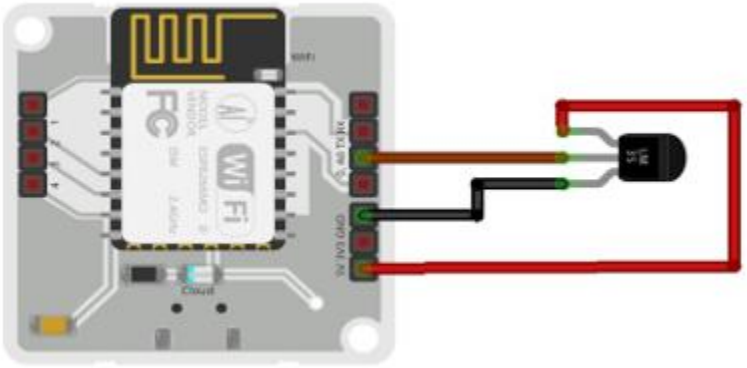

Figure 2: Fritzing diagram for LM35 to Bolt connection

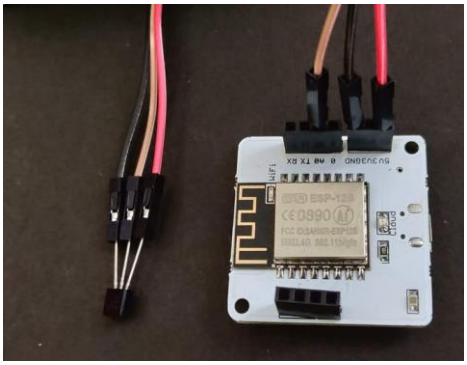

Figure 3: connection establishment in active mode

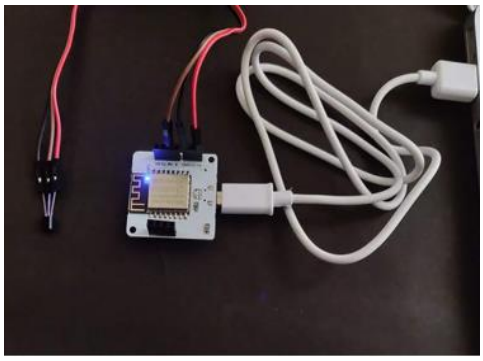

Figure 4: configuring module with power cable bolt wi-fi model

Based on figure 3 author describes that the three male points connect with female end connection with three different colours. For avoiding confusion follows three different colours. We will also require the Bolt Wi-Fi module and LM35 sensor. In figure 4,

connection established between one end of the LM35 sensor to the corresponding end of the Bolt Wi-Fi module. So, the LM35's three terminal VCC pin, GND pin, output pin of LM35 connects with the 5V pin, Ground pin & analog input "A0" pin of the Bolt device respectively. After connection properly power on the device.

i. *Connecting the Bolt device to the Bolt Cloud*

To check, when Wi-Fi module is connected to Cloud, glow green coloured Cloud LED on the Bolt Wi-Fi module.

ii. *Collecting and sharing data over the Bolt Cloud*

- 1st login into "cloud.boltiot.com". Then select the 'Product' tab.
- Generate "new product" for your temperature monitoring system. Once Products are created, it can be used for multiple Bolt devices. This ensures scalability for your IoT products you build on Bolt.
- After creating product configuration, popup window will open where you can configure your products hardware setting and write the software code.
- Click on the "A0" pin, save it and wait for the page to reload.
- Go to coding section and click on the "Import Code example" icon. This will open a pop-up menu where you can choose the variable. In this coding section you can connected only one sensor and choose the only variable and save it.
- Now convert the raw sensor value received into degrees i.e., temp = (analog_value100)/1023and save with proper extension.
- After process completion, link with Bolt IOT equipment over the Cloud. Then the data transferring process will start.
- Now total collected information will be scanned whether temperature is less or equal to 20 ℃ or above 28 ℃, if response had been positive, then the sensor instructs to alert for raising or reducing the temperature of that experimented devices.

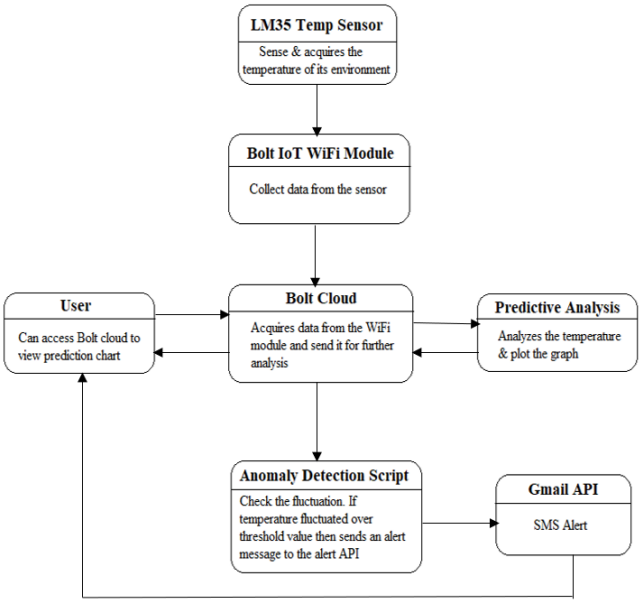

Figure 5: Flow chart of the system

The Flow Control of the system- The main and central hub of the system is the Bolt IoT board which handles all the detection and comparing and the calling of the API. The Bolt IoT board sends a signal to the LM35 sensor to start acquiring the data. The LM35 sensor then collects data every couple of seconds and sends it back the Bolt IoT board. The Bolt IoT board then forwards the data to the Bolt IoT cloud and uses the new dataset to create a prediction chart for predicting future fluctuations in temperature.

Figure 6: Bolt Wi-Fi Module

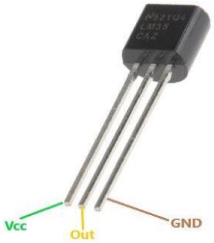

Figure 7: LM35 analog temperature sensor

In figure 6 and figure 7 shows that, Bolt Wi-Fi Module and LM35 analog temperature sensor for creating this project. In the Bolt wi-fi module, Wi-Fi chip installed on it. It generates power from any mobile charger of 5V o/p or laptops to power on the Wi-Fi module via a USB cable. It has Vcc pin, GPIO pins, GND pin and other pins which can be used to connect other i/p - o/p devices to it. The LM35 sensor is an temperature sensor device with linearly output voltage, proportionated to the degree centigrade. It's temperature ranges from −55°C to 150°C as in input. It has three no of pins- VCC, Output & Ground. When temperature fluctuates, VCC pin goes high and Output pin sends the data over the cloud, otherwise GND pin remains high.

III. Simulation Result

The author observed the simulation result, which was demonstrated as in below mentioned table.

Time_Stamp (in IST)	Temperature (Sensor Value)	Temperature (in °C)
11:00:29	219	21.3
11:05:29	284	27.7
11:10:29	216	21.1
11:15:29	215	21
11:20:29	220	21.5
11:25:29	222	21.7
11:30:29	222	21.7
11:35:29	220	21.5
11:40:29	280	27.4
11:45:29	221	21.6
11:50:29	219	21.3

Figure 8: Simulation Result

Here sensor is detecting the temperature and giving the temperature output with respect to time. We have set the threshold temperature in a specific range of 21°C to 27°C. From simulation result, author observed that, when the temperature will cross the threshold value it will give us an alert mail. In the table, we have also highlighted those readings when the temperature crossed the threshold value.

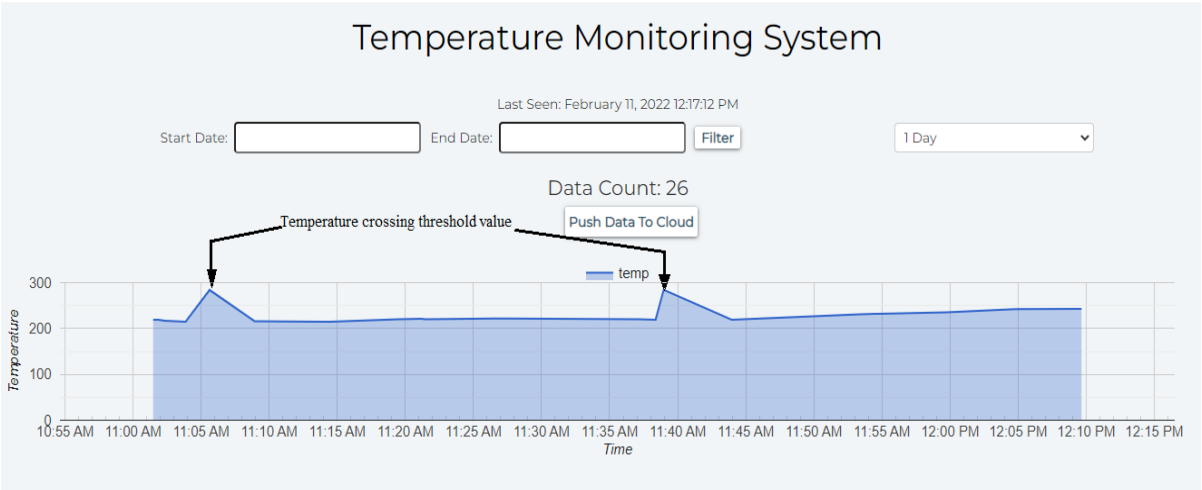

Figure 9: output plot of temperature monitoring sensor

In the figure 9, Author visualized that, experimental based simulation data will be came as a graph plot in x- axis represented as Time and Y- axis sensor Temperature value. With respect of time, it can be change instantaneously. We can also easily identify the exact time when the temperature crosses the threshold value.

IV. CONCLUSION

The project created successfully with low-cost system module. This low-cost system module will help small scale integration chip for recording the temperatures and help system to enhance their capability. From the last decade we noted that Wireless Sensor Network (WSN) is significantly used by many industries. So, we focused this wireless module in this WSN. At first, we will get the raw sensor values from the simulation output & convert the values into Centigrade and plotted the graph. This device can perform temperature sensing, transmitting & receiving the data. So, we can collect & measure data in a more efficient way at anywhere, anytime.

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[10] Yinghui Huang, Guanyu Li, "A Semantic Analysis for Internet of Things," *International Conference on Intelligent Computation Technology and Automation* , 2010.

Dual Port MIMO antenna for Wide band applications

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[2]Electronics and Communication Engineering Department, JIS College of Engineering, Kalyani, West Bengal, India.

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Abstract-This paper presents a simple multiple-input multiple-output (MIMO) antenna for Wideband applications. The proposed antenna is composed of a rectangular copper conductor between antenna elements used to reduce the mutual coupling between the ports. The proposed antenna covers a wide frequency band from 1.8 to 5.24 GHz, which includes the WLAN (2.35-2.5 GHz), WiMAX (3.2-3.85 GHz), and C band downlink (3.7-4.2 GHz) bands where minimum port isolation is obtained more than 20 dB throughout the entire application band. The proposed MIMO antenna structure has a very low envelope correlation coefficient (ECC < 0.002) and high diversity gain (DG > 9.9 dB). It also has minimum channel capacity loss (CCL), which is less than 0.12 Bits/s/Hz. Difference mean effective gain of two-port less than 0.004 dB (MEG1-MEG2<0.004 dB), and total active reflection coefficient (TARC) is better than -10 dB throughout application band.

KEYWORDS- Multiple input Multiple output (MIMO) antenna, mutual coupling (MC) reduction, wideband antenna, total active reflection coefficient (TARC).

I. INTRODUCTION

There has been a great demand for high data rate wideband antennas in modern wireless communication systems [1]. Multiple-input multiple-output (MIMO) systems are widely promised in wireless communication to enhance signal quality and system reliability and offer higher data rates [2]. In a wireless communication environment, multipath fading of the transmitted signal is caused by hills or large buildings. Multiple-input multiple-output (MIMO) systems are widely used in wireless communication to minimize multipath fading and improve system capability [3]. Multiple antennas are used on transmitter and receiver sides in a MIMO system. Therefore, closely spaced antennas in small devices result in strong mutual coupling between the antenna elements and produce distorted radiation patterns with low channel capacity [4].

Multiple designs of MIMO antenna with reduced mutual coupling are reported in the literature of wireless MIMO system applications. In Ref. 5, an antenna with the dimension of 66 mm × 32 mm × 1.5 mm, operating frequency range from 1.5-5.1 GHz, is proposed. It uses multiple vertical slots in the ground plane to achieve more than 15 dB port isolation. A two-element MIMO antenna is presented in Ref. 6, which covers the frequency spectra of 1.71-1.88 GHz and 2.5-2.7 GHz with minimum port isolation of 9 dB. A slot-based MIMO antenna covering the multiband characteristics (2.4-2.5 GHz and 4.9-5.725 GHz) is presented in Ref. 7. The maximum port isolation reported in that article is around 18 dB.

