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NON-CONVENTIONAL SOURCES FOR ELECTRIC VEHICLES

Dr.M. Chiranjivi1,Mr.K.Suresh2, Mr.M.Siddartha3 1,2Associate Professor, Department of EEE, Hyderabad Institute of Technology and Management, Telangana, India-501401 3Assistant Professor, Department of EEE, Hyderabad Institute of Technology and Management, Telangana, India-501401

Abstract
The revolution from gasoline-powered vehicles to electric vehicles (EVs) has been a gradual process to stabilize climate change due to global warming and maintain our standard of living. Zero emission of harmful exhaust gases is a good sign for our health. EVs have several benefits than petrol/diesel vehicles like less noise pollution, low maintenance cost, and low cost of fuel per km. This is effective solution for EV trikes which can be driven by human power by from an electric motor. In this paper, we focused on feasible design solution of a user-friendly three-wheeler electric vehicle which can access with finger print also which consist of self-charging dynamo and solar to charge the EV battery. This vehicle consists of GSM module for sending the SMS and GPS module for vehicle tracking.
Keywords: EV vehicle, PIC microcontroller, Solar panel, Dynamo, Charging circuit, Rechargeable Battery, LCD display, GSM, GPS, Fingerprint module

1. Introduction

The main objective of designing electric trike is to have a light weight and cost-effective vehicle which can be used in the small townships. Keeping this in mind, we have designed various subsystems and tried to reduce weight and cost wherever possible.
The EV vehicle is built over a mild steel metal with a controller circuitry and to access the vehicle using biometric technology.
This vehicle consists of self-charging dynamo and solar panel to charge EV battery. Dynamos are attached to the back wheels of the vehicle. While moving the vehicle, dynamo will rotes and it converts mechanical energy into electrical energy is stored into the EV battery through charging circuit. Solar panel is placed at back side of the EV vehicle with a support iron frame also this solar energy is uses for battery charging.
The innovating thing of this vehicle consists of GSM and GPS technology for vehicle tracking. By sending the simple SMS to the GSM modem from our mobile phone, this system will send the replay message to the person along with location in the form of latitude and longitude values. By placing this value into the google chrome we can identify the exact location of the EV vehicle.

2. LITERATURE SURVEY

1.This chapter explains about literature review of Design and Fabrication of Three Wheel Drift Trike, which includes the theory about drift tike chassis. Usually a drift trike or owner who want the handling of vehicle will purchase the latest in wheel, tyres and other optional equipment, but end up finding that those things in fact handles worse. The first stage in achieving a good handling drift trike will provide the greatest percentage of power efficiency is to go right back to basics. The chassis is the
framework of any vehicle. The steering and drive train components such as engine, chain drive, and final drive components are mounted to chassis. The chassis would have to be strong and rigid platform the suspension components. Furthermore, the construction of today is vehicle require the use of many different material.

Solar charging for the ETrike can provide a totally clean transport solution instead of charging from the utility grid that draws power from fossil fuels. Based on a study conducted by Meralco in preparation for its proposed charging station, the Etrikes gets 3kWh of energy per charge with an AC power requirement of around 3kW. They usually charge three times a day with a total daily energy requirement of 6 to 8 kWh for 4 to 5 hours or charging time.

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Gomish Chawla, Design and fabrication of a tadpole hybrid trike; The principle objective of this research is to conceive, design, build and compete with a small electric as well as human powered tricycle. It should have a seating capacity of 2 riders in front and back position. The vehicle follows a tadpole structure; the design of which has been derived from passenger two rider bicycle. **[1]** According to another study a developed system is an electronic device which could be installed in a vehicle for owners help to track the vehicle accurately. This research has proposed a complete vehicle tracking system which was built using concepts of modern technologies of GPS and GSM. Base of this system is embedded system, which could be used for effective tracking and positioning a vehicle perfectly by making use of GPS (Global Positioning System) 12 and GSM (Global System for Mobile Communications). We could easily monitor and check the status of target vehicle in demand using this system.

