

**JIS**

**Innovations**

**Catalogue**

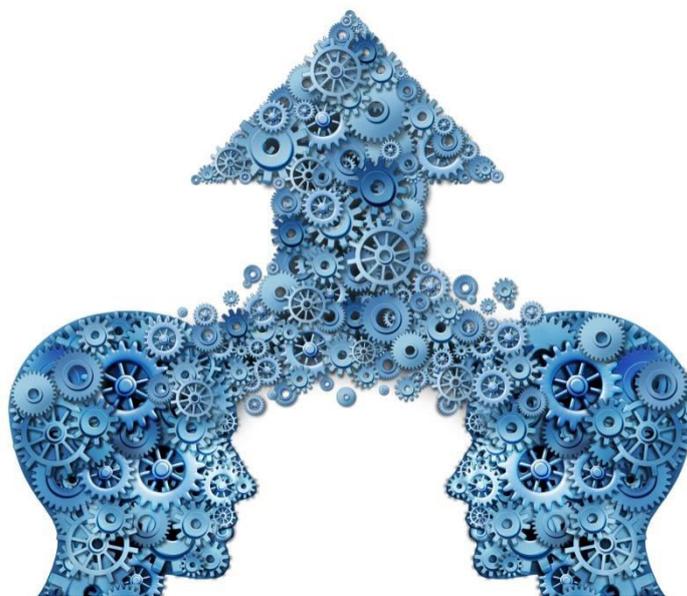
## Innovation, Research and Development



Improving high-quality scientific research is a necessary requirement for creating successful applications. The objective of Research & development (R&D) and innovative initiatives undertaken by JIS College of Engineering (JISCE) is to build research careers, internationalization of human potential, support to strengthen the knowledge foundation and promote the creation of new applications, as well as societal impact of education, research and innovation. All education, research and innovation of this

Institute should aim to be of a high standard. The goal of creating technological and social innovations has emerged alongside R&D-based activities.

To achieve the high quality research ambience the following policies has been undertaken. A research development cell has been established that will prepare and implement the documents for development of research and development activities within the Institute.



## Future Proofing



## CII Center for Innovation at JISCE

Confederation of Indian Industry (CII) furnished a 'Centre for Innovation' to JIS College of Engineering, West Bengal, India. Facility creations alike project funding; technological guidance as well as mentoring service on innovation is implemented from CII Centre for Innovation. Various conferences like IPR Awareness Programme, Competition on Business Model, Best Innovative Minds Competition are all organized from CII Centre for Innovation.



*Inauguration of CII Center for Innovation by Managing Director, JIS Group.*



## Foreign Delegate visit in CII Center for Innovation, JISCE



Innovators with Marcello Forcellini, San Marino, Asset Bank.



Innovators with Hiroyuki Yoshida, PH.D., Associate Professor of Radiology, Massachusetts General Hospital



Innovators demonstrating innovative projects to Hiroyuki Yoshida, PH.D., Associate Professor of Radiology, Massachusetts General Hospital



Marcello Forcellini, San Marino, Asset Bank trying innovative brain control module.



Rafael Brisita, Associate professor and division chair at St. Philip's College, Alamo Colleges sharing valuable advices with innovators.

**Projects and Innovations conducted by several departments of  
JIS College of Engineering  
&  
CII Center for Innovation, JISCE.**

**1. Solar Tree and Solar Street Light in JIS College of Engineering.**

Tree proves to be most beneficial source of energy. The **solar tree** blends art and solar energy technology in a sculptural expression. Solar trees are both artistic and functional clean energy machines. The term "solar tree" has been used to describe a variety of structures incorporating solar energy technology on a single pillar (like a tree trunk). Solar Tree is implemented as alternate source of energy in urban cities. The installation of large solar collectors requires a very big space which is the main problem associated with tapping solar energy. This problem can be avoided by installing a Solar Tree requiring less space instead of a no of solar panels. To satisfy pressing environmental and social demands for urban lighting solar tree opens new prospects.

Solar trees deliver the following benefits:

- Build awareness and interest in solar technology, thereby promoting its adoption
- Provide shade and a meeting places
- Differentiate properties, especially those with other hidden green building measures

Photo-voltaic cells are arranged in Fibonacci series in place of leaves in solar tree which looks is an artificial tree. The amount of energy produced by solar tree is more than an array of solar cells. Solar Tree is made of metal structure and has solar panels at the top instead of branches of real tree. Solar energy is collected by Solar panel and converts it into electricity and uses it for batteries, charging of mobile phones, portable computers and tablets. The panels and lighting use this collected energy.

**TREE stands For: T - Tree generating, R – Renewable, E - Energy and E – Electricity.**



## **2. Solar Photovoltaic Hybridization with usual Grid to compensate Peak Load Demand: 5 kW on Grid Solar Power in JIS College of Engineering.**

The 5 KW<sub>p</sub> Roof top SPV Power Plant is being set up in the college. Necessary instruments for the execution of the project have been installed. The various data of this SPV power plant is recorded and an analysis is on process. The inverter used is an isolated solar inverter which synchronizes the power from SPV plant with the existing grid. This inverter goes into an isolated state when the existing grid supply is cut off. The estimated energy that can be generated from this plant is calculated using the technical specifications of the modules, inverter and other equipments used in the project. A simulation model has been made using PVSYST, a SPV simulation software to get a loss analysis.

### **Objective of the Project:**

- i) To provide the power for the PEAK load by usual grid compensation with SPV.
- ii) Observation of Bus bars synchronization.
- iii) Estimation of annualize life cycle cost of this project for 20 years.
- iv) Estimation of carbon credit from the project.
- v) Estimation for modernization of West Bengal power plant with implementing SPV system to provide peak load demand.



### 3. SOLAR 'e-rickshaw' developed by JIS College of Engineering

The introduced prototype and its features are as follows:

1. Self sufficient on solar energy
2. Capable of a speed of 25- 40 km/h.
3. Capable of climbing up hill on an average inclination of 15deg to 30 deg.
4. Seat 4 people.

Individual Constituent parts Of Prototype:

Solar panels- 85 Watt BP solar panels placed on the roof.

Motor- Lynch motor, which offers the best efficiency greater than 90 % and has a weight of only 9 kgs. At 12 Volts the motor can run at 2.5 KW approx. 4 HP.

Batteries- The batteries mainly store the excess power from the solar panels to give backup for night hour's use. They also supply the initial torque to start the motor.

The batteries are 2 x 12 Volt Exide sealed traction, deep discharge batteries.

Solar Controller- the solar controller is like a fuse which regulates the current from the panels to the motor.

Running gear- Bicycle wheels with spokes have been used and on later versions stronger wheels will be used. A differential is incorporated in the back axle and

Brakes Hydraulic disc brake is fitted to all 3 wheels.



#### **4. Introduce Electromyography (EMG) Signal Interpretation Technique towards the Characterization of Human Arm Movement.**

This project deals with a proposed technique towards electromyography (EMG) signal interpretation for several human arm movements. Considering five important human arm movements (Extension of forearm, Flexion of elbow joint, Pronation of forearm, Shoulder abduction and Wrist flexor stretch), the EMG data clinically recorded from four essential arm muscle (Biceps, Triceps, Flex Arm and Deltoid). The activity of muscle produces the productivity with several types of arm movements. For several movements, some muscles are in active condition and others are in inactive condition for certain unit time. Introducing this phenomenon, the interpretation technique is being proposed. The real-time basis recorded EMG data processes with proper filtering and produce a knowledgebase database towards the representation of several arm movements after justified analysis. In analysis part of this research, the signals are properly enveloped and quantized with perfect sampling presented clearly with distinguish factor of arm movements. In addition, correlation technique and power spectral density (PSD) analyses technique performed towards the discrimination processes among all considering movement. Mainly, the entire research presents the technique of EMG signal interpretation with imposed of all necessary simulative analysis technique.

#### **Related Completed Funding Project:**

Project Title: “Produce the Knowledge Based Database of Electromyography (EMG) Signal to Enrich the Interpretation Technique for Different Human Arm Movement.”

Granted By: All India Council of Technical Education (Govt. of India)

Fund Value: INR 1200000, (EURO 16858)



## 5. Biogas Generation Project in JIS College of Engineering

Biogas is the gas produced by fermentation of organic matter (animal and vegetable) in the absence of oxygen and it is mainly composed of methane (CH<sub>4</sub>). This is floating type biogas generator consist of two PVC water buckets of 1000lt and 500lt capacity respectively (one bigger than the other), with the top of each bucket is cut open so that the smaller one can fit into the bigger bucket and move like a “telescope“. The bigger bucket (ordrum) serves as a digester, and the smaller, placed upside down inthe bigger one serves as the gas holder. The inlet flexible pipe, a bit longer than the height of the tank, is fitted at the bottom side ofthe bigger tank. The effluent outlet is fitted to the upper part of the bigger tank and determines the maximum level of matter in the tank. The gas outlet is fitted to the smaller inner tank and directed toward a gas stove.

### Factors Affecting Yield and Production of Biogas

- The quantity and nature of organic matter
- The temperature
- Acidity and alkalinity (pH value) of substrate
- The flow and dilution of material



## 6. Design Approach on Sophisticated Computational & Cyber Interaction for Several Types Cerebral Palsy Patient. (2CPIP)

Still cerebral palsy, handicapped and physically disabled patients are deprived from the perception of user friendly sophisticated mirandized computer interaction. The attempt is being preceded to improvement of computer interaction with trailing method for several types of cerebral palsy. Communication with surroundings for these patients is a big challenge. The professional skill maybe improved in deliberations of this proposed sophisticated cyber-interactive technique cerebral palsy. Advancement and up gradation of technology, pours the blessings on them to enjoy their sadness life with sharing and caring their emotions. The system has been already arranged here with a revolving chair fixed with pointing device from its base stand and a thin film keypad that is attached with the chair. The transformation and advancement is being requires to contribute cerebral society with introducing the several sophisticated technologies. The cerebral palsy patients will control the computer by clicking the pointing device with their chin and will enter data from keypad through tongue. It is

concerned with the ease and affordability with those peoples and it will pave a new path in the future for not only the cerebral palsy, also the handicapped, physically disabled patients and so on making a positive social impact on humanity.

