Projects and Innovations conducted by several departments of JIS College of Engineering & Innovation and Incubation Centre, JISCE

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.

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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_p 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.

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1.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.

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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)

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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.

Projects and Innovations conducted by several departments of
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Non-Conventional Energy Generated Tire and other System for Motor Cycle or any Vehicle. (EGTSMC)

Conventional energyare 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.

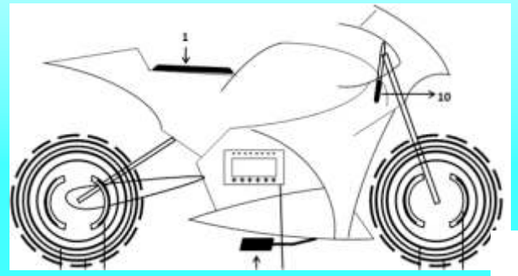
The energy generation from piezoelectric generator is very nominal but in case of large scale generation the energy generation will definitely bring a prodigious walkover. The novelty of the designed vehicle lies in its innovation accentuating the underlying societal impact.

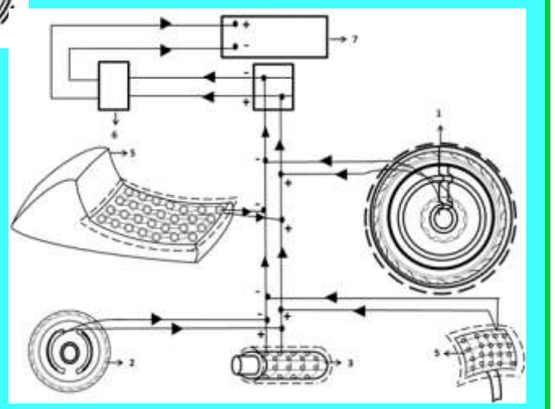
Patent Filing in INDIA:

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.





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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.

Projects and Innovations conducted by several departments of JIS College of Engineering & Innovation and Incubation Centre, JISCE

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.

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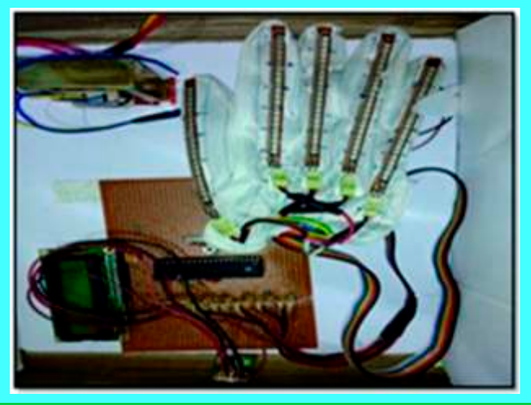

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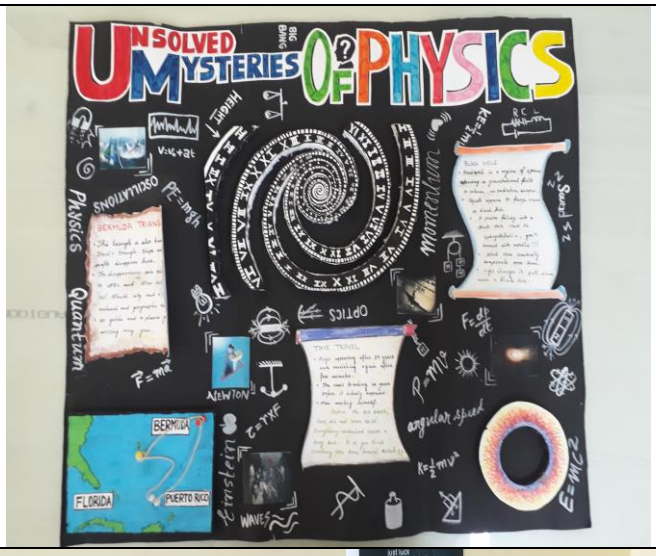

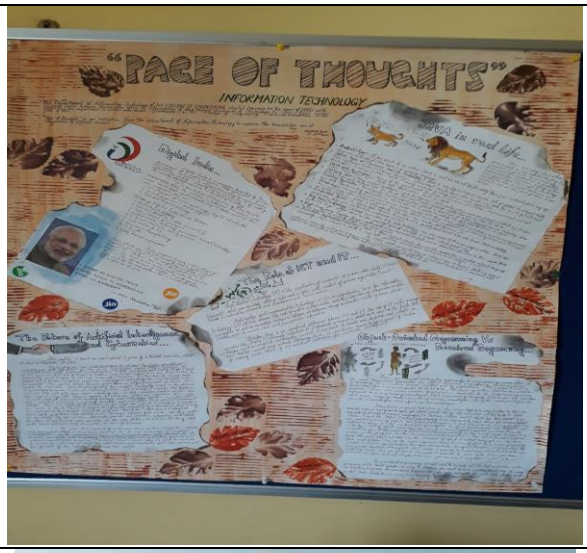

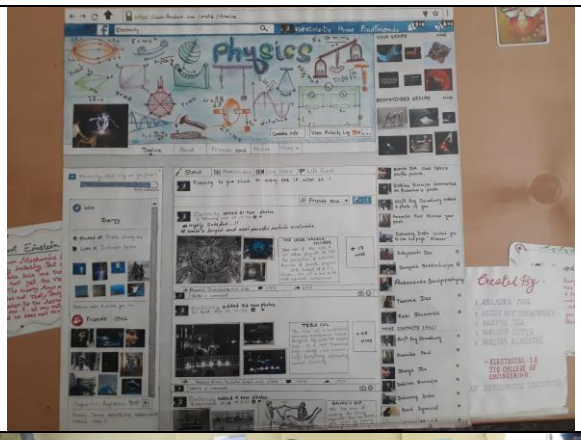
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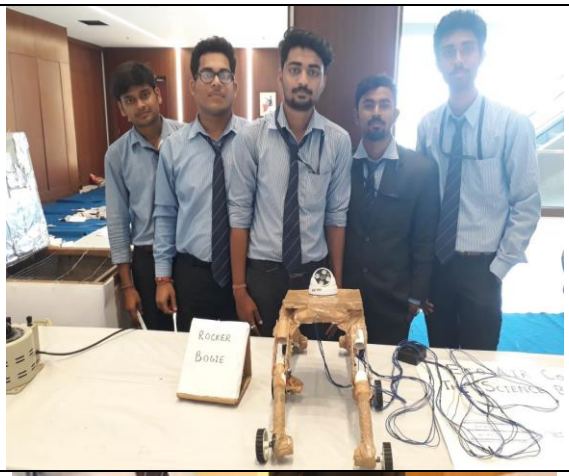
ROCKER BOGIE


METRO STATION


G1
G2