3. Implementation:

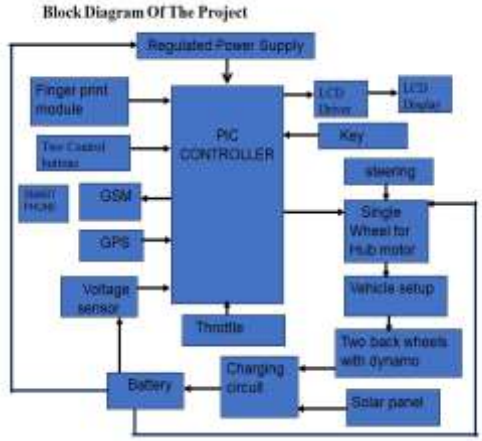


Fig3.1: Block diagram

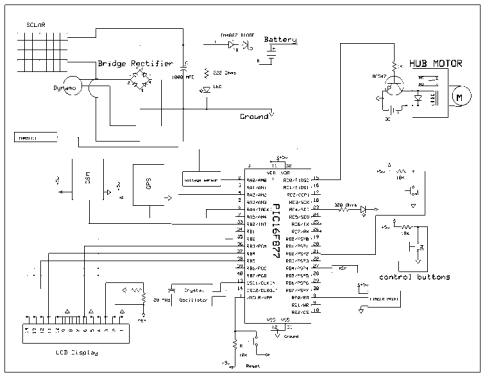


Fig: Circuit diagram of the EV vehicle

Creating an Electric Vehicle (EV) that uses renewable resources, integrates GSM, GPS, and fingerprint technology involves a complex system. Here's an overview of how such a system might work.

Renewable Resource Integration:

Solar panels installed on the EV to charge the battery through charging circuit. Energy generated from these sources is stored in the EV's batteries or a separate energy storage unit.

Self-charging dynamo:

A self-charging dynamo is connected to the vehicle's wheel. As the vehicle moves, the dynamo generates electrical energy through kinetic energy conversion.

Electric Vehicle Charging:

The EV's battery is charged using the renewable energy solar and self-charging dynamo reducing dependence on traditional grid power.

GPS Integration:

GPS technology tracks the real-time location of the EV in the form of latitude and longitude values.

GSM Integration:

A GSM module in the EV enables communication and tracking the vehicle's status.

Fingerprint Technology:

Fingerprint recognition technology can be integrated into the EV as a security measure and an access control system. The driver or authorized users must authenticate their identity using their fingerprints to access and operate the EV.

Security and Authentication:

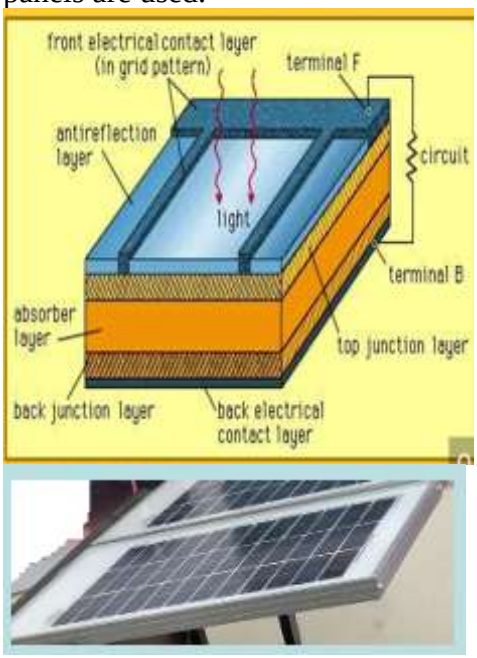
Fingerprint authentication ensures that only authorized users can operate the EV. GSM technology adds another layer of security by enabling remote locking and tracking in case of theft or unauthorized access.

4.Related Work: The brief introduction of different modules used in this project is discussed below:

4.1 Solar:

A solar cell (also called photovoltaic cell) is a solid-state device that converts the energy of sunlight directly into electricity by the photovoltaic effect. Assemblies of cells are used to make solar modules, also known as solar panels.The energy generated from these solar modules, referred to as solar power, is an example

of solar energy. 48V, 20watt Polycrystalline solar panels are used.



1. Photons in sunlight hit the solar panel and are absorbed by semi conducting materials, such as silicon.
2. Electrons (negatively charged) are knocked loose from their atoms, allowing them to flow through the material to produce electricity. Due to the special composition of solar cells, only allow the electrons to move in a single direction. The complementary positive charges that are also created (like bubbles) are called holes and flow in the direction opposite of the electrons in a silicon solar panel.
3. An array of solar panels converts solar energy into a usable amount of direct current (DC) electricity.

4.2 Dynamo:

Fig: Dynamo

DC electric motor uses direct current (DC) electricity to produce continual, rotary motion, so a simple DC generator produces a steady supply of direct current electricity when it spins around. Like a DC motor, a DC generator uses a commutator. It sounds technical, but it's just a metal ring with splits in it that periodically reverses the electrical contacts from the generator coil, reversing the current at the same time. As we saw up above, a simple loop of wire automatically reverses the current it produces every half-turn, simply because it's rotating, and the commutator's job is to cancel out the effect of the coil's rotation, ensuring that a direct current is produced.

4.3 Charging circuit:

Fig: Charging circuit

Above circuit diagram take the input from 48v,20watt Solar panel and dynamo, we can see that the generated DC voltage is being stored into the battery with the help of rectifier and 1000MF capacitor used. We can get the DC voltage at the output terminal is fed to the rechargeable battery which can be indicated if the LED glows.
Here we are using diodes for reverse current protection. Diodes will conduct in forward bias.

