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RPTC TECHNICAL MAGAZINE

RANE TECHNO-VATE

LET'S TAKE THE FIRST STEP TO MAKE THE "SKILLFULL INDIA"…

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RANE POYTECHNIC TECHNICAL CAMPUS

1. BIO-FUEL POWER PLANT RUN BY PUNNAI SEEDS OIL

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ABSTRACT:

The current state of future energy and environmental crises has revitalised the need to find alternative sources of energy, due to escalating oil prices and depleting oil reserves. To meet increasing energy requirements, there has been a growing interest in alternative fuels like bio-fuel that can become a suitable diesel fuel substitute for compression ignition engine. Biodiesel offers a very promising alternative to diesel fuel, since they are renewable and have similar properties.

Key words: *Bio-Fuel, Power Plant, Punnai Seeds.*

INTRODUCTION

Here, we are using Diesel engine in this power plant, which are widely used for their low fuel consumption and better thermal efficiency. The traditional tree of India, particularly those connected with stars and planets seem to have a wider range benefits to humanity. Recently the worth of a tree called Punnai came to be known as providing a viable auto fuel. The oil extracted from the seeds of this tree is found to be a good alternate for diesel. It is also found to be more economical and eco-friendly. Punnai seed oil (Calophyllum inophyllum) was collected and converted into biodiesel from different areas in the Nagapattinam region of South India. This work reports about the engine performances and emissions of Punnai biodiesel, the effect of biodiesel on engine power, economy, durability, emissions and the corresponding factors are surveyed and analysed in detail.

EXISTING LEVEL

There are many renewable and non-renewable resources used in various power plant to produce electricity, but some stands out with high efficiency such as nuclear power plant, thermal power plant and combined cycle power plant. Here, we took the "Diesel power plant" as an existing method of our project. In the diesel engine power plant the fuel mixture and air is used as a working medium. During the time of the suction stroke atmospheric air enters the combustion chamber. With the help of the injection pump fuel is injected in to the chamber. Inside the engine the air and the fuel is mixed and the charge must be ignited because of the compression present inside the cylinder. The main principle observed in the diesel engine is the thermal energy it must be converted in to mechanical energy and further the mechanical energy must be converted in to the electrical energy. The main purpose is to develop electricity with the help of the alternator or generator. A Diesel Power Plant can be used as a mobile plant, Standby unit, Peak load, Emergency plant, Nursery station, Starting stations.

PROBLEM

The cost of diesel is very high compared to coal. This is the main reason for which a diesel power plant is not getting popular over by means of generating power. In other words the running cost of this plant is higher when compared to steam and hydro power plants. The exhaust gas from diesel fuel gives out harmful gases such as hydrocarbons, carbon monoxide, water, and nitrogen which are dangerous to humans and environment. With the depletion of fossil fuels and oils, Diesel rates are hiked up and using diesel for power generation makes difficult to process.

PROPOSAL

From the above review, the following important conclusions are made. The past work reveals that vegetable oils like sunflower, safflower, soybean, rapeseed oil, rice bran oil and their derivatives as alternate fuels in place of diesel in S.I. Engines were proved useful. The past studies reveal that vegetable oils and their derivatives is used in place of diesel in S.I .Engine with little or small modifications(pre heating set up). Here, in our proposed project we are using "Punnai Seeds Oil" as an alternative for diesel in the diesel engine power plant.

STARTING CIRCUIT

The air and fuel mixture act as a working medium in diesel engine power plant. In the starting circuit the diesel and air mixture is supplied into the engine which produces heat energy through combustion and the hot exhaust gas is released out.