This paper presents a two-port MIMO antenna consisting of two square-shaped antenna elements and a copper conductor placed between antenna elements. The antenna covers the wide frequency band from 1.8 to 5.24 GHz, including WLAN, WiMAX, and C-band downlink applications. The antenna shows a very low envelope

correlation coefficient (ECC < 0.002) and high diversity gain (DG > 9.9 dB), along with a minimum channel capacity loss (CCL) of less than 0.12 Bit/s/Hz. The difference of mean effective gain of two-port is less than 0.004 dB (MEG1-MEG2<0.004 dB), and the total active reflection coefficient (TARC) is better than -10 dB throughout the application band. The antenna is simulated, analyzed, and optimized using High-Frequency Structure Simulator (Ansys HFSS) [8]. The rest of the paper is arranged as the detailed design process of the antenna followed by the brief Conclusion.

II. ANTENNA DESIGN AND RESULTS

The antenna is integrated on a FR4 epoxy substrate of dielectric constant (εr) of 4.4 and loss tangent (tan δ) of 0.025. The overall dimension of the antenna is 62 mm × 38 mm × 1.6 mm. The proposed MIMO system is consisting two square-shaped patches separated by 10 mm on the top of the substrate. A very simple copper conductor is employed between the antenna elements on the top of the substrate to reduce the mutual coupling between the two antenna elements. The dimension of the proposed MIMO antenna is presented in table 1.

A) MIMO ANTENNA WITHOUT COPPER CONDUCTOR

A dual-element MIMO antenna without a copper conductor is shown in figure 1. The top layer (Figure 1A) displays the feeding structure of the two antenna elements along with their port locations. The bottom layer (Figure 1B) shows the ground plane. The antenna is simulated using Ansys HFSS, and S- parameters are shown in figure1 C. The antenna operates in the frequency band from 2.51 to 5.31 GHz ($S_{11} \leq -10$ dB) with poor port isolation (S21(dB)).

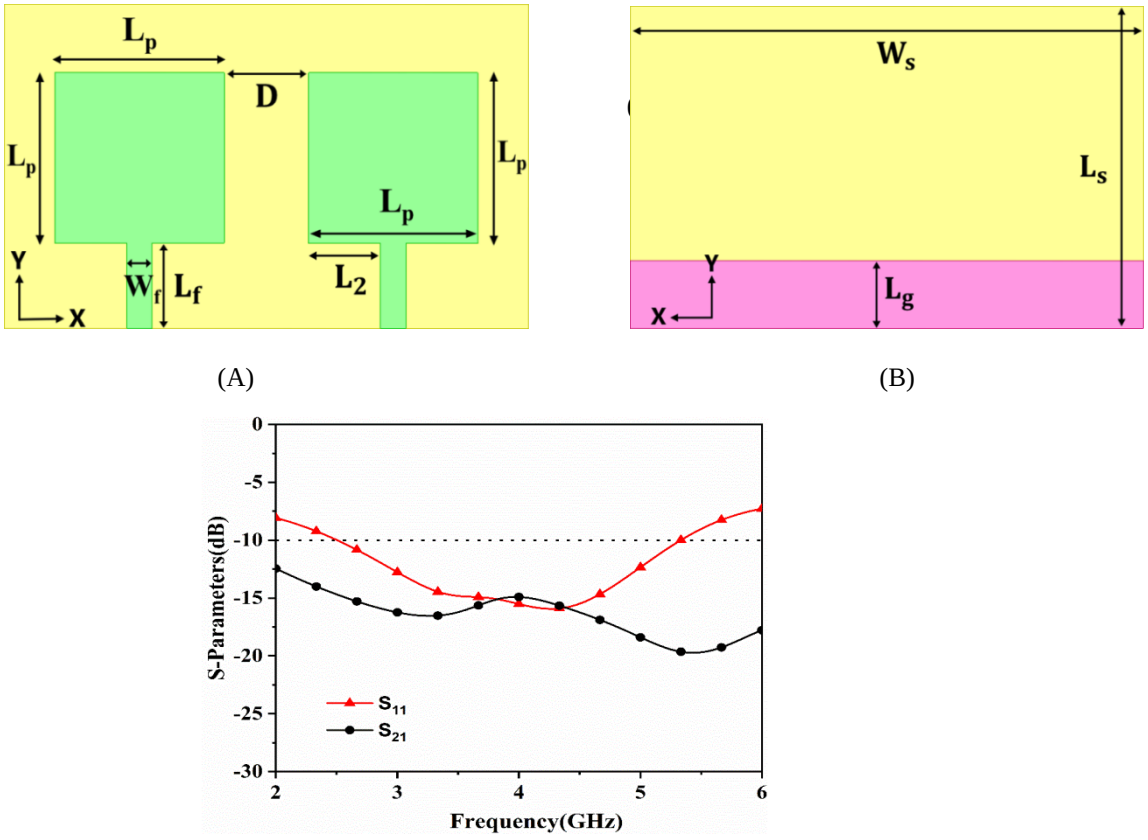
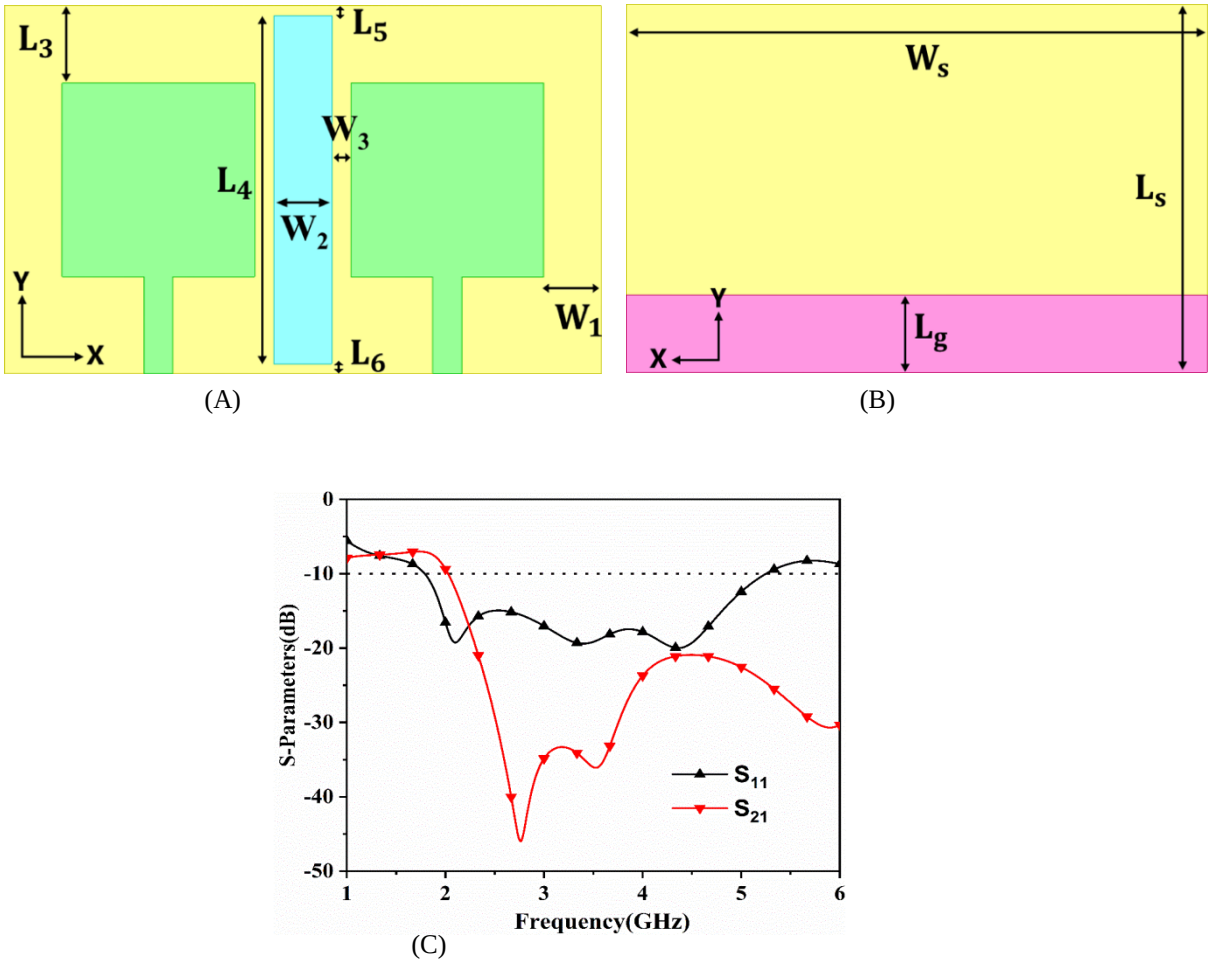


Figure 1: MIMO antenna without Copper conductor (A) top view, (B) bottom view, (C) S-Parameters

B) MIMO ANTENNA WITH COPPER CONDUCTOR

A dual-element MIMO antenna with a copper conductor is shown in figure 2. The top layer (Figure 2A) shows the two antenna elements and the copper conductor, which is placed between antenna elements. The bottom layer (Figure 2B) indicates the ground plane whose dimension is the same as the MIMO antenna without a copper conductor. The antenna is simulated using Ansys HFSS, and S- parameters are shown in figure 2 C. The antenna operates in the frequency band from 1.8 to 5.24 GHz ($S_{11} \leq -10$ dB) with port isolation (S21(dB)) achieved more than 20 dB over the wideband frequency band from 2.35 to 4.2 GHz.



(A) (B)

(C)

Figure 2: MIMO antenna with Copper conductor (A) top view, (B) bottom view,

(C) S-Parameters

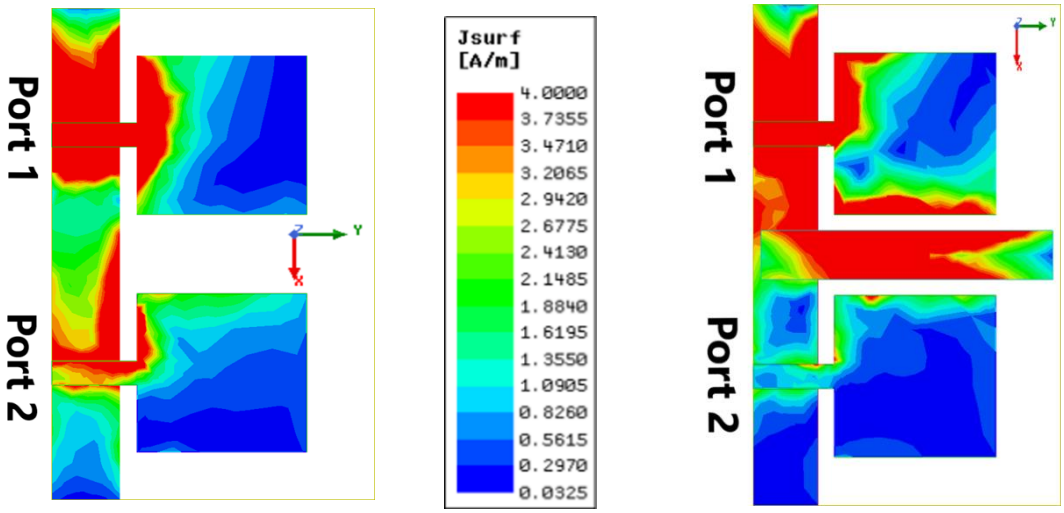
TABLE 1 Parameter-wise dimensions of the MIMO antenna

Parameter	Dimension (mm)	Parameter	Dimension (mm)	Parameter	Dimension (mm)
L_p	20	L_2	8.5	L_3	8
L_4	36	L_5	1	L_6	1
L_S	38	L_f	10	L_g	8
W_1	6	W_2	6	W_3	2
W_s	62	W_f	3	D	10

III. SURFACE CURRENT DISTRIBUTIONS AND RADIATION PROPERTIES

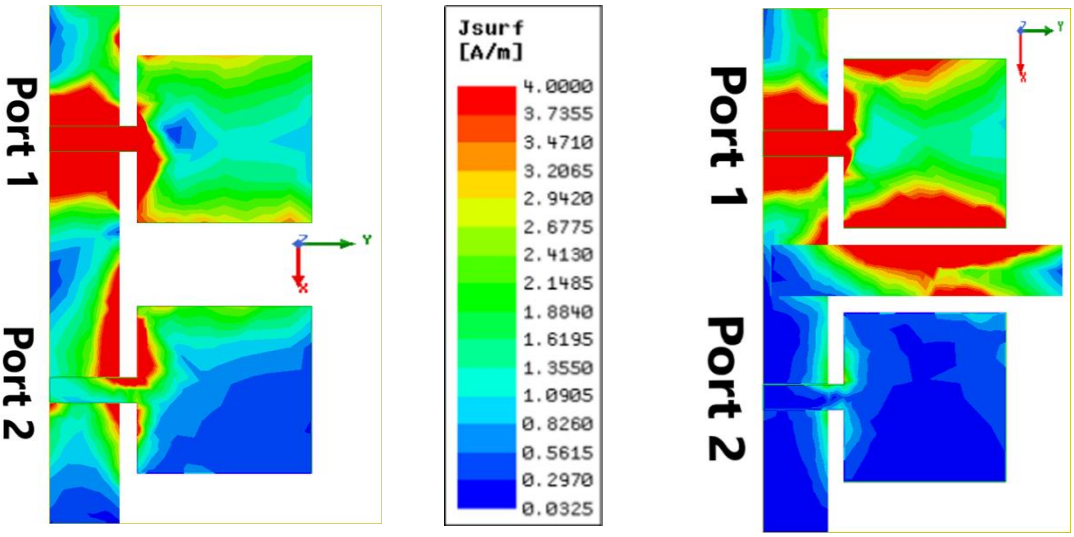
A) CURRENT DISTRIBUTIONS

The simulated surface current distributions with and without a copper conductor at 2.4 GHz and 3.5 GHz are illustrated in figure 3. Figure 3 shows how effectively the antenna with copper conductor reduces mutual coupling between antenna elements. In these surface current distributions, it is observed that the amount of current from the input excitation port 1 to the other port 2 is minimum in the case of an antenna with a copper conductor compared to the antenna without a copper conductor. The copper conductor blocks the flow of the current of port 1 entering port 2, blocking the antenna's near-field radiation between the two antennas.