**Related Funding Project:**

Project Title: “Design Approach on Sophisticated Computational & Cyber Interaction for Several Types Cerebral Palsy Patient.” Granted By: University Grant Commission (Govt. of India)

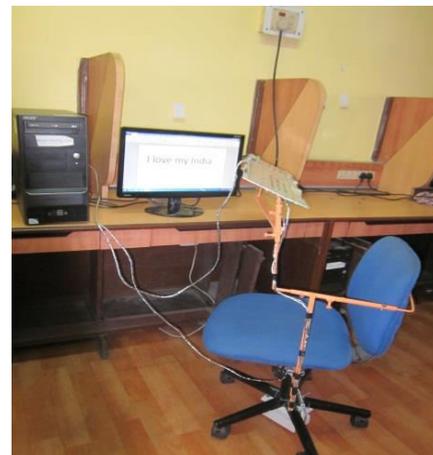
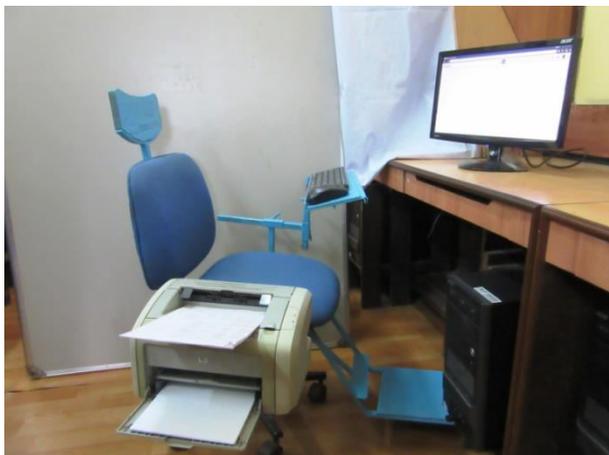
Fund Value: INR 500000. (EURO7025)

**Patent Filing in INDIA:**

**Title of the Innovation:** An Arrangement for Disabled User for Computer Interaction.

**File no.** 180/KOL/2015A. **Date** 13/03/2015.

**Indian Patent Journal no.** 11/2015.



## 7. Model Representation and Study of Essence Effect Creation through Internet Technology towards Odor Transformation Aspect. (E2IT)

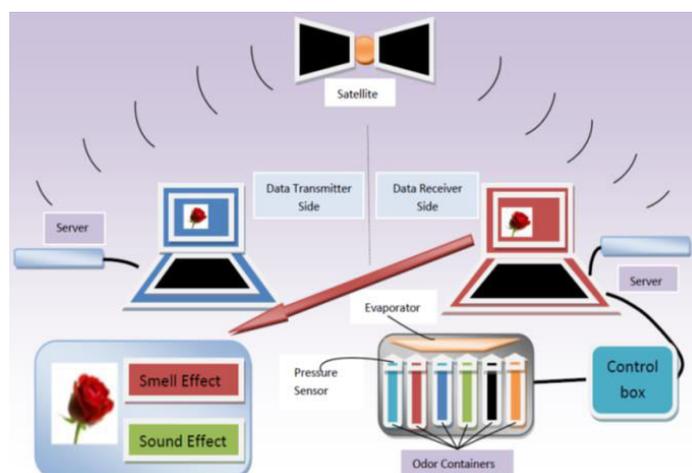
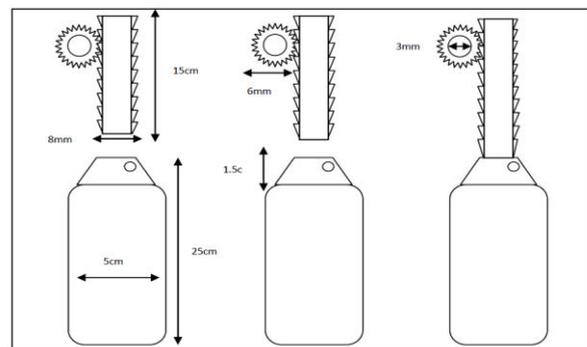
Present age, the sound and visual information are capable to transmit with the advanced communication technological support. In addition, smell adds much vital information to the experiences. Odors particularly create the reaction and produce the sense of aroma in human brain. It is difficult to transmit smell piratical with communication research technique. In virtual reality research, like sound and visual effect creation it is possible to create essence effect in artificial way. Digital scent technology is an equipment to sense, transmit and receive i.e. to communicate a scent-enabled digital media (such as web pages, video games, movies, music and video conferencing), will create a more immersive and attractive environment for the audience. Downloaded images via internet technology are matched with the image-database and spray the essence of the image generating appropriate code is the key features of this proposed research. Attempted prototype entitled “Essence Effect through Internet Technology (E2IT)” successfully performed for some internet transmitting flower pictures. This piece of research work deals with the evolution of odor involving multimedia technology contributing a new path in the research and development of Digital scent technology.

### Patent Filing in INDIA :

**Title of the Innovation:** System for Providing Essence Effect by use of Internet and Method for Providing Essence by using the System.

**File no.** 442/KOL/2014 A. **Date:** 09/05/2014.

**Indian Patent Journal no.** 19/2014.



## 8. Design Approach towards the Development of Braille Computer Display Board for Visually Impaired. (ABCD)

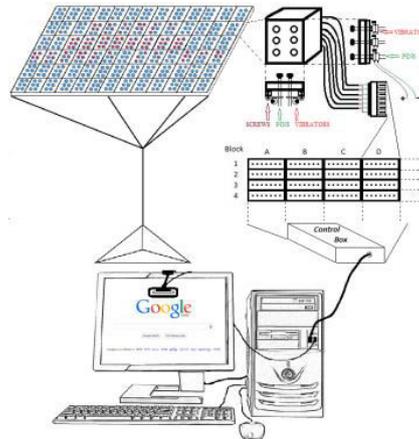
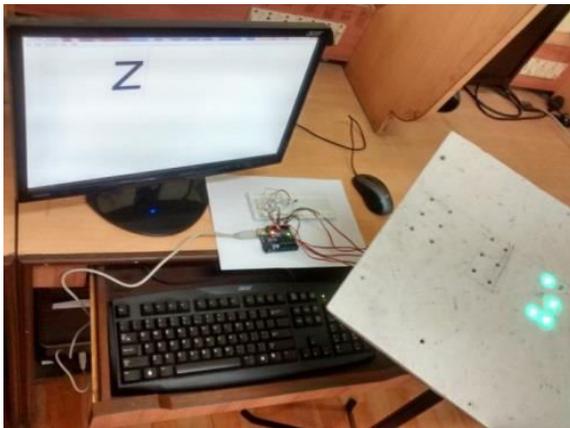
This invention introduced a novelty prototype of Computer Display Board for Blind people. Visually disabled people are incapable to access the computer screen, making backward towards the huge knowledge data through computer and interaction with world. In addition, the internet facility is not well accessing matter for blind also. Blind people are capable to understand the braille language. This attempted prototype processes all the computer screen language to a braille screen based tactile display board for blind people. Blind people are able to access computer screen as braille screen entitled "Arranged Braille Computer Display Board (ABCD)". Introducing this arrangement blind people are capable to access any type of soft data as a converted braille language. In addition, the position of the write up also recognize by the blind. More particularly, the system ABCD interprets any language in computer screen to braille language. With successfully tested and recognized by blind people this prototype activate for single letter braille cell perfectly. Approaching the economic technology with vibration six of brail dots for each cell is carrying its identity than traditional raised dots braille system.

### Patent Filing in INDIA:

**Title of the Innovation:** A communication system having a tactile Display board for blind person.

**File no.**1205/KOL/2015.**Date:**04/12/2015.

**Indian Patent Journal no.**49/2015



**9. Android Based Both Way Communicative Mobile Application Design for Deaf-Mute Introducing Real-Time Sign Language Interpretation. (ADMIRTSL)**

This project is originated on the view on implementation for Mobile use for aurally challenged or speechless (i.e., Deaf and Dumb) peoples in our society. An attempt is initiated to develop the android based mobile application abled to interpret sign language used by dumb. In addition, this android based application incorporates both way communication between normal mobile consumer and mum. An appreciable number of technologies are integrated to invent a real time sign language recognition system capable of performing global communication. The Android platform based speech recognizer, speech synthesizer, and language translator along with pattern recognizer made the invention less costly, optimized and highly portable. However the cloud computation involved sophisticated 3G/4G network. The projected system able to provide satisfactory result and proved to be an efficient recognizer with some easy amendments in software level.

**Related Funding Project:**

Project Title: “Both Ways Communicative Mobile Apps Design for Deaf-mute Introducing Real-Time Sign Language Interpretation.”

Granted By: Department of Science & Technology (Govt. of India)

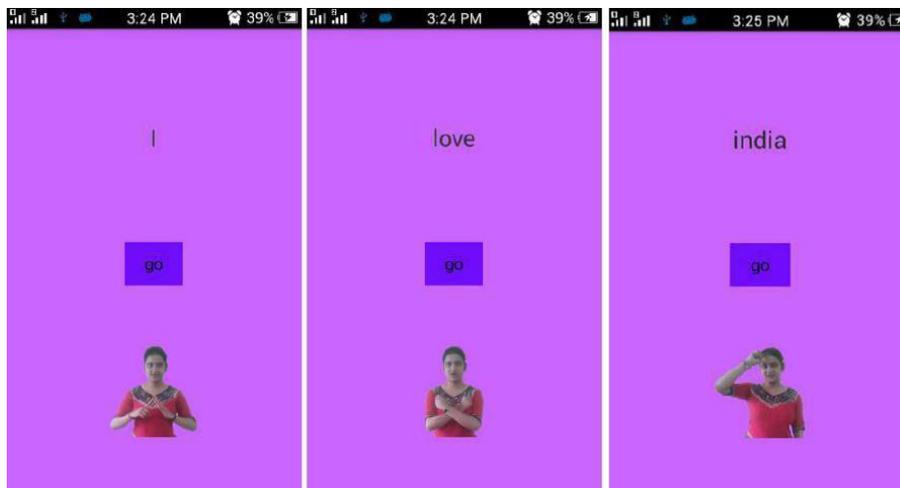
Fund Value: INR3476853 (EURO48844)