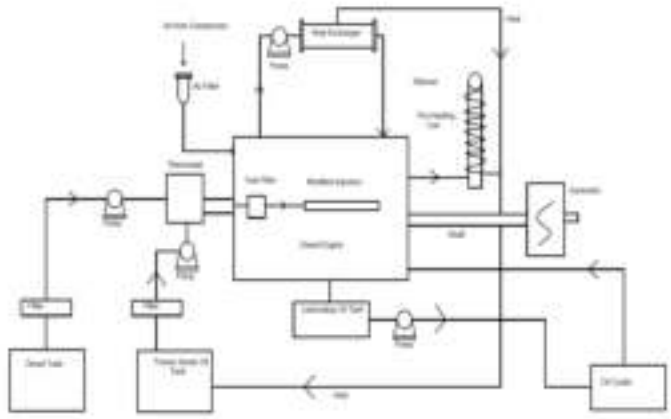
PRE-HEATING CIRCUIT

The heat is taken from the hot exhaust gas when the engine runs with the diesel at the starting stage.Pre-heating method carries the heat to the bio-fuel tank, which heats the bio-fuel and gradually the temperature of the bio-fuel is increased.

BIO-FUEL CIRCUIT

The Viscosity of the bio-fuel is decreased by increasing the temperature gradually to 40 – 50 degree Celsius. The "Punnai Seeds Oil" is supplied into the engine by the help of Thermostat which helps to stop the diesel flow and to input the bio-fuel at a required temperature. After this processes the engine smoothly runs "Punnai Seeds Oil" giving out more efficiency than the diesel fuel.

DIAGRAM



ADVANTAGE*:*

- *Bio-diesel gives lower engine wear.*
- *Bio-diesel is a better solvent than standard diesel.*
- *Bio-diesel cleans the engine.*
- *Bio-diesel removes the deposits in the fuel lines.*
- *Bio-diesel is also used as heating fuel in domestic and commercial boilers.*
- *Bio diesel is more lubricating than diesel. So, it increases the life of engine.*
- *It provides a domestic, renewable energy.*
- *Promotes environmental conservation.*

DISADVANTAGE

• *High Noise is noticed*

APPLICATION

- *Used as a mobile plant, Standby unit, Peak load, Emergency plant, Nursery station, Starting stations.*
- *Used in agriculture.*
- *Applied for the power generation with reduces cost and emission.*

CONCLUSION

In majority of cases the performance was found with some operating problems. The operational problems were engine starting problem, nozzle clogging, increased smoke, engine seizure due to deposit formation, lube oil degradation etc. The high viscosity and low volatility of Punnai seeds oil may be the reason for the above problems. Preheating the Punnai seeds oil and blending with diesel can overcome these problems to some extent. Engine produces the maximum output at a comparable thermal efficiency, but these emit higher smoke, CO, CO2,unburnt Hydro carbons and Nitrogen oxides. Further emissions can be reduced by the use of esterified Punnai seeds oil.

2. REMOTE CONTROLLED 3 AXIS ROBOT ARM

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Remote controlled 3 Axis Robot Arm is designed to control a robotic arm using a standard TV remote. IR sensor is interfaced to the control unit on the robot for sensing the IR signals transmitted by the remote. This data is conveyed to the control unit which moves the robot arm as desired. An At mega series microcontroller is used in this project as control device.

Transmitting end uses a TV remote through which IR commands are transmitted. At the receiver end, these commands are used for controlling the robot arm in all directions such as movement etc. At the receiving end the movement is achieved by three motors that are interfaced to the microcontroller. RC5 based coded data sent from the TV remote is received by an IR receiver interfaced to the microcontroller. The program on the microcontroller refers to the RC5 code to generate respective output based on the input data to operate the motors through controller IC.

- ***Key words: Robot Arm, Remote Controlled, 3 Axis***

INTRODUCTION

Robotics is a combination of electronics, mechanics and programming. In a technical language, it is an electromechanical controlled device. The basic characteristic of robots is that the user instructs them to perform various types of activities. Well, the type of activity more or less depends on the program which is fed into the controller. It is the task of controller to control the electronics and mechanics of the activity which is to be performed. We are here

to design and build a controller which controls the robot.

Now if you want to build a robot that has four wheels and each one is driven by four individual motors and it faces an obstacle forward. A sensor installed inside senses an obstacle in front of the robot and notifies a controller. The controller in turn changes the direction of rotation of motors making the robot turn sideways or reverse, thus avoiding an obstacle. This is how it works. It is the role of controller, which develops a robot that can be controlled by a TV or any IR remote based on Arduino.