With Copper conductor Without Copper conductor

(A)



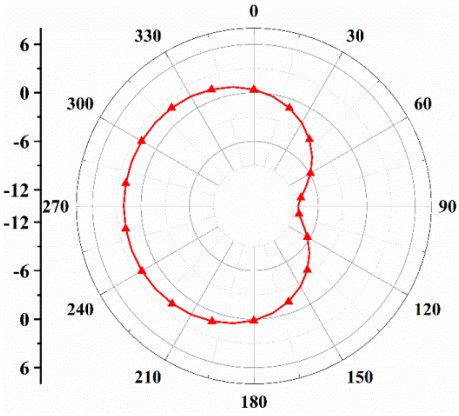
Without Copper conductor With Copper conductor

(B)

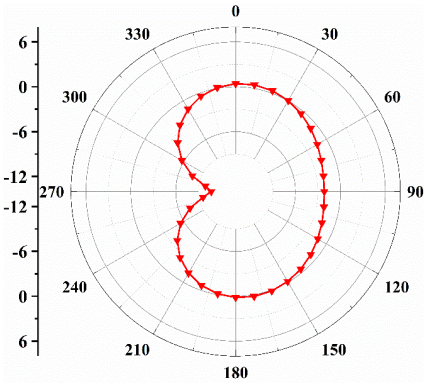
Figure 3: Surface current distributions (A) 2.4 GHz (B) 3.5 GHz

B) RADIATION PROPERTIES

The simulated radiation patterns of the proposed MIMO antenna at 2.4 and 4.2 GHz in E-plane and H-plane are shown in Figure 4A-B, respectively. Figure 5 shows the variation of gain with the frequency of the proposed antenna. The gain is gradually increased with the frequency and achieved a maximum gain of 3.038 dB at 4.75 GHz. It is also observed that gain achieved 0.4 dB at 2.4 GHz and 2.48 dB at 4.2 GHz.

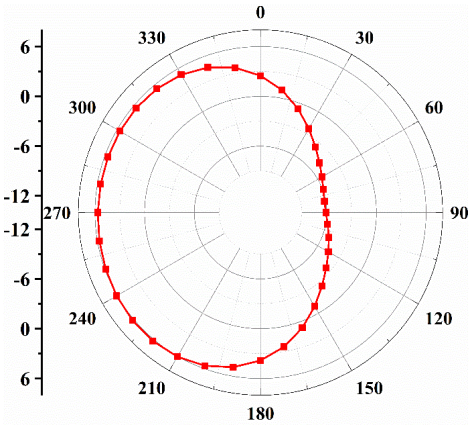


E-Plane

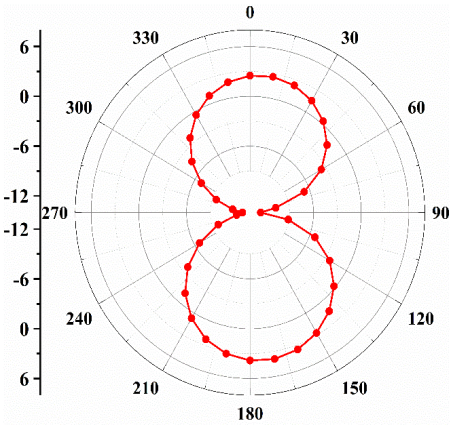


H-Plane

(A)



E-Plane



H-Plane

(B)

Figure 4: Radiation patterns at (A) 2.4 GHz (B) 4.2 GHz

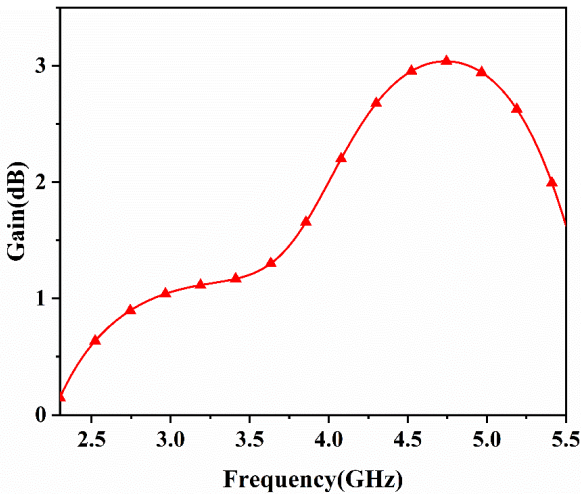


Figure 5: Gain vs Frequency of the proposed antenna

IV. DIVERSITY PERFORMANCES

The diversity performance of the proposed MIMO antenna is evaluated by calculating parameters such as envelope correlation coefficient (ECC), diversity gain (DG), channel capacity loss (CCL), mean effective gain (MEG), and total active reflection coefficient (TARC) [9].

i) Envelope correlation coefficient (ECC)

The ECC parameter is used to determine the correlation between antenna elements, which can be calculated from radiation patterns or S-parameters. The value of ECC should be very low for a good diversity performance, and preferably in most of the MIMO antenna designs, ECC is less than 0.4. The ECC of dual-port MIMO system can be determined using equation 1[10]

$$ECC=\frac{|(S^{*}_{11}S_{12}+S^{*}_{21}S_{22})|^2}{\left(1-|S_{11}|^2-|S_{21}|^2\right)\left(1-|S_{22}|^2-|S_{12}|^2\right)} \quad (1)$$

It is observed from the figure 6, ECC < 0.002 throughout the whole application band of the MIMO antenna.

ii) Diversity gain (DG)

The DG is another vital parameter to analyse the MIMO diversity performance. The ECC and DG are closely interrelated as the lower is the correlation between antenna elements, the higher is the diversity gain, and vice versa. The DG can be computed from the envelope correlation coefficient (ECC) using Equation 2 [11].

$$DG=10\sqrt{1-(ECC)^2} \quad (2)$$

Figure 6 shows a very high diversity gain (DG > 9.9 dB) over the entire application frequency bands of the proposed MIMO antenna.

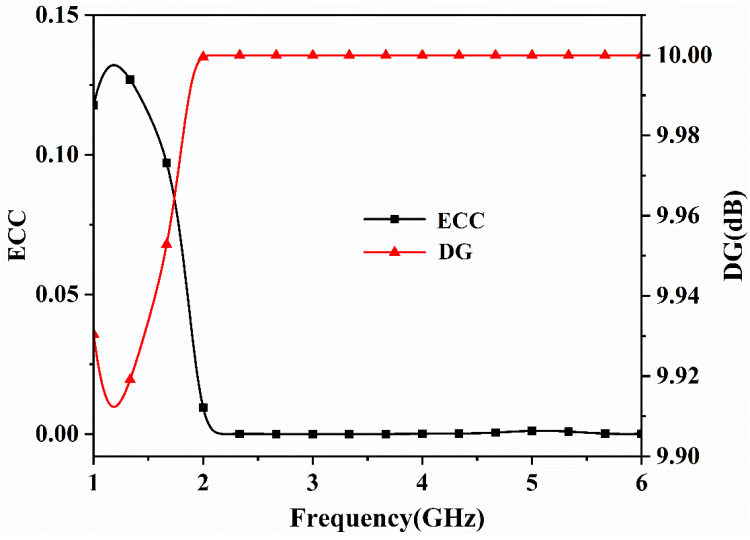


Figure 6: ECC and DG of the proposed antenna

iii) Channel capacity loss (CCL)

Enhancing the number of antenna elements of the MIMO system can improve channel capacity; however, the correlation between closely spaced antenna elements leads to CCL. The CCL of the MIMO antenna system should be <0.4 Bits/Sec/Hz for reliable communication. This CCL can be determined by using Equation 3[12]

$$C(\text{Loss}) = -\log_2 \det\left(\psi^R\right) \quad (3)$$

where ψ^R denotes receiving antenna correlation matrix. For two element MIMO antenna system, ψ^R is a 2×2 correlation matrix and it is expressed as

$\psi^R = \begin{bmatrix} \rho_{11} & \rho_{12} \\ \rho_{21} & \rho_{22} \end{bmatrix}$ and elements of the matrix is determined as

$\rho_{ii} = \left(1-\left|S_{ii}\right|^2+\left|S_{ij}\right|^2\right)$ and $\rho_{ij} = -\left(S^*_{ii}S_{ij}+S^*_{ji}S_{jj}\right)$ for i,j = 1 or 2 .

Figure 7 shows the channel capacity loss lies below 0.12 Bit/s/Hz (threshold value is 0.4 Bit/s/ Hz) throughout the entire application band.

iv) Mean effective gain (MEG)

Another important diversity parameter is the mean effective gain (MEG). MEG helps explain the performance related to the gain and environmental effect of the antenna. The MEG of both the antenna ports can be determined using S-parameters from the equations given below [13].

$$MEG_1 = 0.5\eta_{1,rad} = 0.5\left(1-\left|S_{11}\right|^2-\left|S_{12}\right|^2\right) \quad (4)$$

$$MEG_2 = 0.5\eta_{2,rad} = 0.5\left(1-\left|S_{21}\right|^2-\left|S_{22}\right|^2\right) \quad (5)$$

Figure 7 shows that the difference between two MEG is less than 0.004 dB throughout the operating band, representing the standard range of a MIMO antenna.

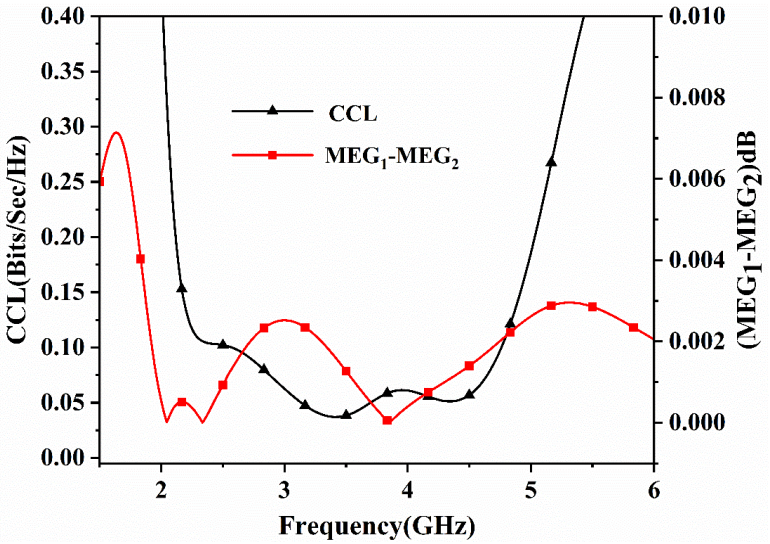


Figure 7: CCL and MEG of the proposed antenna

v) Total active reflection coefficients (TARC)

TARC is defined as the square root of total reflected power divided by the square root of total incident power [4]. The TARC is described as return loss in the whole MIMO antenna system and can be determined using equation 6[14].

$$\Gamma = \frac{\sqrt{\left(|\,(S_{11}+S_{12}e^{j\theta})\,|^2 + |\,(S_{21}+S_{22}e^{j\theta})\,|^2\right)}}{\sqrt{2}} \qquad (6)$$

Where θ is, the phase difference between port 1 and port 2 varies from 0 to 180 with a step size of 60. Figure 8 shows the TARC value better than -10 dB for all values of θ throughout the application band.