**Patent Filing in INDIA:**

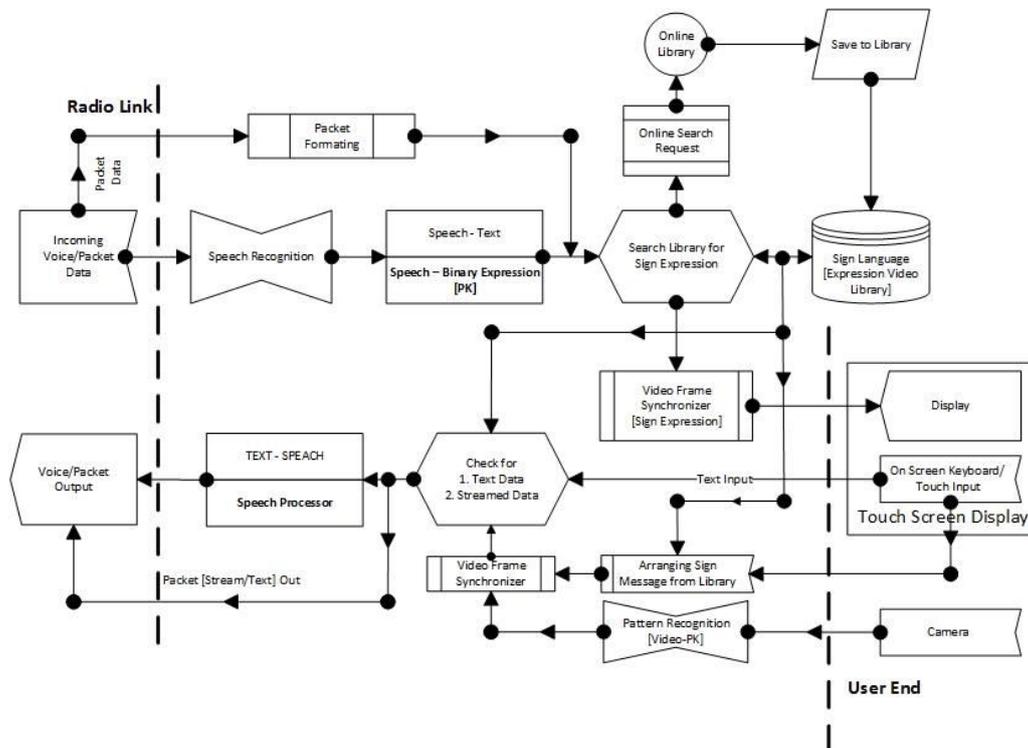
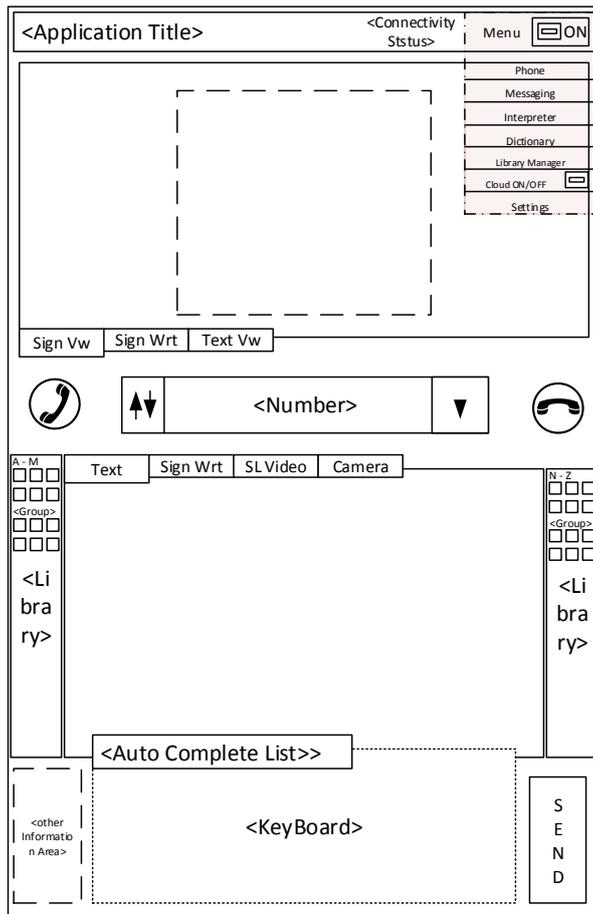
**Title of the Innovation:** Mobile Communication Application System for Deaf-Mute.

**File no.** 1278/KOL/2014. **Date** 23/01/2015.

**Indian Patent Journal no.** 04/2015.



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EDGE DETECTION							



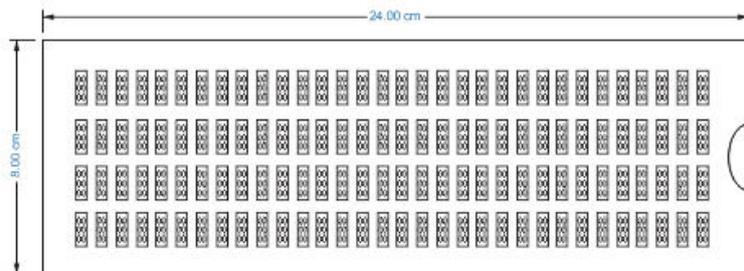
## 10. A Braille Writing Slate.

This invention relates to a Braille writing slate and in particular, this invention relates to a Braille writing slate which has a front frame with a parapet on its back side, forming a template. More particularly, this present invention relates to a Braille writing slate wherein at the front of the writing slate there is a cell plate for guiding the writer's stylus appropriately into the paper below. This present invention relates to a Braille writing slate wherein at the back of the cell plate, the writing paper is a hinged receiving plate and when the receiving plate is forced against the paper, the parapet assures the correct position and punched on protruded dots. Furthermore, this invention also relates to the Braille writing slate which has the beneficial effects of having saving manpower cost, reducing labor intensity, and having safety and reliability.

### Patent Filing in INDIA:

**Title of the Innovation:** A Braille Writing Slate.

**File no.** 281557 (Design). **Date:** Year 2016.



## 11. Dynamic Modeling and Optimizations of Mechanical Prosthetic Arm to Improve the Efficacy of Handicap Person. (CONPRO)

Simulation of a mechanical system incorporating the biological control has drawn the fascination of researchers' interest in the research field of advanced prosthetic control and Biomechanics. This research generates the idea of modeling of a mechanical prosthetic arm via some heuristic applications of simulation techniques. The preliminary part of the work shows the approach to find out open loop transfer function by designing the dynamic model of the mechanical prosthetic arm adopted for control modeling. At first the experimental approach for measurement of different parameters for the prosthetic arm is described. Then the sets of open loop transfer functions are developed. Optimum transfer functions were initiated in the later part of the research for tuning through traditional Ziegler-Nichols (Z-N) method and also with different optimization techniques. Mainly, the projects contribute the procedural approach for generation of prosthetic arm linear transfer function and improve its efficacy.



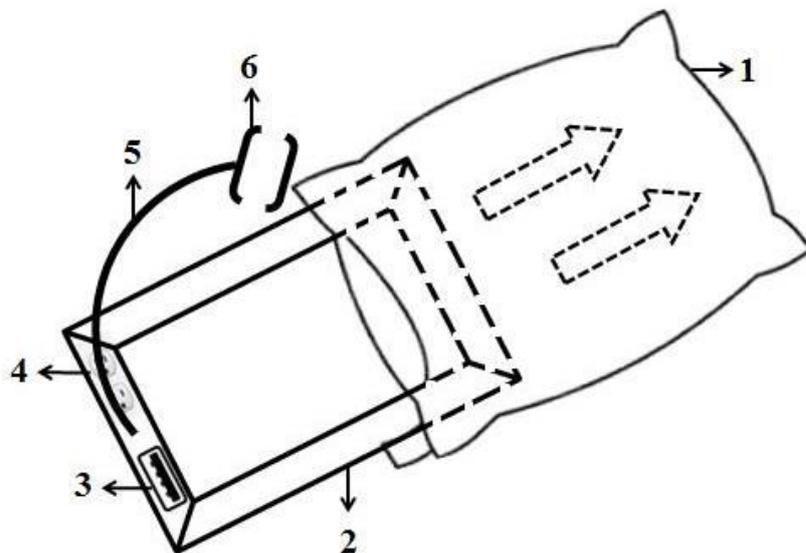
## 12. Cell Phone Holder Relaxing Pillow. (CPHRP)

Relaxing back with a cellphone in hand after coming back from work is a common seen in every house. Relaxing means having a pillow is obvious and having a cellphone in hand. Holding the phone constantly in hand while lying down is a painful scenario. Tab holder relaxing pillow will move out all the problems and remove the barrier between relaxing and surfing. No obstacle will arise in surfing the phone while lying down. The mobile holder and the flexible metal place the mobile where the person wants it to be placed. Chatting, watching movies and any type of official work would be much easier nowadays. Further advancement is done by adding a charging port and a plug. Power bank is put inside to charge the cellphone while using.

### Patent Filing in INDIA:

**Title of the Innovation:** Tab Holder relaxing pillow.

**File no.** 283546(Design).**Date:**Year 2016.



### 13. Smart and Sophisticated Back Looking Helmet Design.

Traffic accident is the most concerning problem we are facing today. We can't buy our lives but we can prevent it by wearing helmet as Khmer proverb say "Prevention is better than cure". Wearing helmet is very useful and safe for us to protect our lives while riding. Keeping an eye behind is one of the most important safety measures for a rider. Sometimes it's difficult to look back through the rear mirror attached with the handle of the bike. Smart and sophisticated back looking helmet remove the obstacle for the rider. Keeping safety first in mind two rear view mirrors are attached with the helmet to easily view backward.

#### Patent Filing in INDIA:

**Title of the Innovation:** Tab Holder relaxing pillow.

**File no.** 283545(Design).      **Date:** Year 2016.



#### 14. Cognitively Velocity Controlled Vehicle.

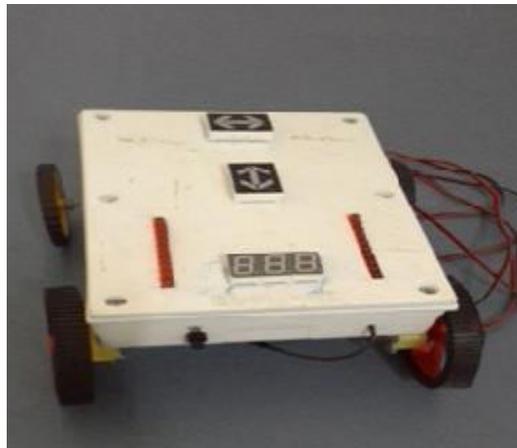
An introduction is provided to artificial agent methodologies applicable to control engineering of autonomous vehicles and robots. The fundamentals that make a machine autonomous are considered: decision making that involves cognitive modeling the environment and forming data abstractions for symbolic processing and logic based reasoning. Capabilities such as navigation, path planning, tracking control and communications are treated as basic skills of cognitive agents. In order to increase the acceptance of vehicles that drive (partly) autonomously, it seems advantageous that the driving style of autonomous cars is human-like. Furthermore, the acceptance of autonomous cars is believed to be increased when their actions and current state becomes more transparent to the passengers. These aspects can be tackled by implementing emotions to an autonomous car which allows a situation specific adaption of driving functions and vehicle dynamics. In this work, the emotions are described by the cognitive model. This innovative model is totally a mind controlled cognitive vehicle based brain computer interface (BCI). BCIs are systems that can bypass conventional channels of communication (i.e., muscles and thoughts) to provide direct communication and control between the human brain and physical devices by translating different patterns of brain activity into commands in real time. Here the robot is self-controlled and totally controlled by mind wave.

#### Patent Filing in INDIA:

**Title of the Innovation:** Cognitively Velocity Controlled Vehicle.

**File no.** 201631017186 A. **Date:** 24/06/2016.

**Indian Patent Journal no.** 26/2016.



### **15. Dexterous Control Intelligence Mapping and System Modeling of Human Arm towards the Prosthetic Approach for Handicap.**

Dexterous characteristic is one of the important features for Human arm. The intelligence interpretation is necessary to implement the artificial arm. The existing sense to grip different matter is need to mapping. In addition, the control modeling is producing its efficacy and required for simulation study. EEG (Electroencephalography) and EMG (Electromyography) signals are rehabilitated for dexterous activity. High sensitive piezoelectric sensor gloves, produces the data represent the haptic information of gripping. The produced data matrix implement for machine learning command of prosthetic arm for handicap person. Mathematically model the total system with system identification simulation processes is enrich its research excellency. Mainly, this research create an knowledge information for dexterous arm for handicap person.