REMOTE CONTROL OF ROBOT ARM WITH FIVE DOF

This paper explains the whole process of making a system for remote control of a robot arm with five Degrees of Freedom (DOF). For this purpose, a hardware structure was fully designed and implemented. The hardware structure is based on microcontroller PIC16F877A and surrounding architecture that controls movement of different axis of the arm. The arm has no sensors, so the visual information from the camera was used as feedback.

Two communications were used to operate robot arm. The first one is realized by serial RS-232 protocol between PC and Microcontroller, and this communication is used to operate the arm. The second communication uses TCP/IP protocol for remote control.

The TCP/IP protocol provides communication between server and client computers and sends information of position of robot arm. For interaction with user appropriate GUI is implemented in MATLAB. The main objective of this paper was to obtain fully and precise control of every degree of freedom.

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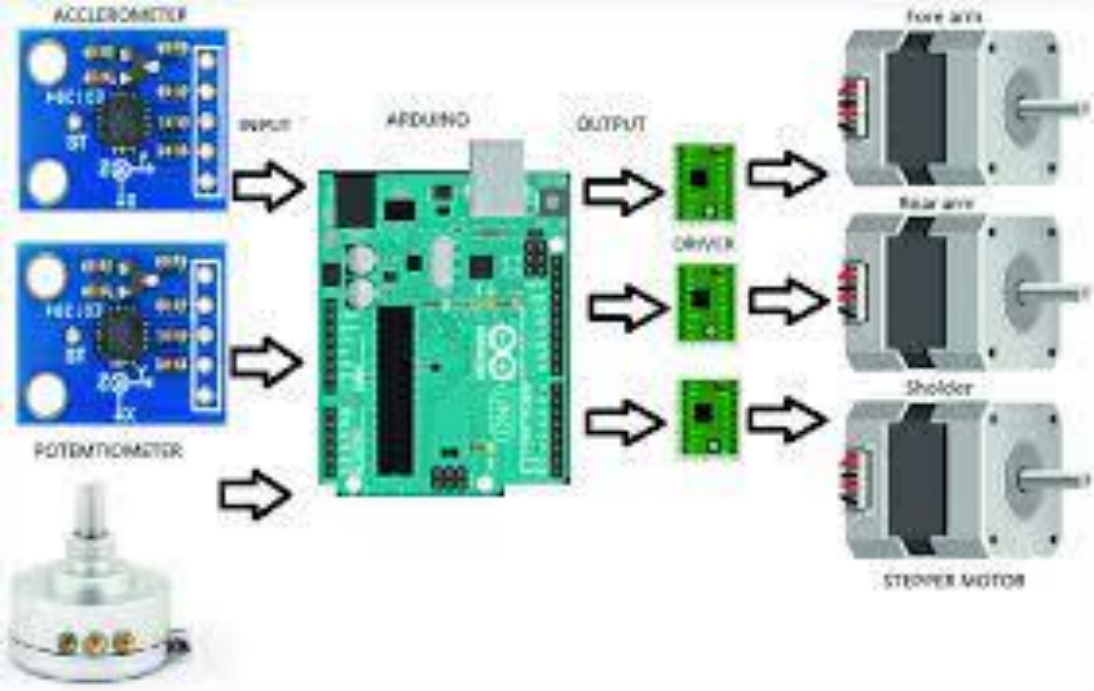
CIRCUIT DIAGRAM:



EXPLANATION

This device is a product of fully independent work. Production implied the implementation of the entire hardware circuit and construction of work algorithm. The structure consists of a microcontroller, a controlling element for the robotic arm and the robotic arm itself. The robotic arm has five Degrees of Freedom modelled after the human arm.

The controlling element consists of ten relays; all assembled in accordance with scheme of the relay is simple. When current flows between pins X and Y, it leads to the creation of a magnetic field. The influence of the magnetic field causes a change in the position of the switch inside the relay.

Control signals from microcontroller are sent to the controlling element. Those control signals need to enable the flow of current which is necessary to trigger the DC motors placed inside the joints of the robotic arm. The system is operated from the computer GUI.