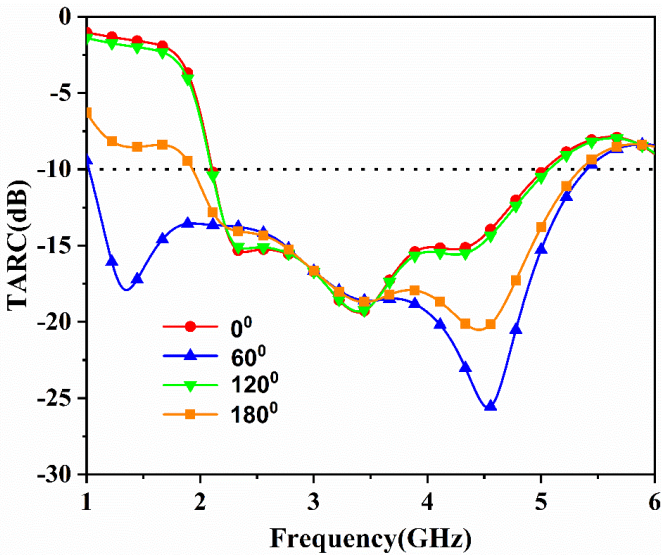


Figure 8: TARC of the proposed antenna

V. CONCLUSIONS

This paper presents a dual-port MIMO antenna with high port isolation. A copper conductor between antenna elements on the top of the substrate, the designed antenna offers more than 20 dB isolation in the 2.35 -4.2 GHz band. The antenna offers very low envelope correlation coefficient (ECC < 0.002), high Diversity Gain (DG > 9.9dB) low channel capacity loss (CCL < 0.12 Bit/s/Hz), low difference MEG(MEG1-MEG2<0.004dB) and TARC value better than -10dB respectively. The antenna covers a size of 62 × 38 mm2 with an element spacing distance of 10 mm.

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8051 Microcontroller Based Wireless Pulse Rate Watcher

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***Abstract*---** The mass reception of remote correspondence in the buyer market has driven down the expense of remote instrument. Subsequently, these days remote instruments are broadly utilized in clinical hardware. Involving remote innovations in persistent consideration, empowers robotized observing of fundamental signs or different boundaries. Minimal expense Microcontroller Based Wireless Heart Rate Monitoring System is a monetarily evaluated instrument with most recent remote innovation. Utilizing a Microcontroller based circuit, remote instruments and legitimate programming plan it gives a simple method for observing and keep up with record of internal heat level. This framework can likewise gauge pulse of more than one individual at the same time. Programming is utilized for keeping up with record pulse. The unit is lightweight, simple to deal with and very solid. In this framework, patients can be checked notwithstanding their area.

Keywords--- Microcontroller Based System, Sensor, Wi-Fi,Monitor and Control, Transmitter, Receiver

INTRODUCTION

Beat Rate is a proportion of the quantity of heart beats each moment (bpm). The normal resting human pulse is around 70 bpm. Pulse differs fundamentally between people in view of wellness, age and hereditary qualities. Perseverance competitors frequently have extremely low resting pulses. Pulse can be estimated by observing one's heartbeat. Beat estimation can be accomplished utilizing particular clinical gadgets, or by just squeezing one's fingers against a conduit (ordinarily on the wrist or the neck).Measuring the beat at the neck and wrist. The beat rate can likewise be estimated anytime on the body where a supply route's throb is communicated to the surface - regularly as it is packed against a hidden construction like bone - by forcing it with the list and center finger. The thumb ought to never be utilized for estimating someone else's pulse, as its solid heartbeat might slow down separating the site of throb. Most extreme pulse (MHR, likewise called STD, or HRmax) is the biggest number of times your heart can contract in one moment. HRmax is utilized as a base number to work out target pulse for work out (see beneath). The normal grown-up heart beats around 60 to 100 times each moment very still. The resting pulse as a rule diminishes with age, and is for the most part lower in great shape individuals.

WIRELESS SYSTEM

Various wireless systems can be used for this purpose. But Wi-Fi technology is the best among them for various advantages. Some of them are low cost, availability & easy to implementation. Another advantage is that Wi-Fi is a global standard & works the same in different countries around the world. The main use of Wi-Fi enabled devices in a medical environment such as hospitals would be for patient monitoring& asset tracking. Most hospitals already have a Wi-Fi network deployed, and equipment such as ECG monitors, pulse oximeters & blood pressure monitors are can now be implemented a cost efficient Wi-Fi transceiver. The information collected can be transmitted to a central server, from which physicians can access the data & alarms can be generated when irregular conditions are detected. Wi-Fi based monitors allow patients to be more mobile and make it easier to transfer patient within the various departments in the hospital.

To set WAN Port IP Address: After power on, it is required to go to the LAN-side computer plugged into one of the wireless router LAN ports. The wireless router will have grabbed a new IP address from the router's DHCP server. If the IP address of the router is already known , we can open a web browser, enter the IP address and log into the routeraddress of the router is not, then according to manual we have follow the process.

A. Function

Heart Rate by the ECG waveform or by the blood pressure flow into the finger (pulse method). The pulse method is simple and convenient. When blood flows during the systolic stroke of the heart into the body parts, the finger gets its blood via the radial

artery on the arm. The blood flows into the finger can be sensed photo electrically. To count the heart beats, here we use a small light source on one side of the finger (thumb) and observe the change in light intensity on theother side. The blood flow causes

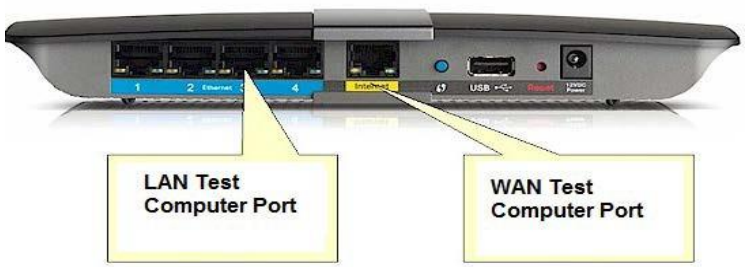

Figure 1

variation in light intensity reaching the light dependent resistor (LDR), which results in change in signal strength due to change in the resistance of LDR.

B. Block Diagram

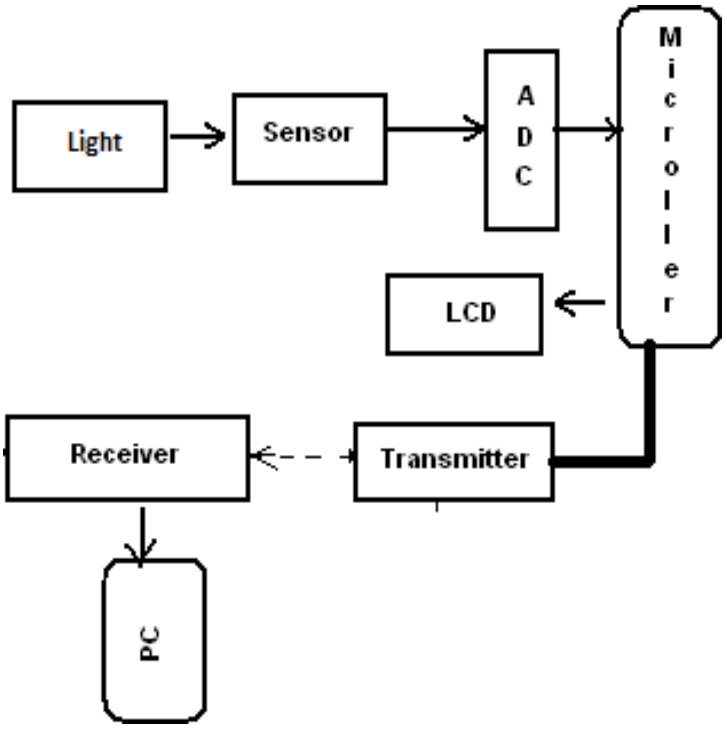

Figure 2

C. Circuit Description

Figure shows the circuit of the microcontroller based heart meter. The setup us a 6 Volt bulb for light illumination offlesh on the thumb behind the nail and the detector as change in the light intensity due to the flow of blood. The photo- current is converted into voltage and amplified by operational amplifier IC LM358 (IC1). The detected signal given to the non-inverting input (pin 3) and its output is fed to another non-inverting input (pin 5) for squaring and amplification. Output pin 7 provides detected heartbeats to pin 12 of the microcontroller. Preset VR1 is used for sensitivity and preset VR2 for triggering settings. Microcontroller IC AT89C2051 (IC2) is at the heart of the circuit. Port-1 pins P1.7 through P1.2, and port-3 pin P3.7 are connected to input pins 1 through7 of IC ULN2003 (IC3), respectively. These pins are pulled- up with 10 KΩ resistor network RNW1. they drive the 2 They drive all the segments of the 7 segments display with the help of inverting buffer IC3. The displays are selected through port pins P3.0, P3.1 & P3.2 of the microcontroller (IC2). Port pins P3.0 down through P3.2 are connected to the base of transistors T3 through T1, respectively. Pin 6 of IC2 goes low to drive transistor T1 into saturation and provide supply to the common anode pin (either pin 3 or pin8) of DIS1. Similarly transistors T2 and T3 drive displays DIS2 and DIS3 respectively. Only three seven segment

displays are used. IC2 provides segment –data and display-enable signals simultaneously in time division multiplexed mode for displaying a particular number on the seven segment display unit. Segment –data and display – enable pulses for the displayare refreshed every 5 ms.. Thus the display appears to be continuous, even though it lights up one by one. Switch S2 is used to manually reset the microcontroller, while the power-onreset signal for the microcontroller is derived from the combination of capacitor C4 and resistor R8. An 11.0592 MHz crystal is used to generate the basic clock frequency for the microcontroller. The circuit is provided by the 6 Voltbattery. Port pin P3.6 of the microcontroller is internally available for the software checking. This pin is actually the output of the internal analogue comparator, which is available for comparing the two analogue levels at pin 12 and 13. As pin12 and 13 of IC2 can work as an analogue comparator, these are used for sensing the rise and fall of the pulse waveform and thereby evaluate the time between two peaks and hencethe beat rate. The output of pulse pick-up pre -amplifier is fed to pin 12 of the microcontroller. Pin 13 of the microcontroller is connected to the preset for reference- level setting of the comparator. Thus voltage at pins 12 and 13 are always compared. The signal rise and the fall at pin 12 are sensed by the program. The internal timer of the microcontroller is used to find the time taken for one wavelength. This time is converted into the heart beat rate in beats per minute by a pre calculated look –up table. The program notes the time betweenthe high-to-low and low –to-high transition of the wave. This time in microcontroller is converted in steps of 4 ms for comparison with the values already stored in the look-up table.This number is used to find (from the look-up table) the heart rate in beats per minute. The number so obtained is converted into a 3 digit number in binary coded decimal (BCD) form. The same is output to the 7-segment LED displays in a multiplexed manner. The display shows the rate for a while and to another measurement. Thus beat rates obtained from time to time are visible on the display.

D. *Flow Chart*

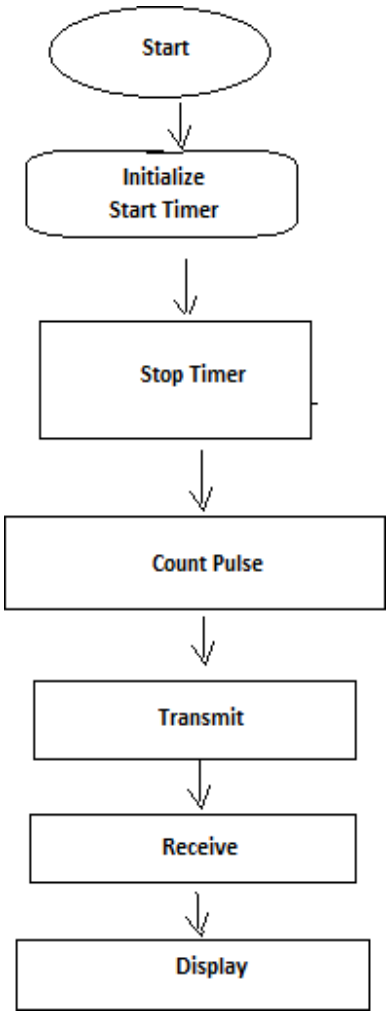

Figure 3

CONCLUSION

Clinical observing gadgets can be straightforward, or complex. Be that as it may, the expansion of remote innovation extraordinarily improves ease of use, increment electrical wellbeing, and gives a new and more regular method for conveying information that can now be achieved considerably more effectively than previously. Similarly, as cells have liberated us from the limits of a room, remote innovation can liberate patients from the limits characterized by the length of the link. The current framework gives low-power, minimal expense, significant distance, and double mode checking, which is appropriate for destitute individuals in the Third-World nations. The utilization of the PIC, ATMEL, and correspondences processor for building squares of the observing framework has the advantages of knowledge, reduced size, and unwavering quality. By the guide of this profoundly incorporated chips, outer parts, and henceforth wirings are kept to a base. A further benefit of this framework is its low-power utilization, which is alluring for compact applications.

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Project on Smart and Safety Window

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***Abstract*-**Rain water sensing window is very useful to protect the interior of houses as it works automatically by sensing the water. It is particularly very helpful device to use in rainy season. This invention can be used successfully for domestic purpose. This system can evaluate whether the water particles are contracting with the window or not and sensing this will close automatically to protect the interior of the house, and will automatically open when there is no rain outside. Not only that, the main key feature that makes it more use full and increases its effectiveness is its gas sensing feature. It will automatically get open if there's any leaking of gas, and put a buzzer on.