### **16. Economic Class Generalized Handicapped Vehicle for Upper and Lower Amputee Patients (ECGHV)**

Economic Class Generalized Handicapped Vehicle (ECGHV) for Upper and Lower Amputee Patients is an innovatively designed low cost vehicle for handicapped, cerebral palsy patients and senior citizens. The handicapped vehicle emphasizes on the focal points by ensuring user-friendly distinctiveness for physically challenged people and affordable characteristics for availability to all stratum of people in the society. The novelty of the designed vehicle lies in its effortless simplicity and indisputable intention, accentuating the underlying societal impact. The requisite for handicapped vehicle is indispensable for social, economic and operational emancipation of disabled personage. India has a hefty numeral of disabled personage and bounty of them belongs to low income cluster. Disability restrains the prospect for reverential livelihood and curbs from attainment of prosperous and industrious escalation.

The appliance of contemporary expertise to emergence of copious aids, could diminish the consequence of disability and enhance the economic prospective for the disabled individual.

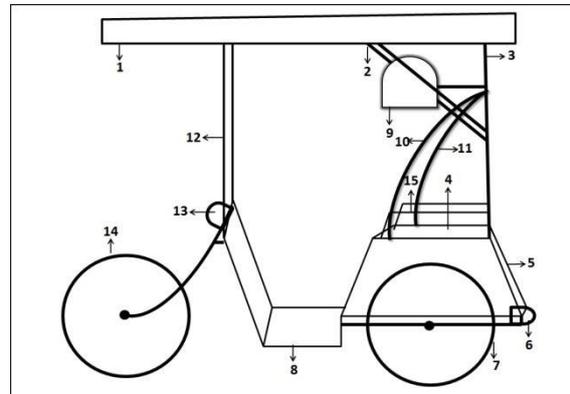
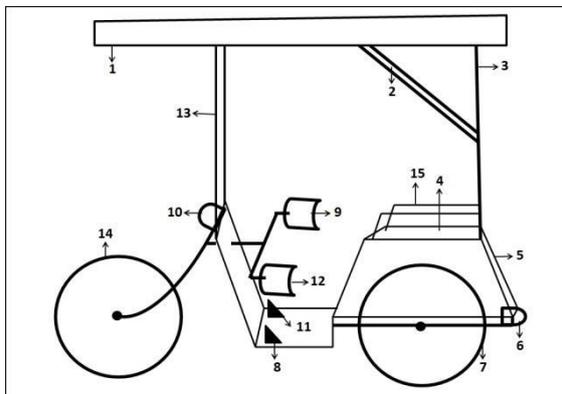
A handicapped vehicle could significantly improve the mobility of the physically disabled individual and empower in a noteworthy compoment. The economically viable vehicle would not only be a medium of conveyance for the physically challenged individuals but it would also be a tool for economic liberty for many an individual in diurnal strife for futile existence.

**Patent Filing in INDIA:**

**Title of the Innovation:** Upright Bicycle for Handicapped Person.

**File no.** 201631008553 A. **Date:** 08/04/2016.

**Indian Patent Journal no.** 15/2016.



4 **CAMPUS** **t2** THE TELEGRAPH WEDNESDAY 9 MARCH 2016 ANEX

**SCIENCE FOR A CAUSE WAS THE MOTTO AT JISTECH 2K16**

For most of us, having a personal robot like R2-D2 or TARS is the stuff of dreams. But if you are a student at JIS College of Engineering, Kalyani, you get to build your own bot on campus!

As part of the college's technical symposium JISTech 2K16, electronic engineering students Md. Mamar and Samin Mondal designed and built a robot, that too from e-waste, to emphasise how electronic waste could be properly recycled. This handsome robot can shake hands and move its limbs!

Every outdoor event we cover these days seems to have drones for photography or security. At JIS, computer science engineering students Sayan Dey Biswas, Subham Roy Tapadar, Soukhin Basu, Subhankar Das, Soumyadeep Bhattacharya and Ujjwal Barman built this super-cool quadcopter. It's a multi-rotor helicopter that is lifted and propelled by four rotors. They generally use two pairs of identical fixed pitched propellers. The drone was built for internal surveillance at the institute.

Eco Handy Van (EHV) is an innovatively designed low-cost vehicle for people living with handicap or cerebral palsy, as well as senior citizens. Designed and built by electronics and communication engineering students Dipesu Banerjee, Souvik Maitra, Ayan Pal, Rahul Halder and Akash Sinha, the EHV is user-friendly and eco-friendly. It is battery-operated yet affordable. Efforts are on to file a patent for commercial production of this vehicle. The core team of EHV is moving towards a start-up, inspired by APJ Abdul Kalam, to become employment-givers, not seekers.

Built by computer engineering students Anjan Ghosh, Sunandini Sukia, Anirban Saha and Raj Sekhar Bhakat, this hydraulic bridge consists of two cantilever spans made of popsicle sticks, with which two individual hydraulic systems were attached. A hydraulic crane, a hydraulic lift, a small ship and a river with coastal area were simulated in the project. This bascule bridge (a bridge with a section that can be raised and lowered using counterweights) would open from the middle and the cantilever spans would rise up to provide a clear pathway for the ship into the river. Such a bridge can be seen in London, Chicago, Tamil Nadu...

## 17. Non-Conventional Energy Generated Tire and other System for Motor Cycle or any Vehicle. (EGTSMC)

Conventional energy are tapped and used abundantly at present. Conventional energy will be outmoded thereafter decades. Keeping in mind a way of precaution is taken to upturn the use of non-conventional energy. The energy deficiency engendered by vehicles and human beings will be recycled as the non-conventional energy to take over the glitch by the conventional energy. Piezoelectric generator is the non-conventional energy source which is renewable and ecologically safe possessing the ability of certain materials to generate an electric charge in response to applied mechanical stress.

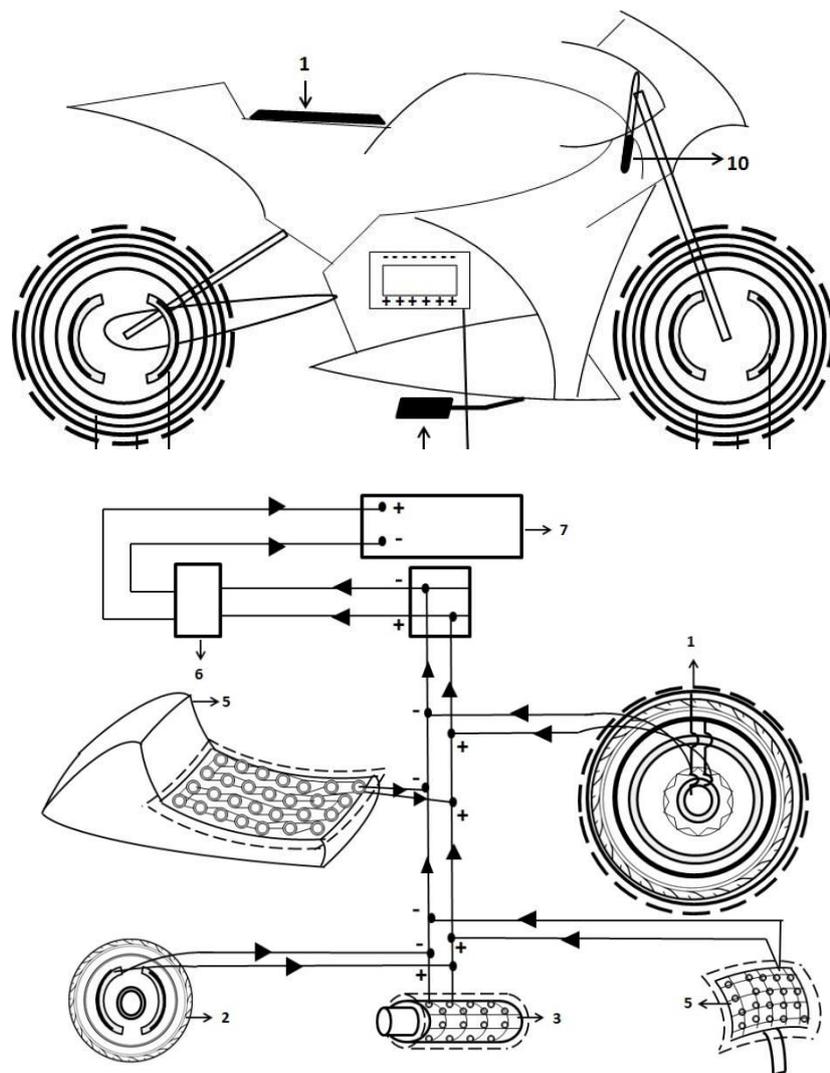
The energy generation from piezoelectric generator is very nominal but in case of large scale generation the energy generation will definitely bring a prodigious walkover. The novelty of the designed vehicle lies in its innovation accentuating the underlying societal impact.

### Patent Filing in INDIA:

**Title of the Innovation:** A System for Generating Electricity by Using Piezoelectric Generator.

**File no.** 201631008575 A. **Date:** 08/04/2016.

**Indian Patent Journal no.** 15/2016.



## 18. High DOF Interpreted EMG Data Based Prosthetic Arm.

EMG is the detection of the electrical activity associated with muscle contraction. It is obtained by measurement of the electrical activity of a muscle during contraction. EMG signals are directly linked to the desire of movement of the person. Robot arms are versatile tools found in a wide range of applications. While the user moves his arm, (EMG) activity is recorded from selected muscles, using surface EMG electrodes. By a decoding procedure the muscular activity is transformed to kinematic variables that are used to control the robot arm. This project is a design of a new low-cost series elastic robotic arm. The arm is unique in that it achieves reasonable performance for the envisioned tasks with high DOF. There are numerous dimensions over which robotic arms can be evaluated, such as backlash, payload, speed, bandwidth, repeatability, compliance, human safety, and cost, to name a few. In robotics research, some of these dimensions are more important than others: for grasping and object manipulation, high repeatability and low backlash are important. To develop the articulated innovative arm design of the robot with high DOF equations were developed for both forward and inverse kinematics. Forward kinematics gives the location of the end effector in the “universe” frame. The inverse kinematics gives the joint angles needed in order for the to the robot arm reach the goal frame. This high DOF based prosthetic arm operates according to EMG database. The EMG signal is obtained for different users for different arm movements using signal acquisition system. The EMG signals are used as input to the Microcontroller and converted to digital ones in the comparator. According to these signals the program built in the microcontroller make decisions to control the motors to drive the prosthesis arm.