CONCLUSION

The paper titled "Remote Controlled 3 Axis Robot Arm" is a model for reducing fatal accidents with the help of microcontroller and IR remote module. Humans and their safety play a major role for Technology ruling the world now days, but it should not erase problems for our development. Human safety is the most important factor. Finally, the aim of the project is to develop Remote Controlled 3 Axis Robot Arm.

3.BOOMING TECHNOLOGIES BASED ON INDUSTRY 4.0

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MECHATRONICS ENGINEERING

Mechatronics is a multidisciplinary field that refers to the skill sets needed in the contemporary, advanced automated manufacturing industry. At the intersection of mechanics, electronics, and computing, mechatronics specialists create simpler, smarter systems.

Interesting Facts!

10 Amazing Inventions made possible by Mechatronics Engineering.

1. *Sophie the Robot*
2. *NASA' Curiosity Rover*
3. *Anti-Lock Brakes*
4. *I-Limb*
5. *The CNC Machine*
6. *Roomba*
7. *Robotic Arm for Automation*
8. *BLEXX Exoskeleton*
9. *Boston Dynamics Big Dog*
10. *Tesla's Autopilot*

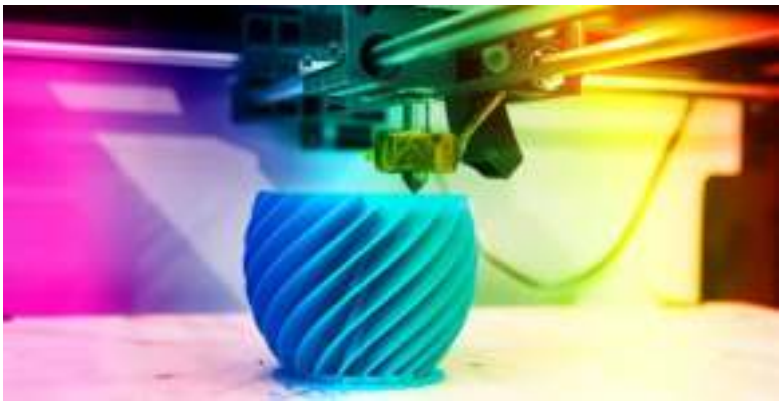
ROBOTICS AND AUTONOMOUS SYSTEM

Robotics and autonomous systems is a multidisciplinary scientific and technological domain for implementing complex systems with cognitive capabilities. Autonomous systems were introduced to regulate organizations such as Internet service providers (ISP), educational institutions and government bodies. These systems are made up of many different networks but are operated under the umbrella of a single entity for easy management.

Interesting Facts!

- ✓ *An autonomous robot is a robot that is designed and engineered to deal with its environment on its own, and work for extended periods of time without human intervention.*
- ✓ *Automation and robots are two distinct technologies, but the terms are often used interchangeably.*
- ✓ *Silas Adekunle, a Nigerian, credited for building the world's first gaming robot and has just become the highest paid in the field of Robotic engineering. He has also been described as the smartest robotics engineer in the world.*

ADDITIVE MANUFACTURING



Additive manufacturing (AM) or additive layer manufacturing (ALM) is the industrial production name for 3D printing, a computer controlled process that creates three dimensional objects by depositing materials, usually in layers.

Interesting Facts!

- ✓ *Chuck Hull is the co-founder, executive vice president and chief technology officer of 3D Systems. He is one of the inventors of the SLA 3D printer, the first commercial rapid prototyping technology, and the widely used STL file format.*
- ✓ *Additive manufacturing first emerged in 1987 with stereolithography (SL) from 3D Systems, a process that solidifies thin layers of ultraviolet (UV) light-sensitive liquid polymer using a laser*
- ✓ *Some of the sectors where it is most widely used include lighting, transportation (automotive parts), consumer electronics and wearables, and on-demand products.*

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

Interesting Facts!