Keywords- SMART WINDOW, GAS SENSOR, RAIN SENSOR, RAIN DETECTION, GAS LEAKAGE DETECTION

I. Introduction

A) Rain Sensor

Rain water sensing window is very use full to protect the interior of houses as it works automatically by sensing the water. It is particularly very helpful device to use in rainy season. This invention can be used successfully for domestic purpose. This system can evaluate whether the water particles are contracting with the window or not and sensing this will close automatically to protect the interior of the house, and will automatically open when there is no rain outside. Not only that, the main key feature that makes it more use full and increases its effectiveness is its gas sensing feature. It will automatically get open if there's any leaking of gas and put a buzzer on.

B) Gas Sensor

Gas leakage is a serious problem and nowadays it is observed in many places like residences, industries, and vehicles like Compressed Natural Gas (CNG), buses, cars, etc. It is noticed that due to gas leakage, dangerous accidents occur. The Liquefied petroleum gas (LPG), or propane, is a flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, and vehicles because of its desirable properties which include high calorific value, less smoke, less soot, and major harm to the environment. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. These gases can catch fire easily. In homes, LPG is used mainly for cooking purposes. When a leak occurs, the leaked gases may lead to an explosion. Gas leakage leads to various accidents resulting in both material loss and human injuries. Home fires have been occurring frequently and the threat to human lives and properties has been growing in recent

years. The risks of explosion, fire, suffocation are based on their physical properties such toxicity, flammability, etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. The Bhopal gas tragedy is an example of accidents due to gas leakage. The reason for such explosions is due to substandard cylinders, old valves, no regular checking of gas cylinders, worn out regulators and a lack of awareness of handling gas cylinders. Therefore, the gas leakage should be detected and controlled to protect people from danger. An odorant such as ethane thiol is added to LPG, so that leaks can be detected easily by most people. However, some people who have a reduced sense of smell may not be able to rely upon this inherent safety mechanism. A gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage. A number of research papers have been published on gas leakage detection techniques. K. Padmapriya proposed the design of a wireless LPG monitoring system. In this paper, the user is alerted about the gas leakage through SMS and the power supply is turned off. Meenakshi Vidya proposed the leakage detection and real time gas monitoring system. In this system, the gas leakage is detected and controlled by means of an exhaust fan. The level of LPG in cylinder is also continuously monitored. Selvapriya proposed the system in which the leakage is detected by the gas sensor and produce the results in the audio and visual forms. It provides a design approach on software as well as hardware. In the existing method, different gas sensing technology is used. In this paper a low-cost advanced sensor-based gas leakage detector, alert and control system is proposed and discussed. The system is very efficient, user friendly, portable, small in size and cost effective. It will cost around 800 Rs. only.

Fig. 1 Rain Sensor module and Gas Sensor module

II. REASEARCH ELABORATION

A) BITS AND PIECES TOGETHER

I) OBJECTIVES

Goals and benefits to the end customer of the responding system are listed below:

- Prevent rooms and furniture from getting soaked by rains while window is left open
- Maintain indoor air quality, specifically maintaining the Particulate Matter 10 (PM10) at a comfortable and innocuous level
- Maintain indoor room temperature at a comfortable level, preventing overheating or under cooling.

ii) LIST OF COMPONENTS

I. Arduino Uno
II. Catalytic bead gas sensor (pellistor)
III. LDR(light depending resistor)
IV. Rain sensor(infrared radiation)
V. LM393 Comparator
VI. 4 channel 12v relay
VII. Sliding window prototype
VIII. Servo motors
IX. L298N
X. Battery bank
XI. PCB board
XII. BUZZER
XIII. Led

iii) ADVANTAGES AND DISADVANTAGES

1. Rain Sensor

Based on available information of automatic window opening and closing different advantages and disadvantages can be summarized as follows:

i) Advantages:

- The main advantages of automatic window opening and closing are their low cost and high effectiveness.
- Permitting a wide range of applications and versatility in the buildings (especially like IT Companies).
- It requires no special skill to operate (because of automation) and therefore is most suitable for rural application.
- It can be made from locally available materials.
- Less expensive to install and operate and can be easily made and maintained

ii) Disadvantages:

- Sensor may get damage due to some natural affects like high speed flow of air in the atmosphere.
- Some Space is required inside the building.
- Automatic window will take more time (Especially after the flow of rain it takes more time to open the window).

2. Gas Sensor

i) Advantages

- Simple and low cost technology.
- Measures flammability of gases.

ii) Disadvantage:

- It requires air or oxygen to work.
- It can be poisoned by lead, chlorine and silicon.

B) Use of Simulation Software

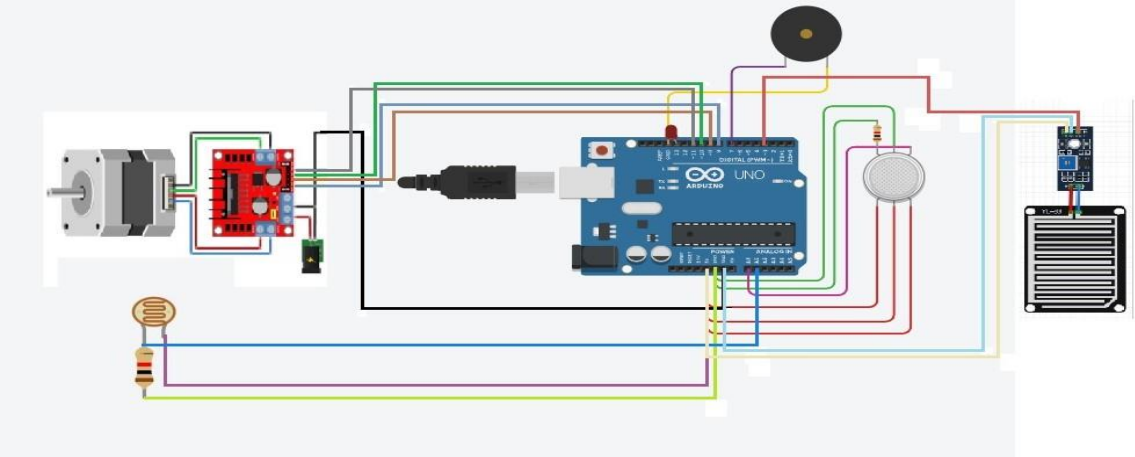

Fig. 2 Project outline (Here we used tinkercad.com for project's testing purposes).

III. RESULTS OF FINDING

A) PROJECT AIM

The aim of this project is also to automatically detect and stop leakage. We are used the gas sensors here. These sensors usually employed an audible alarm to alert people when a dangerous gas has been detected.

B) CIRCUIT DIADRAM

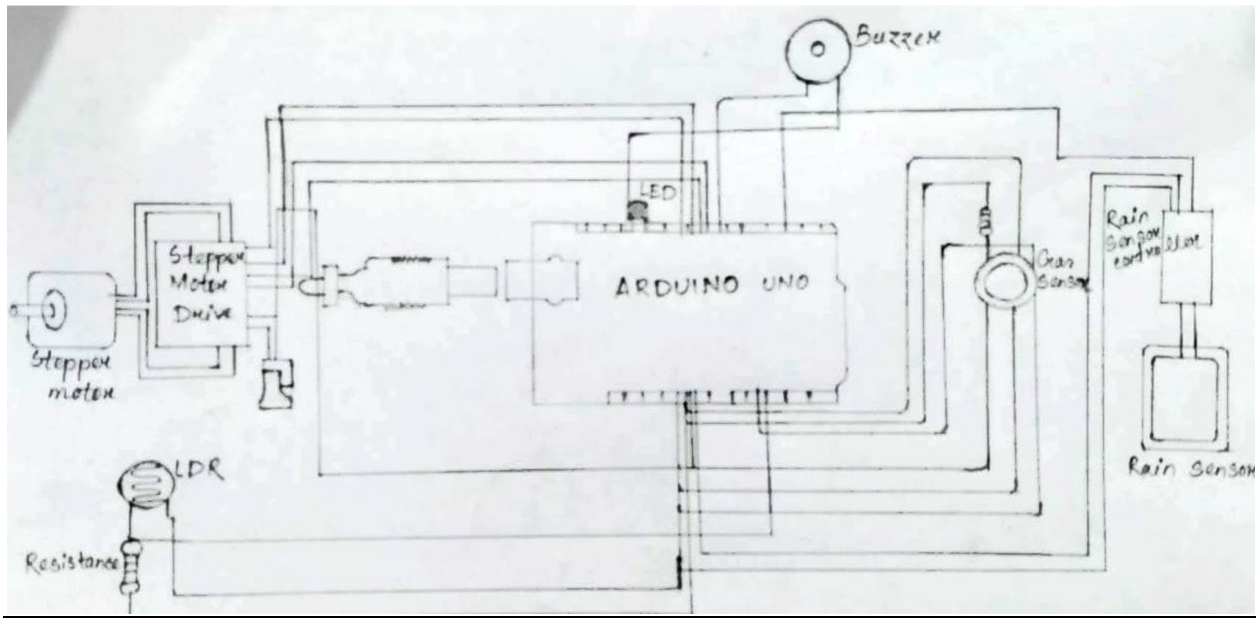

Fig. 3 A simple model of the circuit, shown by which the systems of the project is going to work.

IV. CONCLUSION

This project is a simple step towards the innovation and to make our daily life hazard free. It might be simple but it having its own effectiveness as well as efficiency. This can be further developable. This will help to ensure your safety and works as a helping hand in need.

ACKNOWLEDGEMENT

This work is the result of inspiration, support, guidance, motivation, co-operation and facilities that were extended to us at their best and most by persons at all level, we are indebted to them. It gives us great pleasure and we take this opportunity to express our deep sense of gratitude to our project guide, Ms. Debodyuti Upadhyay for her resourcefulness and support that helped us out of any difficulties we faced during the project. Her effective planning, co-ordination, skill, knowledge and experience have made it possible for us to successfully complete the project with stipulated time. We are profoundly grateful to our HOD of Electrical Engineering Department, Dr. Papun Biswas for his continuous co-operation. We express our sincere thanks to all the Technical Assistance who helped us with various technical supports that we needed for successful completion of our project. We are indebted to our friends and well-wishers for their constant support and immense help.

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A State of Art Review on wearable antenna

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Abstract- Wearable antennas have gained much attention in recent years due to their attractive features and possibilities in enabling lightweight, flexible, low cost, and portable wireless communication and sensing. Such antennas need to be conformal when used on different parts of the human body, thus need to be implemented using flexible materials and designed in a low-profile structure. Ultimately, these antennas need to be capable of operating with minimum degradation in proximity to the human body. Such requirements render the design of wearable antennas challenging, especially when considering aspects such as their size compactness, effects of structural deformation and coupling to the body, and fabrication complexity and accuracy. Despite slight variations in severity according to applications, most of these issues exist in the context of body-worn implementation. Moreover, measured transfer functions show that these textile antennas possess excellent transient characteristics, when operating in free space as well as on the human body. They can operate in the entire UWB band approved by the Federal Communications Commission (3.1–10.6 GHz). Despite slight variations in severity according to applications, most of these issues exist in the context of body-worn implementation. This review aims to present different challenges and issues in designing wearable antennas, their material selection, and fabrication techniques. More importantly, recent innovative methods in back radiations reduction techniques, circular polarization (CP) generation methods, dual polarization techniques, and providing additional robustness against environmental effects are first presented. This is followed by a discussion of innovative features and their respective methods in alleviating these issues recently proposed by the scientific community researching in this field.

Keywords- Wearable devices, Wearable antennas, flexible, reconfigurable antennas, energy harvesting for wearable devices, specific absorption rate (SAR).

I. Introduction

The Fifth Generation (5G) network is a promising technology which will not only fulfil this exponentially increasing data rate requirement for mobile terminals, but also will enable
integration with various services [1]. The overview of different technologies used in future 5G networks can be seen in Figure 1. IoT is another technology foreseen to be enabled by the
full deployment of 5G networks, wirelessly interconnecting all ``things," from household equipment to daily consume devices. According to forecasts from Ericsson [4], it is estimated
that about 28 billion smart devices will be connected across the global world by 2021 using legacy technologies and new wireless RF formats. Such connections will be the major enabler for applications in consumer electronics, building security and automation. A substantial portion of the consumer electronics segment is envisioned to be implemented as part of consumer outfits. Wearable devices are expected to be an integral part of the Internet of Things (IoT) [3] (see Figure 2). According to Cisco annual report of Virtual Networking Index (VNI,2014-2019) [5], the amount of traffic from wearable devices will increase to 277 petabytes per month by 2019, and the number of wearable devices will rise to 578 million in 2019.This is a five-fold increase compared to devices in 2014.Wearable devices are those which can be worn by a person and have the capability to connect with each other directly or through embedded cellular connectivity. They communicate with external devices through their embedded wireless modules, which interoperates with other components such as a battery, sensors, and antenna. Antennas in one of the most significant components in wearable devices as they contribute to the overall efficiency of a wearable wireless link.