### Patent Filing in INDIA:

**Title of the Innovation:** High DOF Interpreted EMG Knowledge Based Prosthetic Arm.

**File no.** 201631017724 A.      **Date:** 30/09/2016.

**Indian Patent Journal no.** 41/2016.



## **19. Introduce Electromyography (EMG) Signal Interpretation Technique towards the Characterization of Human Arm Movement. (ESITCHAM)**

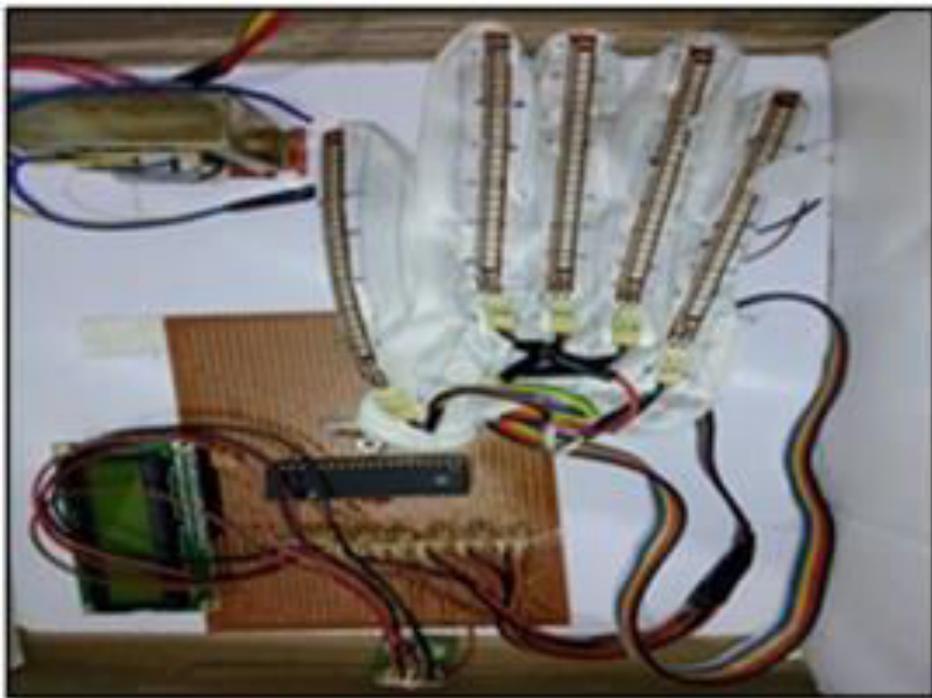
This project deals with a proposed technique towards electromyography (EMG) signal interpretation for several human arm movements. Considering five impotent human arm movements (Extension of forearm, Flexion of elbow joint, Pronation of forearm , Shoulder abduction and Wrist flexor stretch), the EMG data clinically recorded from four essential arm muscle (Biceps, Triceps, Flex Arm and Deltoid). The activity of muscle produces the productivity with several types of arm movements. For several movements, some muscles are in active condition and others are in inactive condition for certain unit time. Introducing this phenomenon, the interpretation technique is being proposed. The real-time basis recorded EMG data processes with proper filtering and produce a knowledgebase database towards the representation of several arm movements after justified analysis. In analysis pert of this research, the signals are properly enveloped and quantized with perfect sampling presented clear distinguish factor of arm movements. In addition, correlation technique and power spectral density (PSD) analyses technique performed towards the discrimination processes among all considering movement. Mainly, the entire research presents the technique of EMG signal interpretation with imposed of all necessary simulative analysis technique.

### **Related Funding Project:**

Project Title: “Produce the Knowledge Based Database of Electromyography (EMG) Signal to Enrich the Interpretation Technique for Different Human Arm Movement.”

Granted By: All India Council of Technical Education (Govt. of India)

Fund Value: INR 1200000, (EURO 16858)



## 20. Interpretation of Electrooculography (EOG) Signal for vision and Control Modeling of Human Eye towards Artificial Approach.

This project is based on the glimpse of modeling of a prosthetic eye by incorporating clinical study of a human eye and by attempting a proper interfacing technique between a prosthetic or artificial eye and human brain intelligence via integrated control approaches and with the help of simulation aspects. Specific result analysis has been carried out by generating an appropriate transfer function of linear concept. After the generation of transfer function model, the simulation approach is incorporated via stability analysis for designing of the prosthetic eye. With analysis and study of Electrooculography (EOG) Signal for several site situation, the interpretation model creation effort proceeds. In addition, EEG (Electroencephalography) and Electrooculography (EOG) signals deformation characterize jointly. Moreover, an attempt is taken on furnishing the hardware implementation of producing an ideal prosthetic eye which tends to be a pre-innovative work in the varied field of prosthesis and artificial intelligence.



## 21. Human Eye Control Dynamics modeling Introducing Original Mathematical and Computer Graphics Approach. (EYMOV)

The human eyeball movement in different directions is controlled by six different sensitive eye muscles which are as follows: Medial rectus (MR), lateral rectus (LR), superior rectus (SR), inferior rectus (IR), superior oblique (SO) and inferior oblique (IO). All the above six muscles are playing an important role in moving our eyeball. The medial rectus (MR) moves the eye inward, and toward the nose (adduction). The lateral rectus moves the eye outward, away from the nose (abduction). Superior rectus (SR) basically helps to move eye upward and inward (adduction) and also it helps to rotate top of the eye toward the nose. The primary act of inferior rectus (IR) muscles is to move the eye downwards which occurs during depression and moves the eye inward (adduction). The different position of human eye ball movement represents to determine the probable path of momentum. In this consecutive sequence of eyeball movement visualize the boundary of maximum flexible path of human eye ball movement. The elliptical boundary path generated by the retina of human eye is measured. Introducing mathematical representation of elliptical-spiral of retina momentum is involved and characterized human sight. MIMO modeling of control system for eye movement create its research efficacy. In addition, the Electrooculography (EOG) Signal pattern analysis towards the eye dynamics presented.



## 22. Design & Simulation Aspect towards Modeling of Automatic Cardiovascular Disorder Diagnosis System. (MAC2DS)

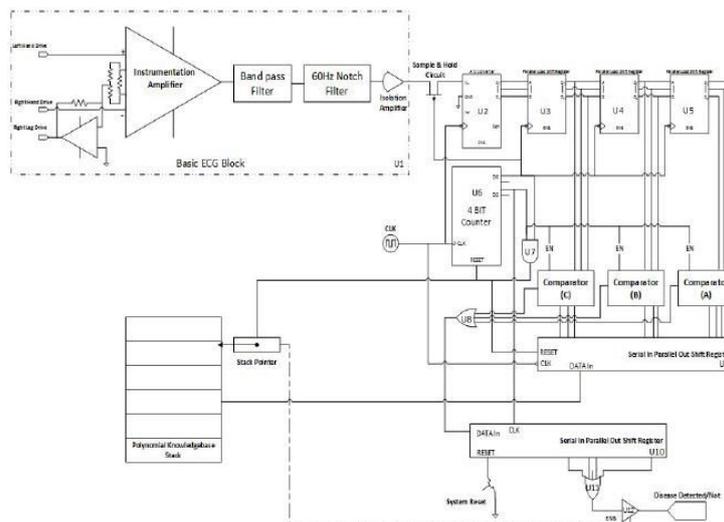
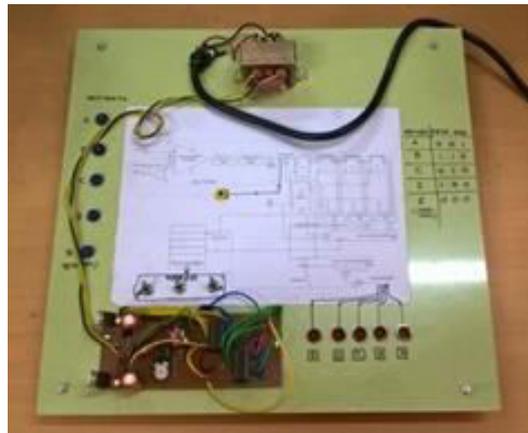
A cardiovascular disorder has now been a very big problem throughout the world, particularly in India. The result of advancement in engineering in our society; a huge change has taken place in medical science. As a result the scientists are looking forward to take an advantage for further development related with cardiovascular disorders. This project represents an innovative concept of the technology to detect cardiovascular diseases in an automatic way based on the ECG signal which will guide the scientists to achieve their goals. The equations of different ECG signal have been calculated by the help of software. The simulation approach is introduced to develop the nonlinear ECG equations of five different diseases where the data were collected clinically. Apart from that a register based modeling approach has been developed which introduces automatic cardiovascular diagnosis system (ACDS). On the basis of dissimilarity in the behavior of ECG signal equation helps to diagnose different heart diseases by the generation of error. Additionally the preliminary prototype representation of ECG malfunctioning highlights the above mentioned concept through a block diagram and a self-explanatory flowchart.

### Patent Filing in INDIA:

**Title of the Innovation:** A System for Providing Cardiovascular Disorder Diagnosis Services.

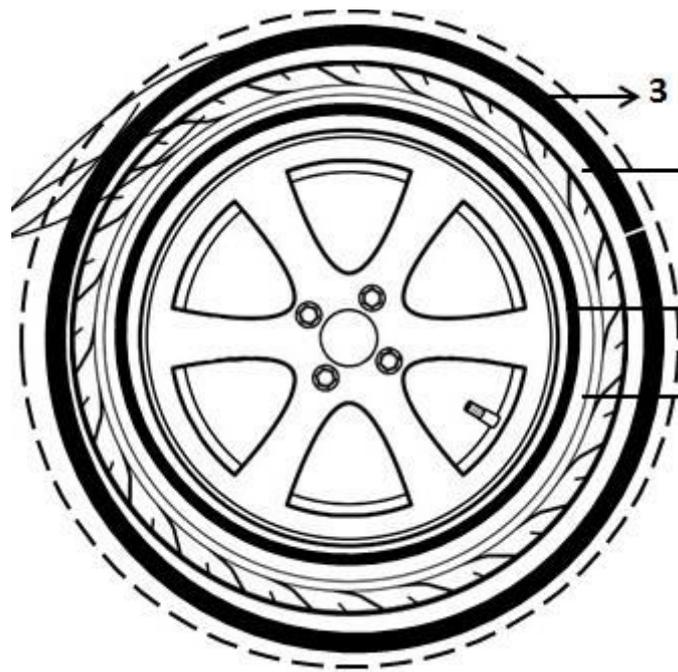
**File no.** 201631008555 A.      **Date:** 08/04/2016.

**Indian Patent Journal no.** 15/2016.



### 23. Effort on Renewable Energy Generation Aspects from Vehicle Tires (REGVT)

This project describes how the special property of piezoelectric material as pressure sensor is used in vehicle (car, truck, motorcycle, cycle etc.) tyre construction for the electric power generation resource. Present age renewable energy related research is a booming field for researcher and scientist. This attempt proposes the novel concept towards this field to overcome fuel loss by the vehicle. In this project there are two significant parts. The first step is related to the mechanical construction of the tyre, where the piezoelectric material strip is placed at a certain distance at the outer periphery of the tyre and they are connected to each other. The high sensitive piezoelectric material produces the energy, partially support towards the vehicle energy requirement. In the second step the collection of generated electric power from the series of piezoelectric strip is performed. The electro-mechanical design involved major action in this part. Finally, the generated energy is stored in the battery, used in various applications in a car. Moreover, the processes implementation and statistical research is involved for renewable energy generation towards the minimization of vehicle fuel consumption.