- ✓ *AI enabled IoT creates intelligent machines that simulate smart behaviour and supports in decision making with little or no human interference.*
- ✓ *The convergence of AI (Artificial Intelligence) and IoT can redefine the way industries, business, and economies functions.*
- ✓ *Gartner estimates that over 80% of enterprise IoT projects will incorporate AI by 2022*
- ✓ *Java, C, JavaScript, and Python were the top four choices for developers who are "building IoT solutions."*
- ✓ *The first AI Program was written in 1952 by Arthur Samuel for the prototype of the IBM 701.*

MACHINE LEARNING

Machine learning is powered by data and generates insight from it. Machine learning uses past behaviour to identify patterns and builds models that help predict future behaviour and events. Internet of Things (IoT): IoT refers to connecting devices and capturing input from multiple sources.

Interesting Facts!

- ✓ *Machine Learning is a subset of AI refers to teaching machines to make predictions without explicitly programming them. Instead, they use historical data to predict new outcomes.*
- ✓ *Three types of machine learning: supervised learning, unsupervised learning, and reinforcement learning.*
- ✓ *Machine learning algorithms are mathematical model mapping methods used to learn or uncover underlying patterns embedded in the data.*
- ✓ *Convolutional Neural Network (CNN/ ConvNet) is a class of deep neural networks, most commonly applied to analyze visual imagery.*

CYBER SECURITY

Cyber security is the application of technologies, processes and controls to protect systems, networks, programs, devices and data from cyber-attacks. Computer security, cybersecurity, or information technology security is the protection of computer systems and networks from information disclosure, theft of, or damage to their hardware, software, or electronic data, as well as from the disruption or misdirection of the services they provide.

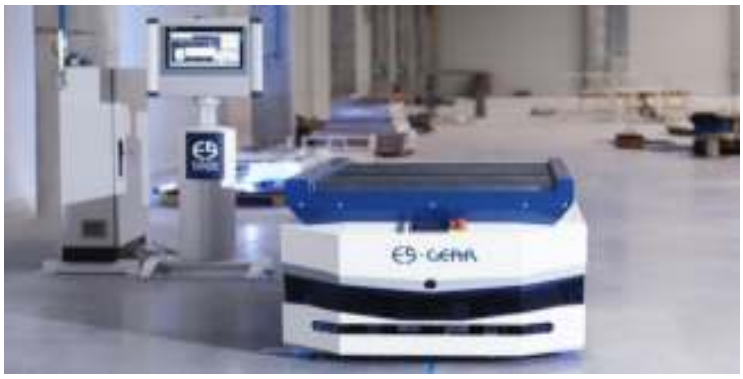
Interesting Facts!

- ✓ *The eight most basic elements of a strong cybersecurity posture are:*

1.Asset Management & Identification, 2. Risk Management, 3. Access Management, 4. Threat Management, 5. Security Controls, 6. Disaster Recovery & Business Continuity, 7. Incident Management, 8. Security Education, Training, and Awareness.

- ✓ *Cybersecurity began in the 1970s when researcher Bob Thomas created a computer programme called Creeper that could move across ARPANET's network, leaving a breadcrumb trail wherever it went.*

AUTOMATED GUIDED VEHICLE



An automated guided vehicle or automatic guided vehicle (AGV), also called autonomous mobile robot (AMR), is a portable robot that follows along marked long lines or wires on the floor, or uses radio waves, vision cameras, magnets, or lasers for navigation. They are most often used in industrial applications to transport heavy materials around a large industrial building, such as a factory or warehouse.

Interesting Facts!

- ✓ *The AGVs travel at a maximum speed of 7 km/h depending on the respective situation.*
- ✓ *Noble points out that the company has provided AGV/AGC systems to most OEM automotive manufacturers – including Volkswagen, Nissan, Honda, General Motors, Chrysler, Ford, Toyota and Tesla Motors – as well as many tier one and two automotive suppliers, such as Johnson Controls and Magna.*

n 1954, in Northbrook, Illinois, he and his company Barrett Electronics invented the "Guide-O-Matic", the world's first driverless vehicle.

COLLABORATIVE ROBOT (COBOT)

A Cobot, or collaborative robot, is a robot intended for direct human robot interaction within a shared space, or where humans and robots are in close proximity. Cobot applications contrast with traditional industrial robot applications in which robots are isolated from human contact.