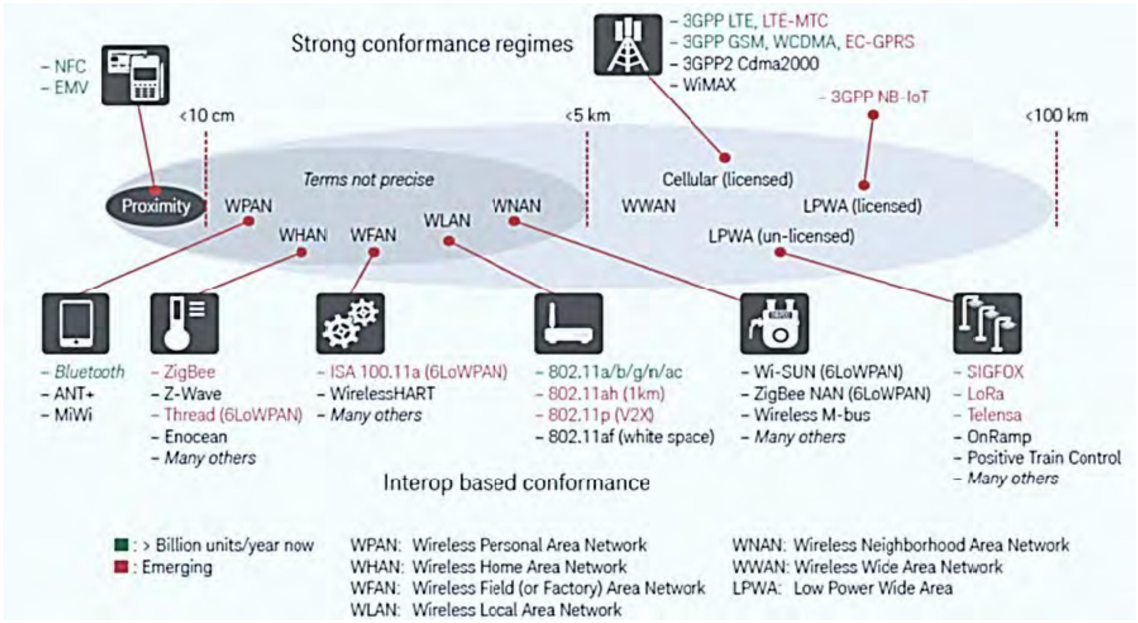

Figure 1. Overview of the different technologies used in future 5G networks

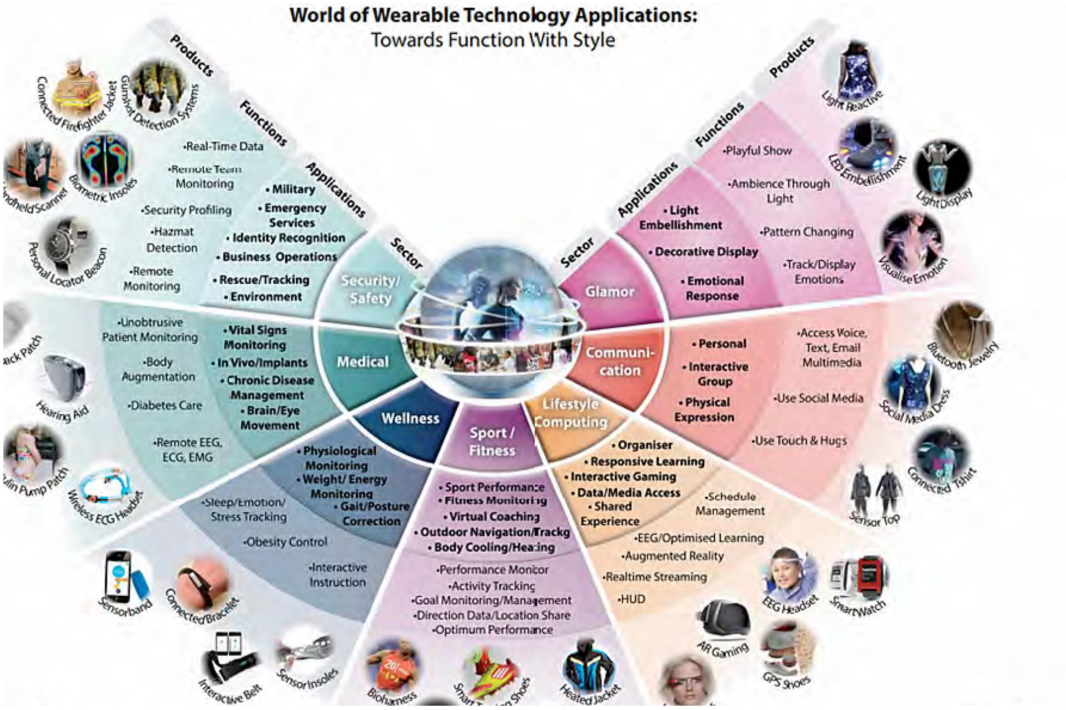

Figure 2. World of wearable Technology

II. Flexible Materials for Wearable Antennas

Wearable antennas are built using different kind of conductive and dielectric materials. These materials are carefully chosen to provide a reasonable number of mechanical deformations (bending, twisting and wrapping) with minimal influence based on different weather conditions and proper EM radiation protection. Recently, various types of conductive material represent according to nature of polyethylene terephthalate (PET), Polyethylene naphtholate (PEN) substrates comes with predefined stable dielectric properties.

III. Materials what is used

Generally dielectric constant high and materials would be nature of perfect ground substrate and highly nature of (DGS) Defected Grounded Structure and nature of created result of nature of related substantial nature of created path of nature related to path of nature of related feature of nature of substrate which reciprocates the nature of created to get radiation pattern in polar plot. Somewhat, material will be high conductive in nature creates high dielectric properties in nature. Thus, the material comes in place of nature high conductive.

IV. Wearable Single and Dual Polarized Antennas

Wearable devices being potentially the most effective outdoor location tracking system, the design of circularly-polarized wearable antennas which can function with least disruptions to their operation, given the dynamics of the human-body, will enable its effective features. Global Navigation Satellite System (GNSS), which requires the antenna to be circularly polarized and broadband to support the multiple satellite constellations. For, multiple satellite constellations, there are large number of Precise Point Positioning (PPP), Real-Time Kinematic system (RTK) which need the base station and receiver in circularly polarized single and dual polarized antennas. For, multiple satellite constellations, thus will be precised in different position.

V. Summary

Wearable antennas are one of the critical components in the realization of wearable and portable devices, which will be setup as hand-held, on-body and off-body antenna. Due to their lightweight, flexibility, low cost and conformal characteristics, they are ideal for wireless communication and sensing applications in a woven form. Since, antenna needs low-loss dielectric material and highly conductive materials for efficient EM radiation reception/transmission, highly conductive materials such as copper, conductive fabric, metallic inks. This is followed by the important design and operational issues - back radiation mitigation, miniaturization methods, circular polarization generation techniques, compliance to regulatory EM absorption limits, operation robustness in extreme outdoor environments, alleviation of body effects, and susceptibility to structure deformations. Thus, ensemble types of current radiation

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Voice Controlled Robotic Vehicle

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***Abstract*— The paper is designed to control a robotic vehicle by voice commands for remote operation. An ARM series microcontroller is used together with an Android Application for the desired operation. These vehicles, which can be controlled remotely or autonomously with the help of controller and sensors on them, can be used in many tasks such as military, industrial, etc. The Google Voice and Voice-Bot application is used for voice commands. The Bluetooth module is connected with the mobile app. Once done, the commands which are given through the mobile get sent to the Arduino via the module. After receiving the commands, Arduino operates the motors in order to move the vehicle in four directions. The communication between android device and receiver is sent as serial communication data. Arduino program is designed to move the motor through a motor driver circuit as per the commands sent by android device.**

***Keywords*— Arduino UNO, Android Application, Bluetooth module, DC Servo motor.**

I. INTRODUCTION

The project Voice Controlled Car helps to control robot through voice commands received via android application. When they say voice control, the first term to be considered is Speech Recognition that is making the system to understand human voice. Speech Recognition is a technology where the system understands the words (not its meaning) given through speech. It describes the implementation of a voice-controlled robotic car using Arduino. In this project, the user gives specific voice commands to the robot through an Android app installed on the smartphone. At the receiving side, a Bluetooth transceiver module receives the commands and forwards them to the Arduino on the robotic car.

II.DESIGN

The system consists of a transmitter (Android smartphone) and a receiver (robot). Block diagrams of the transmitter and receiver sides are shown in Fig 1&2 respectively. Screenshot of the home screen of Voice control app is shown in Fig. 3.

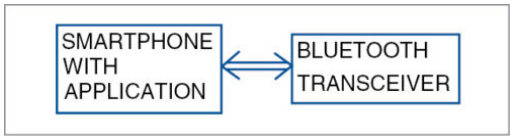

Fig 1 Block diagram of transmitter side.

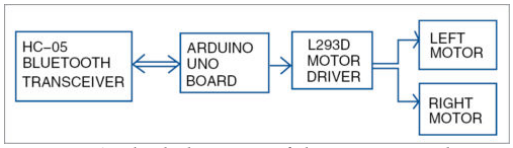

Fig. 2 Block diagram of the receiver side.

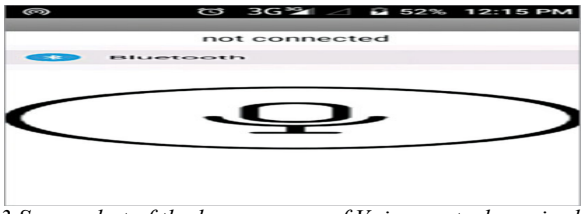

Fig. 3 Screenshot of the home screen of Voice control app is shown.

II. METHODOLOGY COMPONENT

1. Arduino Uno

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno.

2. Bluetooth Module

HC-05 is a Bluetooth Module device used for wireless communication with Bluetooth enabled devices (like smartphone). It communicates with microcontrollers using serial communication (USART).

Default settings of HC-05 Bluetooth module can be changed using certain AT commands.

As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, there is no need to shift TX voltage level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

3. Motor Driver

A motor driver IC is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. For this tutorial we will be referring the motor driver IC as L293D only. L293D has 16 pins.

4. Robot Chassis withy motors and wheels

The 2 Wheel Drive Robot Chassis is the perfect mechanical platform for our robotics projects. This kit includes all the hardware and mechanical components required to build your robot, including motors, wheels, chassis, nut and bolts, etc. Just add your electronics – Arduino and Motor Driver and we can start programming our robot. It offers a large space with predrilled holes for mounting sensors and electronics as per your requirement. This robot chassis lets us get our mechanical platform ready in minutes and quick start our robot building process. It allows us to spend our time and effort on programming our robot rather than designing and fabricating our own custom platform.

III. BLOCK DIAGRAM

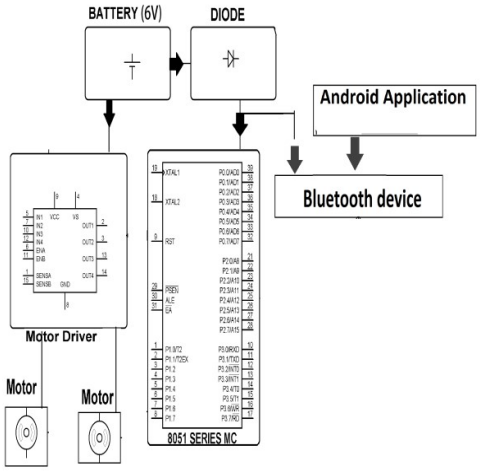

Fig. 4 Block diagram of the system.

IV. ALGORITHM

Step 1: Start
Step 2: Wait for the message to be received.
Step 3: If the signal received is 'GO' then motor 1 and motor 2 moves forward.
Step 4: If the signal received is 'BACK' then motor 1 and motor 2 moves in the reverse direction backward.
Step 5: If the signal received is 'LEFT' then motor 1 moves forward while motor 2 moves backward.
Step 6: If the signal received is 'RIGHT' then motor 1 moves backward and motor 2 moves forward. Motor 1 and motor 2 stop .
Step 7: Go to step 2.

V.RESULT

In this proposed system a speech recognition module is not required to recognize human voice to control robot. In this system an android application is used to recognize and process human voice which is further converted into text (making use of google speech to text converter). This text is transferred to the robot using Bluetooth. This text is further processed by the controller to control the robot accordingly. Here implementation includes following procedure. Download the application "ARDUINO BLUETOOTH VOICE CONTROL" from Google play store and install it.

VI.CONCLUSION

The voice controlling commands are successfully transmitted via Bluetooth technology and on reception; the desired operations successfully take place. This project reduces human efforts at places or situations where human interventions are difficult. Such systems can be brought into use at places such as industries, military and defence, research purposes, etc.