## 24. Thought Concentration Controlled Dexterous Prosthetic Arm For Handicapped.

The project is a thought controlled dexterous prosthetic arm mainly will be used for handicapped people. Prosthesis is an artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions. Many delicate and complex tasks hands can perform, such as writing in calligraphy or playing the violin. At the same time, hands have the strength and durability required to grip heavy objects and withstand impacts. When someone loses hand or arm due to injury or disease, the rich functionality once offered by that hand is lost as well. At this point of view this invention will be more significant if the arm has the power of dextracity and it is mind controlled .Thoughts can operate machines. With the aid of a tiny brain implant known as a brain-computer interface (BCI), the handicapped people can also use this arm; control its dextracity according to thought.

### Patent Filing in INDIA:

**Title of the Innovation:** Thought Concentration Controlled Dexterous Prosthetic Arm for Handicapped.

**File no.** 201631017174 A. **Date:** 24/06/2016.

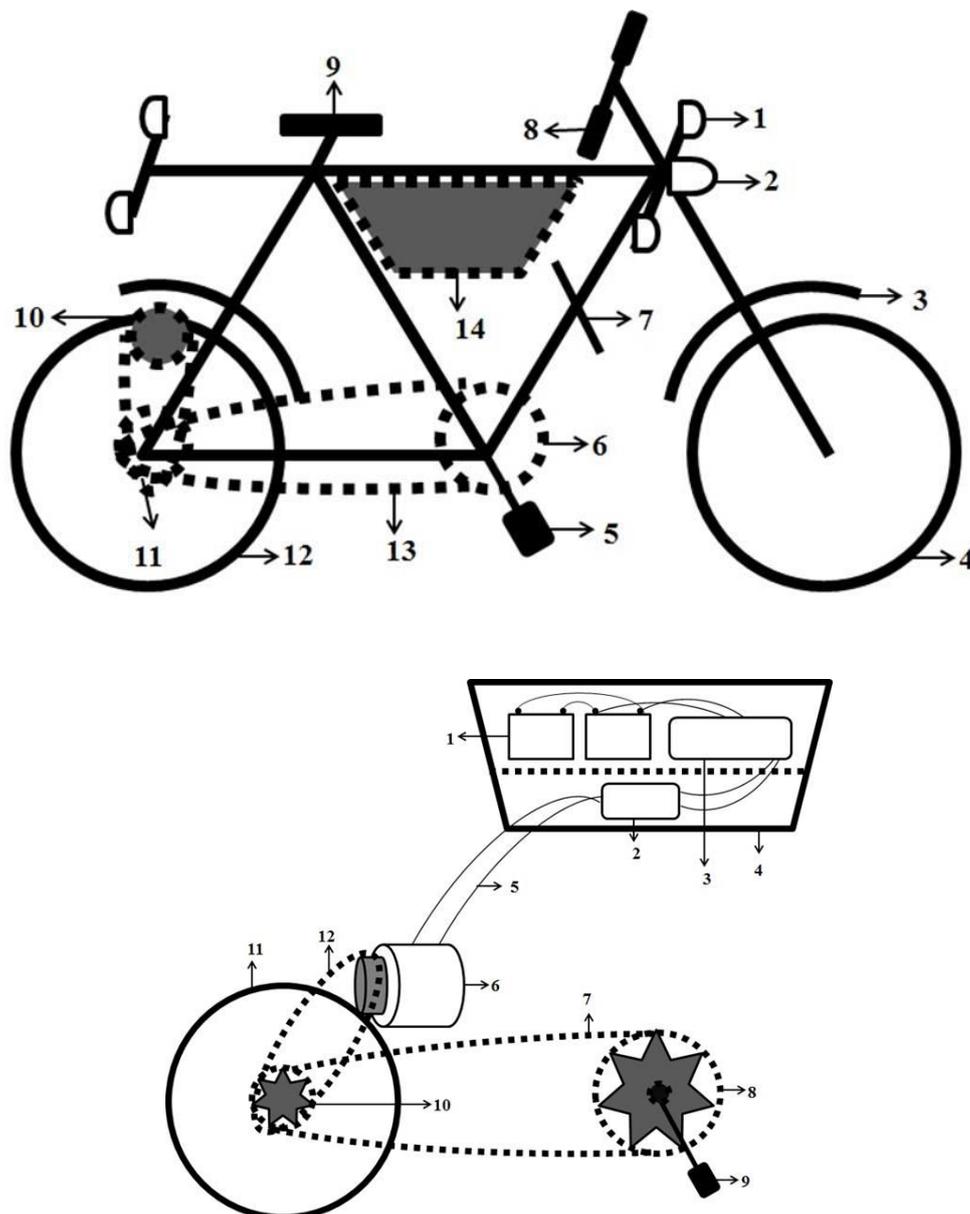
**Indian Patent Journal no.** 26/2016.



## 25. Economic Class Battery Assembled Cycle (ECBAC).

Economic Class Battery Assembled Cycle (ECBAC) is an innovatively designed low cost, versatile customized assembled commutator vehicle for any cyclist, handicapped, and senior citizens. The battery assembled cycle emphasizes on the focal points by ensuring user-friendly distinctiveness for lay citizens and affordable characteristics for availability to all stratum of people in the society. The novelty of the designed vehicle lies in its effortless simplicity and indisputable intention, accentuating the underlying societal impact. The requisite for battery assembled cycle is indispensable for social, economic and operational emancipation of any personage belonging to low income cluster. The economically assembled viable vehicle would not only be a medium of conveyance for the physically challenged and senior section of individuals but it would also be a tool for economic liberty for many an individual in diurnal strife for futile existence.

Funding agency Neoleap business venture appreciated this product and ready to fund us to start a business startup CII Center for Innovation.



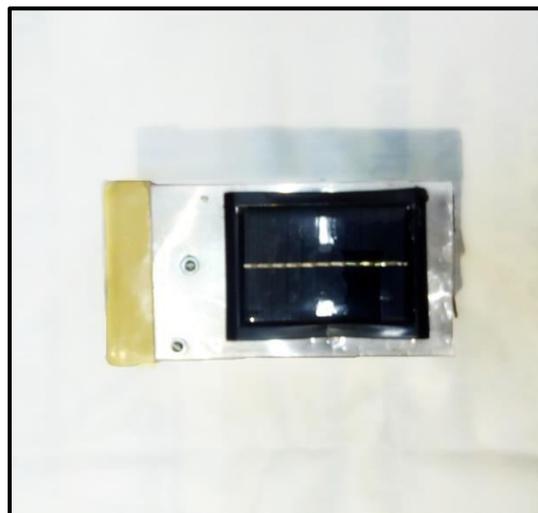
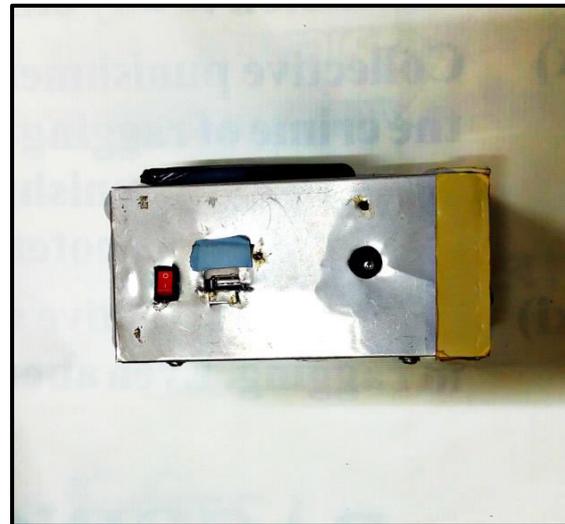
## 26. Automatic Utensil Scrubber.

Health is Hygiene. Keeping kitchen utensils hygienically clean prohibit them from becoming a source of bacteria tarnishing food and cause food poisoning. Handy Utensil Scrubber (HUS) is an innovatively designed low cost, modified utensil scrubber for any female section of the society. The scrubber emphasizes on the focal points by ensuring user-friendly distinctiveness for females and affordable characteristics for availability to all stratum of people in the society. The novelty of the designed product lies in its effortless simplicity and indisputable modification, accentuating the underlying societal impact. The requisite handy utensil scrubber is indispensable for social, economic and operational emancipation of any personage.



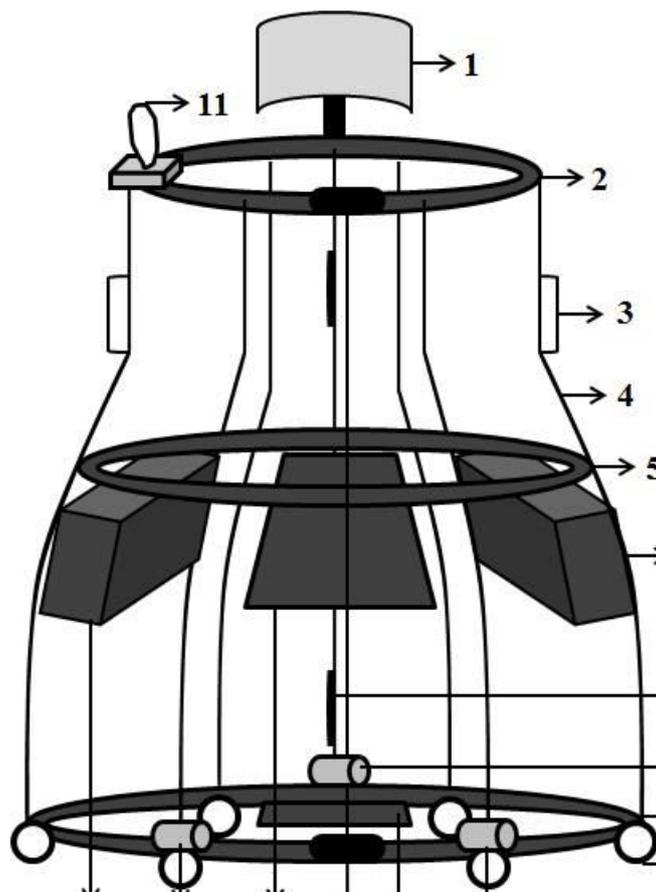
## 27. Hybrid Solar-Wind Twin Charger for Mobiles.

Conventional energy are tapped and used abundantly at present outmoding thereafter decades. Keeping in observance a way of precaution is taken to upturn the use of non-conventional energy. Burgeoning the use of non-conventional energy, a two way hybrid mobile charger is taken in consideration in implementing both solar energy and wind energy as the renewable sources of energy. The proposed innovative two way hybrid mobile charger can be used both all through day time and night time while travelling and in stable condition. Energy harvesting is explored, with apiece relying on the solar panel energy observation and turbine on formation of electrical energy from solar and wind energy owing to the availability of wind and solar energy. Wind energy and solar energy is considered as the main source for the generation of energy. The energy generation from the use of non- conventional source of energy in the charger will definitely bring a prodigious walkover. The novelty of the designed vehicle lies in its innovation, effortless simplicity and indisputable intention, accentuating the underlying societal impact.