Interesting Facts!

- ✓ *Cobot, is a robot that is capable of learning multiple tasks so it can assist human beings.*
- ✓ *Cobots were invented by Northwestern University Professors J. Edward Colgate and Michael Peshkin in 1996. Cobots were initially called "programmable constraint machines.*
- ✓ *Most Cobots are cheaper than traditional, industrial robots.*
- ✓ *Most Cobots have a maximum of speed of 1.5 m/s, though they're usually operated at 1 m/s or less, depending on the proximity to human co-workers.*

PRODUCT LIFECYCLE MANAGEMENT(PLM)

Product life-cycle management is the succession of strategies by business management as a product goes through its life-cycle. The conditions in which a product is sold changes over time and must be managed as it moves through its succession of stages. It to help determine advertising schedules, price points, expansion to new product markets, packaging redesigns, and more.

Interesting Facts!

- ✓ *There are four stages in a product's life cycle- Introduction, Growth, Maturity and Decline*
- ✓ *New product development (NPD) is the process of bringing an original product idea to market. Although it differs by industry, it can essentially be broken down into seven stages: ideation, research, planning, prototyping, sourcing, costing, and commercialization.*
- ✓ *Raymond Vernon, an American economist who was developed the Product Life Cycle theory.*
- ✓ *Oracle Agile PLM is a product lifecycle management solution that helps businesses manage product value chains.*

The Internet of things describes physical objects with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks. An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments.

INTERNET of THINGS(IOT)

Interesting Facts!

- ✓ *The future of IoT has the potential to be limitless.*
- ✓ *Four pillars underpin the ability of IoT to operate successfully: device, data, analytics and connectivity.*
- ✓ *Botnets are a series of internet-connected devices that are created to steal data, compromise networks, or send spam. Botnets contain malware that allows the attacker to access the IoT device.*
- ✓ *IoT devices require unencrypted wireless connections, so it poses High Riskes.*

PUZZLES ZONE

WORD PUZZLE

Complete all these words.

S	*Q*	*U*			

F			*T*

S	*H*			

T	*A*			

M			*H*

K	*A*					*A*

M			*T*

PUZZLES ZONE

Which is the Longest word in English Language?

How many words you can make from that Maximum?

Check your IQ Level based on Number of words.

1.10-15-Average. 2 16-20-Moderate, 3. 20-30-High

2 + 3= 5

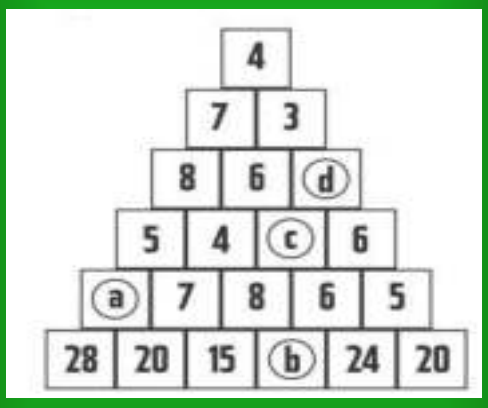
3 + 7= 17

4 + 5= 19

5 + 8= 37

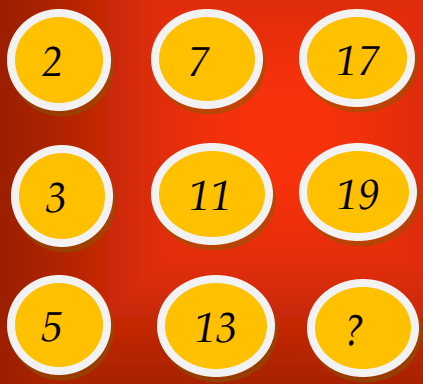
Then,

6 + 7=?



a,b,c,d=?

Find the missing Number?



"The object of Education is not fill a man's mind with facts;
It is to teach him how to use his mind in thinking."

- HENRY FORD

For Your Valuable Feedback/Suggestion: r.ravishankar@ranepolytechnic.edu.in

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