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Steganography Analysis of Medical Images

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Abstract: Improvement of systems administration produces many advantages in telemedicine field. Yet, tragically, this office turns into a danger to security of clinical data. Steganography is regularly utilized in clinical picture handling to conceal some significant data. It tends to be finished utilizing some better form of undetectable watermarking. In Steganography, fundamental picture is kept mystery under cover picture. In our exploration work, another procedure for steganography of clinical pictures utilizing alpha mixing has been proposed. We have worked with both shading and dark scale pictures. Utilizing legitimate worth of alpha, we have adjusted pixel worth of primary as well as cover picture. During remaking, planes of the principle shading picture is supplanted by mixed picture. Hypothetically utilizing this method, a ton of pictures can be steganographic, but to get a sensibly decent result, we have worked with just two pictures. Utilizing appropriate worth of alpha, unique picture is recovered from the stego picture. PSNR values is broadly utilized for quality checking. In our exploration work, we have likewise utilized this traditional strategy.

Keywords: Steganography, Alpha Blending, Medical Image, Image Security, PSNR

I. INTRODUCTION

Alpha mixing is utilized to show an alpha bitmap which has straightforward and cloudy pixels. In everyday steganography and imperceptible watermarking should be possible in both spatial space and recurrence area. There are numerous procedures utilized for steganography in most recent couple of years. Also a few scientists have examined on watermarking as well. V. Mahalakshmi et. al investigated the exhibition of different steganography processes utilized in clinical imaging yet there is least report about consequence of numerical analysis.[1] M Nangedda et al proposed a procedure of steganography with computerized watermarking. [2] D Triapthi and his partners distributed an audit article of steganography cycles of typical pictures yet their there is no report about top quality pictures. [3] P Ganesan and R. Bhavani have clarified Picture Steganography in recurrence space utilizing Double Wavelet and Mixing Model. They have dissected the presentation of the outcome exhaustively. [4] Sachin clarified steganography in spatial area utilizing traditional LSB calculation. Anyway this is framework isn't reasonable for boisterous pictures. [5] A Patra et. al proposed a procedure of imperceptible watermarking utilizing alpha mixing. They have uncommonly involved their method in apparent watermarking [6-7]. David Ramirez et al sent off a plan for undetectable shading watermarking method in anaglyph 3D pictures. They have embedded the picture in the DCT space utilizing QIM-DM strategy [8]. Edge versatile plan is subsequently proposed by Luo et al. [9] where the idea of imperceptible watermark is utilized. Here inserted districts are fluctuated in light of the element of the picture to be implanted. The likelihood of data robbery and therefore, its unlawful use can be safeguarded by the safeguard vector geo-spatial information as presented by Yan et al. [10]. Abandons created during the evaluation of JPEG picture can be decreased to deliver more prominent BER by the technique shown by Chen [11]. The improvement becomes conceivable because of the controlling variables for change of DCT coefficient. This technique fundamentally lessens the contrast between

watermarked picture and the recovered picture. In our proposed scheme, we have used one color image and one gray scale image for hiding. The entire color image is divided into three planes – red, green and blue respectively. Value of alpha selected is 0 to 1. With the value of selected alpha, pixel values of both main image and cover image is modified. During reconstruction, the particular plane is replaced by blended image. By varying the value of alpha, we have performed steganography process of selected medical image. Finally using conventional PSNR value for quality checking, we have analyzed that our result is quite satisfactory.

II THEORY

Let us assume that selected images are $f_1(x,y)$ and $g_1(x,y)$ respectivly. $f_1(x,y)$ is the color image which is used for hiding the main image and $g_1(x,y)$ is the gray scale medical image. Here three planes of color image $f_1(x,y)$ is represented by $f_r\,(x,y)$, $f_g\,(x,y)$ and $f_b\,(x,y)$ respectively. At first, we have multiplied each pixel of red plane $f_r\,(x,y)$ of the color image by different values of alpha (α). The resultant image is represented by n_1.

Similarly, each pixel of the second image $g_1(x,y)$ is multiplied by alpha (1-α). The resultant image is stored by n_2. The sum total two multiplied images formed the blended image. It is represented by p_1. Similar process is done with each pixel of green plane $f_g\,(x,y)$ and blue $f_b\,(x,y)$ of the color image. Mathematically we can write as:

$$n_1 = \sum f_r\,(x,y) * \propto \quad \text{---------- (1)}$$

$$n_2 = \sum g_1\,(x,y) * (1-\propto) \quad \text{---------- (2)}$$

$$p = \sum n_1 + n_2 \quad \text{---------- (3)}$$

The sum total *p* is also a gray scale image. During reconstruction of the color image, we have replaced one plane by *p* to get blended colour image. We have calculated PSNR using the formula;

$$PSNR = 10\log_{10}\frac{R^2}{MSE}$$

PSNR indicates Peak Signal to Noise Ratio and MSE denotes Mean Square Error.

III RESULT

We have workred on Matlab 2015 software.

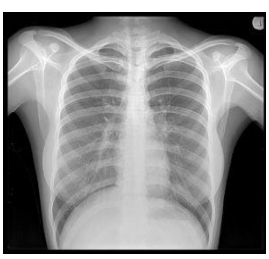

Fig 1 (a) Color Image 1(b) Medical Image

We have first alpha blended with red plane $f_r(x, y)$ of the color image $f_1(x, y)$. Value of alpha is taken from 0 to 1. Then we have replaced the red plane $f_r(x, y)$ with blended image. The output of each different value of alpha is shown in Fig 2.

α = 0.5 α = 0.75 α = 0.9 α = 0.1

Fig 2: Blended image for different values of α when Red plane is replaced

α = 0.5 α = 0.75 α = 0.9 α = 0.1

Fig 3: blended image for different values of α when Green plane is replaced

α = 0.5 α = 0.75 α = 0.9 α = 0.1

Fig 4: Blended image for different values of α when Blue plane is replaced

Corresponding PSNR values are represented in tabular form.

Table- 1

PSNR values for RED Plane

Alpha	PSNR
0.1	32.6
0.5	32.4

0.75	32.3
0.9	32.3

PSNR values for GREEN Plane

Alpha	PSNR
0.1	34.1
0.5	34.4
0.75	34.8
0.9	31.7

PSNR values for BLUE Plane

Alpha	PSNR
0.1	32.7
0.5	32.6
0.75	32.4
0.9	31.6

IV CONCLUSION

For our examination work, we have utilized worth of alpha from 0.1 to 0.95. Results propose that the alpha bowing procedure for steganography of clinical picture gives great strength, as clear from the PSNR table. Notwithstanding, it has been seen that with the expansion of alpha, imperceptibility of the fundamental picture is expanding. Recreated yield demonstrates that mixing with alpha worth near 0.1 is best for steganography. We have additionally seen that with the lessening of alpha worth, worth of PSNR is expanding for each plane. This basic procedure can be utilized for steganography of two-shading pictures which will be examined in future correspondence.

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Plant Leaf Disease Detection using Support Vector Machine

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Abstract- In the agricultural area, identifying plant diseases is quite challenging. Manually monitoring plant diseases is really tough. The key to reducing losses in agricultural product output and quantity is early detection of plant diseases. Plant disease research include looking at visually discernible patterns on the plant If the identification is erroneous, there is a significant loss in crop yield and market economic value. As a result, we may apply image processing in MATLAB to identify leaf illness. The steps for illness detection include loading the image, contrast enhancement, converting RGB to HSI, feature extraction, and SVM.As a result, image processing is utilized to detect infections in plants. Disease detection entails a number of steps. Image capture, image pre-processing, image segmentation, statistical feature extraction, and so on are all steps in the process classification. For segmentation, the K-means clustering technique is utilized, and for classification, the support vector machine is used disease categorization. After that we got 99% of the accuracy.

Keywords- Image Processing, Leaf diseases detection, K-means clustering, feature extractions,SVM Classification.

I. INTRODUCTION

The economy of developing countries like India relies mainly on agriculture. Due to plant diseases, the quality and quantity of agricultural products have declined. Plant diseases are mainly caused by fungi and bacteria, and the life cycle of microorganisms cannot be predicted. Some plant diseases are not visible in the early stages, they only appear in the final stages. Disease detection in agriculture is an important research field in India. We found that agriculture, forestry and fisheries accounted for 20.00% of GDP [1]. Therefore, it has become an important research area because the use of image analysis to classify diseased leaves can significantly reduce the cost of treatment. To this end, a four-step method is applied, starting from the acquisition of the image to its segmentation, feature extraction, and classification as the final result of the project.

1.The diseases of plant leaf features are described as,

Infectious agents such as fungi, bacteria, and viruses are commonly responsible for plant illnesses. Plant disease signs are obvious indications of infection, while symptoms are the visible repercussions of these diseases. Symptoms of fungal infections include visible spores, mildew, or mould, as well as leaf spot and yellowing.

Fungal diseases are fungi-caused plant disease. Fungi can be solitary or multicellular, but both take nutrients and tear down tissue to infect plants. The most prevalent type of infection in plants is fungus. Plants have various distinct symptoms or diseases effects that might be observed. Symptoms of fungi infections include spots on plant leaves, yellowing of leaves, and birds-eye marks on berries. When it comes to some fungal diseases, the organism can be seen on the leaves as a growth or a mould.

1.1 Fungal infection on a leaf:

Malformations on stems or the undersides of leaves could be the cause. Signs of infection are direct observations of the disease-causing organism. Bacteria are prokaryotic single-celled creatures. Bacteria may be found almost everywhere, and while many are beneficial, others can cause disease in humans and plants. Because bacteria are small, their signals are sometimes more difficult to detect than those of fungi. Bacterial

ooze is a milky white liquid that appears when you cut an infected stem. One symptom of a bacterial illness is this. Water-soaked lesions, which are wet areas on leaves that exude bacteria, are another symptom. The lesions eventually expand and form reddish-brown blotches on the leaves as the disease proceeds. Leaf spots or fruit spots are a typical indication of bacterial illness. Unlike fungal spots, these are frequently enclosed by leaf veins.

1.2 Bacteria-affected leaf:

Viruses are infectious particles that are too small for a light microscope to detect. They infiltrate host cells and take over host machinery, forcing the host to make decisions they don't want to make. Plants show no symptoms of viral infections because viruses are invisible even under a light microscope. There are, however, signs that a trained eye can detect. Mosaic leaf patterns, yellowed leaves, and crinkled leaves are all examples of this. Symptoms of a viral infection Many plant viruses, such as the tobacco mosaic virus, receive their names from this typical pattern of discoloration. Reduced plant growth is also a common symptom of viral infections.

II. LITERATURE SURVEY

Leaf Disease Detection Using Deep Learning Algorithm by **Patil et al. (2020) [2]** The CNN algorithm has two layers. The feature extraction layer comes first, followed by the feature extraction layer. The accuracy of the CNN approach for detecting plant leaf disease is up to 86.26 percent.

Kaur et al. (2019) [3] proposed a method for Detecting Plant Diseases Using Image Processing and Classification. For feature analysis, the author applied the Gray-Level Co-Occurrence Matrix (GLCM), and for detection, the author used the KNN classifier. The accuracy of this technique for recognition was up to 95%.

Htun et al. (2018) [4] identified the development of paddy diseased leaf classification system using modified color conversion.143 no's of data samples are used for classification and identification of diseased paddy leaf. Only four diseases are covered by this system: leaf blight, brown spot, leaf blast, and leaf streak. Statistical, color, and texture information based on SVM can be used to detect and classify paddy disease.

Zhang et al. (2017) [5] Super pixel clustering and the EM method were used to segment plant disease leaf images. It is utilized in pixel clustering, which compares neighboring pixels with some property in terms of brightness, texture, and color and groups them into a homogenous zone. For Image segmentation, the EM algorithm is utilized.

Singh et al. (2016) [6] Image segmentation and soft computing techniques are used to detect plant leaf diseases. The author presented an image recognition and segmentation procedure for plant leaf disease, with the minimal distance criterion and SVM being applied for classification. To carry out the experiment, Data sample is taken from rose leaf, lemon leaf, banana leaf and beans leaf. The R, G, and B components of the input image are mapped to the threshold images using co-occurrence features. The co-occurrence features of the leaves are retrieved and compared to the feature library's corresponding characteristics.

Rajleen Kaur et al. (2015) [7] To improve plant disease identification, the classifier Support Vector Machine has been improved. The training dataset and train data sets are two data sets used by the Support Vector Machine. The training image and the trained image are compared here. After that, picture masking is performed to identify the healthy, diseased, and histogram images. Finally, the diseased and healthy picture areas are compared, and the result is displayed as a percentage of disease fractions with the disease name indicated.

Amoda et. al. (2014) [3] K means clustering algorithm tries to divide the objects (pixels) into K number of classes on the basis of features. In our approach we divide the leaf image into four clusters or segments with the help of K means clustering where those segments containing diseases are separated from those free of any disease. If more than one segment contains diseases, the leaf is said to have more than one disease. The best outcome of the algorithm is when leaf is classified for 3-4 segments.