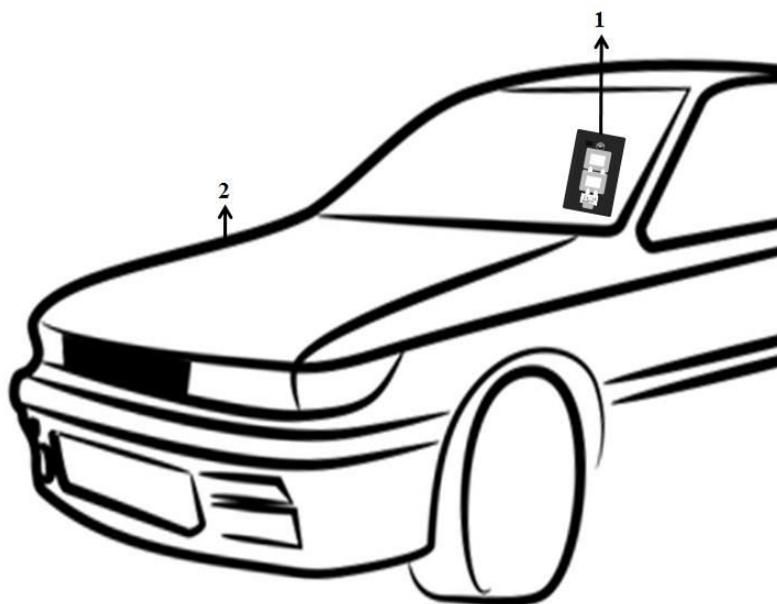
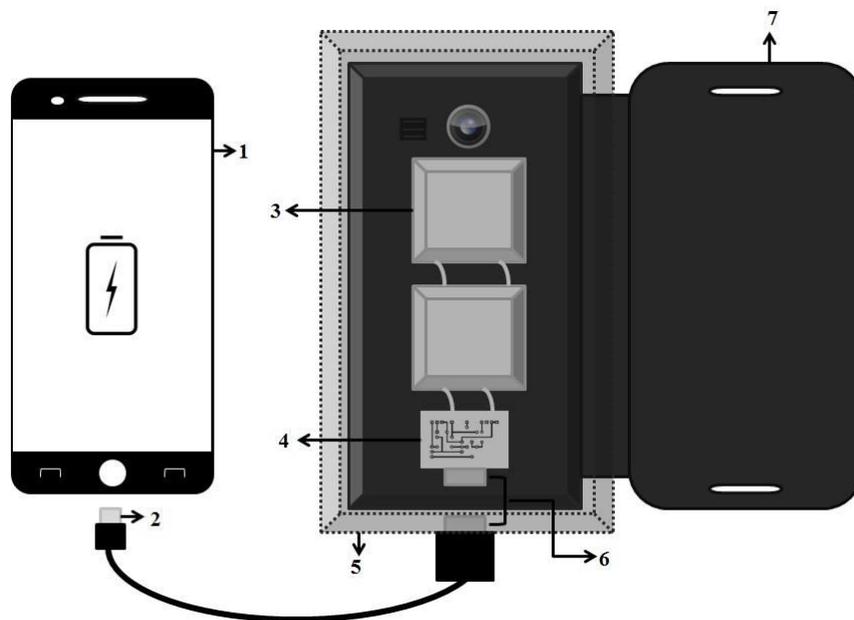
## 28. Wheel Walker for Aged, Cerebral Palsy and Handicapped People (2WACPHP).

Cardio-vascular exercise allying regular walking strengthens the heart and lungs, proliferating unconditional fitness. Walker (2WAHP) is an innovatively designed low cost walker for handicapped, cerebral palsy patients and senior citizens. The walker emphasizes on the focal points by ensuring user–friendly distinctiveness that need additional support to maintain balance or stability while walkingfor physically challenged people and affordable characteristics for availability to all stratum of people in the society. The novelty of the designed vehicle lies in its effortless simplicity and indisputable intention, accentuating the underlying societal impact by introducing an optional motor controlled driving system to help the senior section of society when get tired on walking. A joystick controlled motor arrangement is introduced with a foldable sitting arrangement and a leg rest. The requisite for walker is indispensable for social, economic and operational emancipation of disabled personage as well as senior citizens. A walker can significantly improve the mobility of the physically disabled and senior individuals and empower in a noteworthy comporment.



## 29. Smartphone Flip Cover Charger (SFCC).

Conservative energy are detailed and cast off profusely at extant. Conventional energy will be obsolete thereafter decades. Keeping in cognizance an approach of deterrent is taken to upsurge the usage of non-conventional energy. The energy from sun will be reprocessed as the non-conventional energy to take over the glitch by the conventional energy. Peltier generator converts heat (temperature differences) directly into electrical energy (a form of thermoelectric effect). Thermoelectric generators function like heat engines, but are less bulky and have no moving parts. Peltier generators could be used in automobiles as automotive thermoelectric generators (ATGs) to increase fuel efficiency. The energy generation from Peltier generator is very nominal but using a boost convertor the energy generation will definitely bring a prodigious walkover. The novelty of the designed product lies in its innovation accentuating the underlying societal impact.



## Projects undertaken with collaboration of Chinese Company through CII Center for Innovation by JIS College of Engineering.

### 1. Wireless Detachable Bluetooth Microphone Speaker.

Wireless Detachable Bluetooth Microphone Speaker is an innovatively designed low cost, light weight portable all-purpose featured sound system. Wireless Detachable Bluetooth Microphone Speaker accentuates on the focal facts by ensuring user-friendly distinctiveness for lay citizens like beggars and affordable characteristics for availability to all stratum of people in the society. The novelty of the designed prototype lies in its wireless detachable module's effortless uncomplicatedness and incontrovertible intention, accentuating the underlying societal impact. The featured shockproof all-purpose sound system innovative device is advantageous from most of aspects considering other basic small sound systems. Considering the modern generation advancement in technology this portable lightweight low cost innovation is taken in consideration to meet the daily needs of lower income cluster section of society as well as for usage in rallies and in road traffic transportation supervision.



Wireless Karaoke Microphone



Wireless Karaoke Microphone



Wireless Karaoke Microphone

Chinese Models with Bluetooth Karaoke Facility

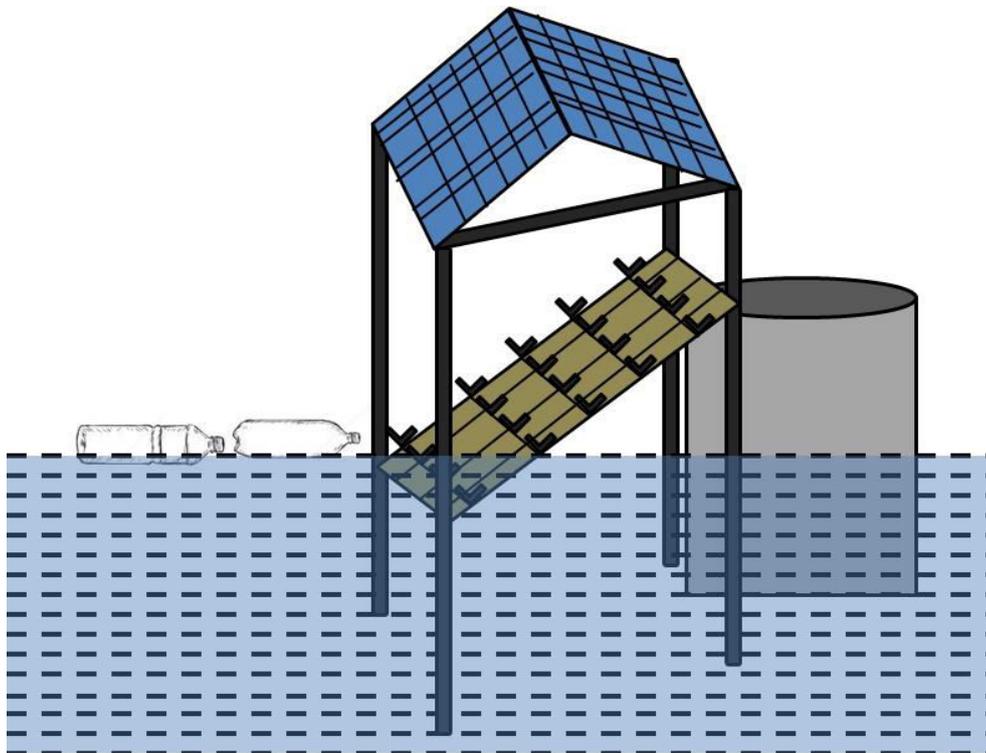


Indian Model with Wireless Detachable Bluetooth Microphone Speaker Facility with karaoke USB, SD Card Facility.

## Projects undertaken with collaboration of Russian Federation through CII Center for Innovation by JIS College of Engineering.

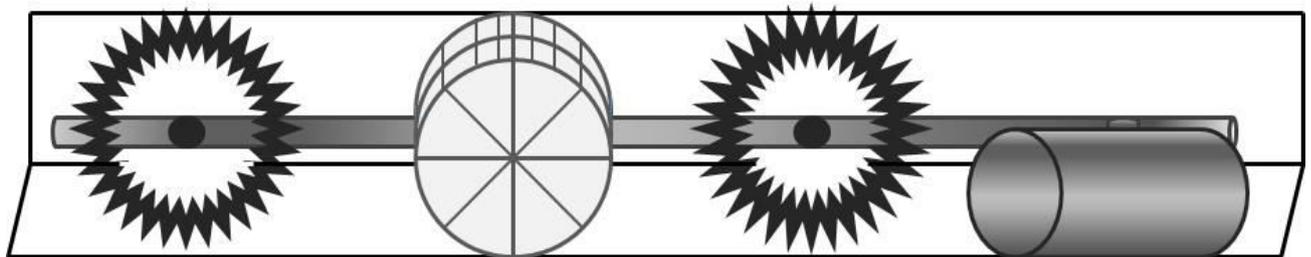
### 1. Floating Plastic Material Cleaner for Water Bodies.

Geographically and adventure-wise, water bodies have utmost importance. Rivers and lakes stand for purity and each one of us should do our bit towards keeping this purity intact by making the waters clean and pollution-free. Because of the establishment of a large number of industrial cities on the bank of river there are several types of waste like human waste, animal waste, industrial waste, religious events waste etc. mixing in water bodies (like Ganges and other rivers around the world). The mobility of the river is immobilized by the plastic materials being the primary object of pollutions of our environment. The floating plastic material cleaner for water bodies is one of the novel and cost effective solution on the aim of pollution free environment. The present technology will detect the plastic as well as other lumped polluted material through sensing technology. Accumulating all the polluted material with a motor controlled automated rotatory chained chassis arrangement it put the waste in a bin attached with the module. On the view of non-conventional source of energy the system operates with solar technology. The novelty of the proposed design is concentrated on keeping power consumption in mind, the innovative proposed module will only work when it detects any waste in front of the sensor and on that time the motor controlled rotatory chained chassis arrangement starts to work.



## **2. Drainage Waste Cleaning Sophisticated Module.**

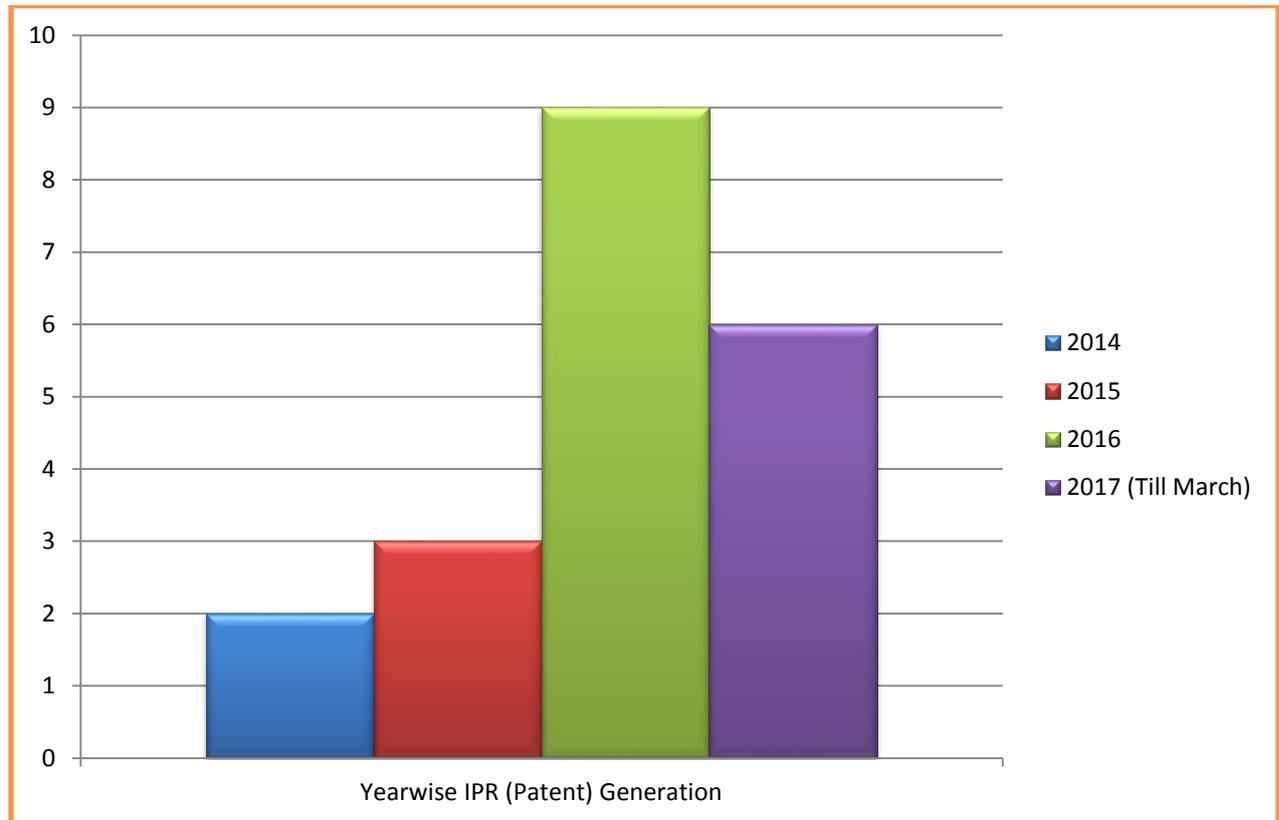
Drains are crucial in maintaining a clean, hygienic and odor free environment, as they are our main disposal channel of liquid waste. If drains get blocked, not only will waste be prevented from passing through, but also a build-up of soil and bacteria will occur, closely followed by strong unwanted smells. As a hygienic control plan this proposed sophisticated prototype will automatically clean the drains through different robotic motorized cleaning arrangements and collecting the drain waste in a container attached with the cleaner. The full container will leave the waste in road side defined place. In day to day life in Kolkata as well as in various places around the world, drain blockage is a primary concern of society. Drainage Waste Cleaning Sophisticated Module will retain the drains uncontaminated sustaining hygienic environments as well as keeping rivers clean from drainage wastes.



## **3. Pre Disaster Alert System with Six Sense Interpretation Process.**

In present age, the advancement of BCI technology carrying its importance towards the interpretation of several brain signal. The existence of six senses is a very important research investigation article under BCI research. Research experience says six senses of animals can pre-assume the natural calamities. The proposed innovative concept introduced as pre disaster alert system with interpreting the six sense brain signal of several animals. Normally, the system monitoring EEG (Electroencephalography) for a dog as a real time basis informing the specific variations of EEG(six sense) in case of pre-assuming natural calamities, presenting the alert commands of Tsunami, Earthquake and others disasters.

## Intellectual Property of India (Patents) published through CII Center for Innovation by JIS College of Engineering.



**Total Number of Patents (IPR) till March, 2017: 20 Nos.**

### Year 2014 (File & Published):

#### 1. Patent Filing in INDIA:

Title of the Innovation: **System for Providing Essence Effect by use of Internet and Method for Providing Essence by using the System.**

File no. **442/KOL/2014 A.** Date: **09/05/2014.**

Indian Patent Journal no. **19/2014.**

#### 2. Patent Filing in INDIA:

Title of the Innovation: **System for Medical Treatment Following Music Therapy and the Method Thereof.**

File no. **20/KOL/2014 A.** Date: **07/02/2014.**

Indian Patent Journal no. **06/2014.**

### Year 2015 (File & Published):

#### 1. Patent Filing in INDIA:

Title of the Innovation: **A communication system having a tactile Display board for blind person.**

File no. **1205/KOL/2015.** Date: **04/12/2015.**

Indian Patent Journal no. **49/2015**

**2. Patent Filing in INDIA:**

Title of the Innovation: **An Arrangement for Disabled User for Computer Interaction.**  
File no. **180/KOL/2015A.** Date: **13/03/2015.**  
Indian Patent Journal no. **11/2015.**

**3. Patent Filing in INDIA:**

Title of the Innovation: **Mobile Communication Application System for Deaf-Mute.**  
File No: **1278/KOL/2014.** Date: **23/01/2015.**  
Indian Patent Journal no: **04/2015.**

**Year 2016 (File & Published):**

**1. Patent Filing in INDIA:**

Title of the Innovation: **High DOF Interpreted EMG Knowledge Based Prosthetic Arm.**  
File no. **201631017724 A.** Date: **30/09/2016.**  
Indian Patent Journal no. **41/2016.**

**2. Patent Filing in INDIA:**

Title of the Innovation: **Thought Concentration Controlled Dexterous Prosthetic Arm for Handicapped.**  
File no. **201631017174.** Date: **24/06/2016.**  
Indian Patent Journal no. **26/2016.**

**3. Patent Filing in INDIA:**

Title of the Innovation: **Cognitively Velocity Controlled Vehicle.**  
File no. **201631017186 A.** Date: **24/06/2016.**  
Indian Patent Journal no. **26/2016.**

**4. Patent Filing in INDIA:**

Title of the Innovation: **A Braille Writing Slate.**  
File no. **281557 (Design).** Date: **Year 2016.**  
Indian Patent Journal no. **N.A.**

**5. Patent Filing in INDIA:**

Title of the Innovation: **Smart and Sophisticated Back Looking Helmet.**  
File no. **283545 (Design).** Date: **Year 2016.**  
Indian Patent Journal no. **N.A.**

**6. Patent Filing in INDIA:**

Title of the Innovation: **Tab Holder relaxing pillow.**  
File no. **283546 (Design).** Date: **Year 2016.**  
Indian Patent Journal no. **N.A.**

**7. Patent Filing in INDIA:**

Title of the Innovation: **A System for Providing Cardiovascular Disorder Diagnosis Services.**  
File no. **201631008555 A.** Date: **08/04/2016.**  
Indian Patent Journal no. **15/2016.**

**8. Patent Filing in INDIA:**

Title of the invention: **A System for Generating Electricity by Using Piezoelectric.**

File no. **201631008575 A.** Date: **08/04/2016.**

Indian Patent Journal no. **15/2016.**

**9. Patent Filing in INDIA:**

Title of the invention: **Upright Bicycle for Handicapped Person.**

File no. **201631008553 A.** Date: **08/04/2016.**

Indian Patent Journal no. **15/2016.**

**Year 2017 (Filed till March, 2017):**

**1. Patent Filing in INDIA:**

Title of the Innovation: **Economic Class Battery Assembled Cycle. (ECBAC).**

File no. **201731011683.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

**2. Patent Filing in INDIA:**

Title of the Innovation: **Handy Utensil Scrubber. (HUS).**

File no. **201731011706.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

**3. Patent Filing in INDIA:**

Title of the Innovation: **Hybrid Solar-Wind Twin Charger for Mobiles.**

File no. **201731011719.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

**4. Patent Filing in INDIA:**

Title of the Innovation: **Wheel Walker for Aged, Cerebral Palsy and Handicapped People. (2WACPHP).**

File no. **201731011721.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

**5. Patent Filing in INDIA:**

Title of the Innovation: **Smartphone Flip Cover Charger. (SFCC).**

File no. **201731011724.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

**6. Patent Filing in INDIA:**

Title of the Innovation: **Wireless Detachable Bluetooth Microphone Speaker.**

File no. **201731011727.** Date: **31/03/2017.**

Indian Patent Journal no. **N.A.**

## **Problem Statements of Tata Steel for Innovative Solutions through CII Center for Innovation by JIS College of Engineering.**

In Mentors' Speak session during ICT East 2016 in ITC Sonar Bangla, students from JIS College of Engineering formed team and presented their business ideas to the industry leaders and mentors like:

- **Mr Alope Mookherjea**, Chairman, CII Eastern Region Innovation Task Force
- **Mr Sauvik Banerjee**, Global CTA & Innovation Lead, SAP
- **Mr Sandipan Chattopadhyay**, Founder & Mentor, Xelpmoc
- **Mr Kaushik Chattopadhyay**, Associate Director, Cognizant Technologies
- **Mr Shiladitya Mukhopadhyaya**, CTO & Co-Founder, Rasilant Technologies Pvt Ltd
- **Mr Siddhartha Mitra**, Analytics and Information Management (AIM), Cognizant Technologies.

Mentors guided the teams to develop their ideas further.

As a part of Innovation Club activity, Tata Steel Ltd. Provided the problem statements for innovative solutions. The concerned officials of Tata Steel Ltd will guide and mentor students of the Club who will come up with some solutions.

- Robot/machine to capture facial recognition for decision making on consumer buying.
- Smart furniture - categorize and business opportunity (locking and unlocking).
- Smart techniques for fabrication of Modular Gates and grills.
- Design and develop rural end consumer products from steel (HR, GP, GC, CR).
- Using steel low cost modular kitchen/appliances/storage solution for rural.
- Solar home lighting solution - opportunities and business potential.



Confederation of Indian Industry

### **Innovation Club** An initiative of CII Eastern Region

Problem statement from Tata Steel:

- 1) Robot/machine to capture facial recognition for decision making on consumer buying
- 2) Smart furniture - categorize and business opportunity (locking and unlocking)
- 3) Smart techniques for fabrication of Modular Gates and grills
- 4) Design and develop rural end consumer products from steel (HR, GP, GC, CR)
- 5) Using steel low cost modular kitchen/appliances/storage solution for rural
- 6) Solar home lighting solution - opportunities and business potential