III. RESEARCH ELABORATION

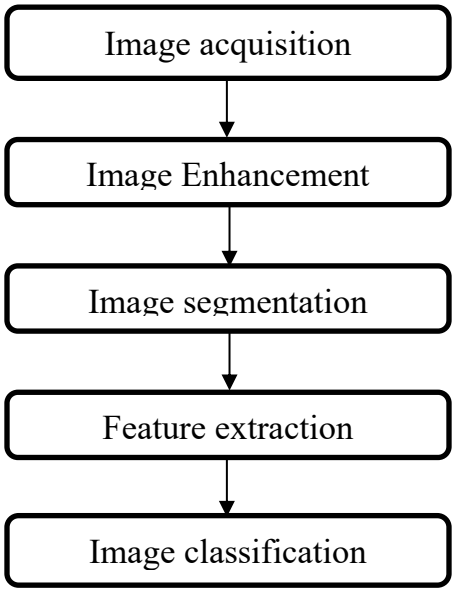

Fig: Recognition Block Diagram

Dataset:

The dataset was taken from Kaggle of village plant dataset and Pomegranate dataset.
i.This dataset was taken from Kaggle of village plant dataset.

ii.I have collected this dataset from nearest agriculture field of Rampurhat in the district of Birbhum,West Bengal.

Image Acquisition: Images can be captured with a digital camera, and data can be preserved by using the images. The data set was then used for training as well as a comparison of disease leaves and healthy leaves.

Enhancement: The contrast of images is improved using the enhancement approach. The contrast enhancement might be useful in removing noise from an image.

Fig: Image Enhancement

Image Segmentation: This phase seeks to reduce an image's representation so that it becomes more meaningful and easier to understand. This phase is also the essential method to image processing because it is the foundation of feature extraction. Images can be segmented using a variety of approaches, including k-means clustering, the Otsus algorithm, and thresholding. The k-means clustering algorithm divides objects or pixels into K number classes based on a set of features. The items and their accompanying clusters are classified by minimizing the sum of squares of distances between them.

K-means: The k-means method attempts to divide a data set containing information into a predetermined number of clusters (k). Initially, a set of k centroids is chosen. The centroid of a cluster is a data point that is located in the middle of the cluster. The centroids are chosen at random from the current input data set, such that each one is distinct and different from the others. The SVM is trained using these centroids. After that, it generates a randomized collection of clusters.

Fig: Clustering of Leaves

Feature Extraction: As a result, the characteristics from this area of interest must be retrieved in this stage. These characteristics are required in order to deduce the meaning of a sample image. Color, shape, and texture can all be used to create features. Recently, the majority of researchers have expressed an interest in using texture traits to detect plant disease. Feature extraction is a crucial step in extracting the region of interest. The essential features calculated and treated as feature values in our proposed method include mean, standard deviation, entropy, IDM, RMS, variance, smoothness, skewness, kurtosis, contrast, correlation, energy, and homogeneity. The feature vector for these values was then constructed. The segmented method displays several image values.

Classification: In machine learning, a support vector machine is classified as a supervised learning model. The main applications of SVMs are classification and regression analysis. To provide an output, SVM must be linked to a learning algorithm. In comparison to other procedures, SVM has delivered higher results for classifications and regressions. There are two types of training: basic and advanced. The SVM training technique generates a model that assigns new samples to one of two categories, making it a binary linear classifier that is non-probabilistic. The SVM representation depicts points in space that are also mapped, allowing the examples to be shown as they have been divided by a distance as wide as possible.

IV. RESULTS OF FINDING

These features are acquired in this paper: energy homogeneity, Multi SVM, kurtosis, Skewness IDM, Contrast correlation, standard deviation, entropy, RMS, variance smoothness. The original image is obtained from the database, then K-mean clustering is applied to produce distinct clustering images, which are then contrasted and segmented. Alternaria Alternate, Anthracnose, and Bacterial Blight and healthy, potato late blight, bacterial blight are the three diseases identified from a particular leaf.

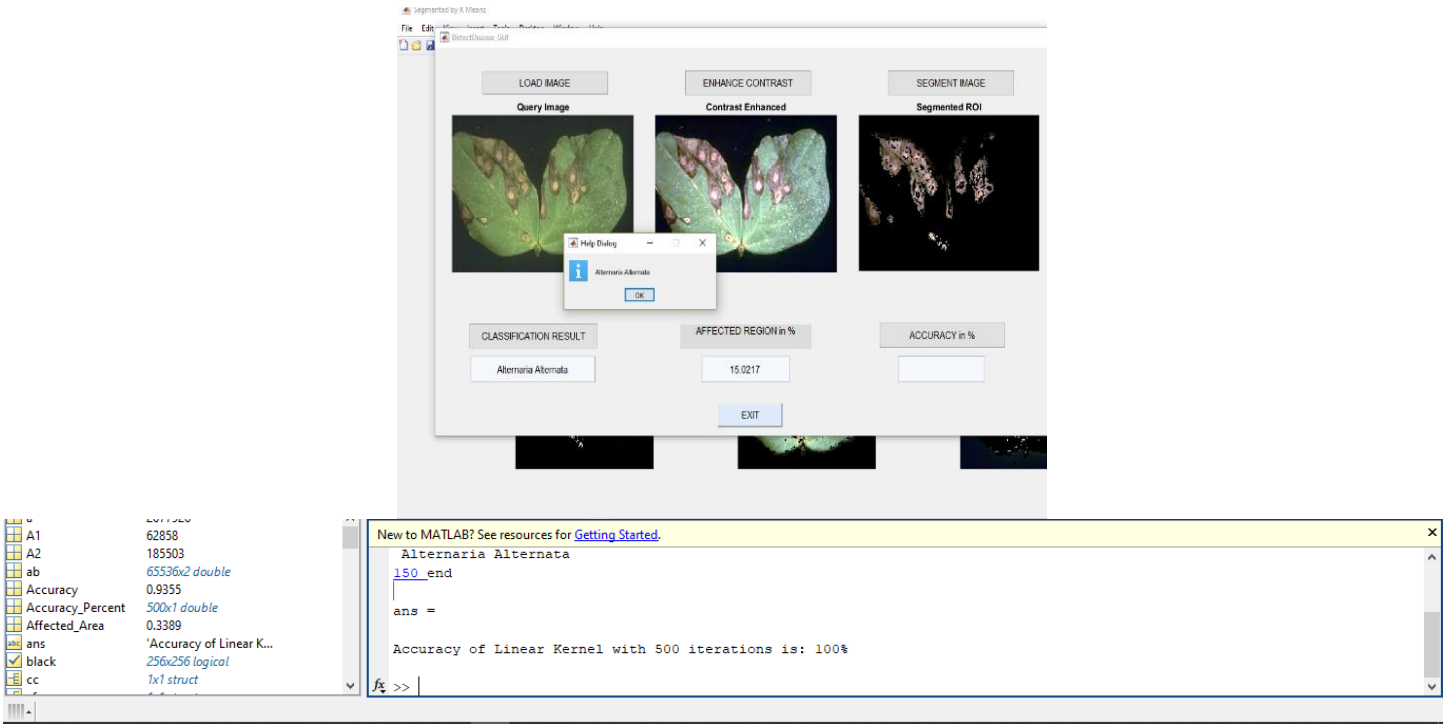

Fig: Result for Alternaria Alternata Disease Leaf

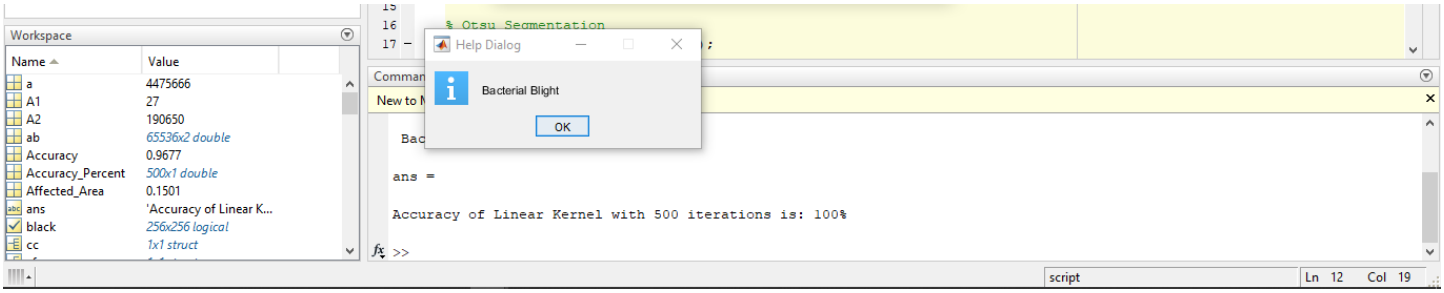

Fig: Result for Bacterial Leaf

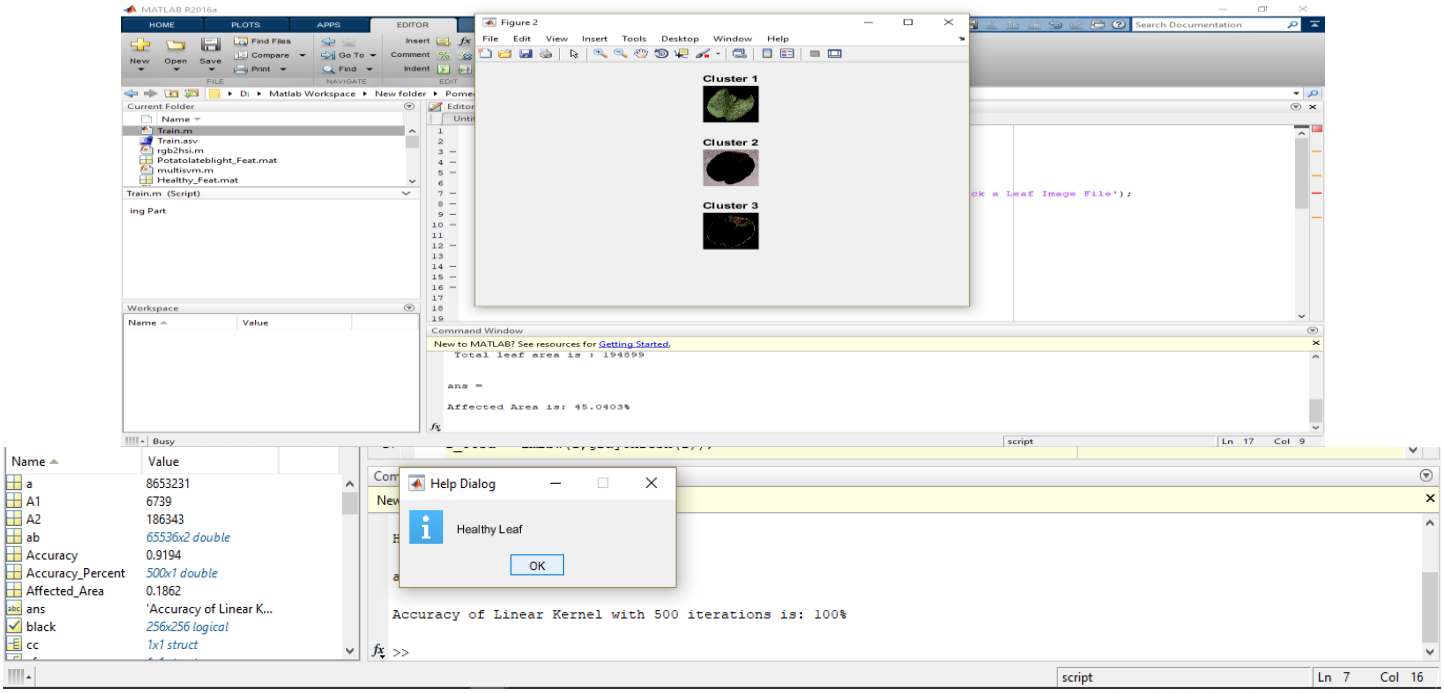

Fig: Result for Healthy Leaf

V. CONCLUSION

The suggested system's primary goal is to identify the disease. The outcome demonstrates a helpful strategy that aids in the accurate diagnosis of disease leaves A method for computer-assisted segmentation and classification is proposed. The K-means clustering algorithm is utilized for segmentation, and the support vector machine is employed for classification. The statistical parameters are applied as classification features. The work can be used to determine the status of a pomegranate leaf, and it can also be expanded to determine if a leaf is diseased or healthy on plant. It also has the ability to classify various disorders. As a result, associated diseases for these plants were investigated. The best results were obtained with very little computing effort, demonstrating the efficacy of the proposed method in recognizing and classifying leaf disorders. Another advantage of this method is that plant illnesses can be detected at an early stage, or even at the beginning. This strategy could help farmers avoid a major loss.

VI. Acknowledgment

I have collected this dataset from nearest agriculture field of Rampurhat in the district of Birbhum, West Bengal.

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