4.4 Rechargeable Battery:

Fig2: Rechargeable Battery

A rechargeable battery, storage battery, or accumulator is a type of electrical battery. It comprises one or more electrochemical cells, and is a type of energy accumulator. Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems

connected to stabilize an electrical distribution network. Rechargeable batteries are known as secondary cell because its electrochemical reactions are reversible.

Rechargeable batteries have lower total cost of use and environmental impact than disposable batteries. Some rechargeable battery types are available in the same sizes as disposable types. Rechargeable batteries have higher initial cost but can be recharged very cheaply and used many times.

4 .5 Throttle:

Fig; Throttle

When the accelerator (gas pedal) is pushed down, the throttle plate opens and allows air into the engine. When the gas pedal is released, the butterfly closes and effectively chokes off (throttles) air flow into the combustion chamber. This process effectively controls the speed of the engine and ultimately, the speed of the vehicle.

4.6 Steering:

Fig: Steering

A conventional automotive steering arrangement allows a driver to control the direction of the vehicle by turning the direction of the front wheels using a hand–operated steering wheel positioned in front of the driver. The steering wheel is attached to a steering column, which is linked to rods, pivots and gears that allow the driver to change the direction of the front wheels.

4.7 Back wheel:

Fig: Back wheel

The rare wheels start slipping or proactively based in the vehicle condition or drive mode selection.

4.8 HUB motor with front wheel:

Fig: Front wheel with hub motor

The wheel hub motor (also called wheel motor, wheel hub drive, hub motor or in-wheel motor) is an electric motor that is incorporated into the hub of a wheel and drives it directly. Hub motor electromagnetic fields are supplied to the stationary windings of the motor.

The outer part of the motor follows, or tries to follow, those fields, turning the attached wheel. In a brushed motor, energy is transferred by brushes contacting the rotating shaft of the motor. Energy is transferred in a brushless motor electronically, eliminating physical contact between stationary and moving parts.

Although brushless motor technology is more expensive, most are more efficient and longer-lasting than brushed motor systems.

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4.9 Controller Circuit:

Fig: Controller

It takes information in the form of signals from input components, e.g., throttle and brake, through different sensors. Then, it processes the received signals and translates them into commands for the output components, e.g., the motor.

4.10 Battery charger:

Fig: Battery charger

Hook up the charger and plug it directly into the battery.

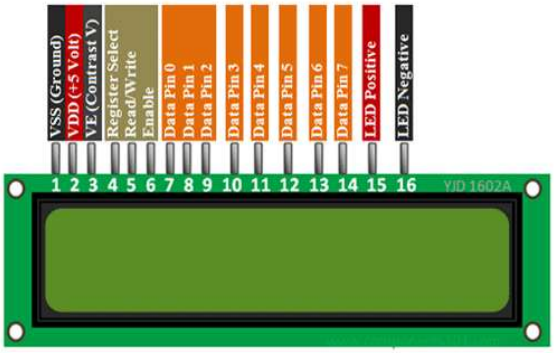
Wait for the battery to charge. Newer models come equipped with an LED indicator light that turns red when the battery is very low or totally drained, yellow indicating a charge is needed soon, or green once the battery has been fully charged.

4.11 MS Steel Metal:

To fabricate the vehicle using MS steel metal.

4.12 LCD Display:

One of the most common devices attached to a micro controller is an LCD display.



An **LCD** is an electronic **display** module which uses liquid crystal to produce a visible image.

4.13 PIC Microcontroller:

Fig: PIC microcontroller

The control unit in our design is a PIC programmable interface controller. A microcontroller is like a computer that is on a chip and possesses elementary microprocessor components together with some functions that are specialized, like comparator and Analog/Digital converter. Applied in the authors work microcontroller belongs to the PIC32 advanced family of microcontroller devices. The program memory of this microcontroller has 256 KB and its data memory (RAM) has 64 KB. We use PIC 16F72 Microcontroller.

4.14 GSM:

Fig: GSM

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SIM900A GSM Module is the smallest and cheapest module for GPRS/GSM communication. It is common with Arduino and microcontroller in most of embedded application. The module offers GPRS/GSM technology for communication with the uses of a mobile sim. It uses a 900 and 1800MHz frequency band and allows users to receive/send mobile calls and SMS.

A GSM module works by connecting to the GSM network through a SIM card. The SIM card provides the module with a unique identification number, which is used to identify the device on the network. The GSM module then communicates with the network using a set of protocols, which allows it to send and receive data.

4.15 GPS:

Fig: GPS Receiver

GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. When the GPS module works, the green indicator on the GPS module will blink (the red one is for power-on indication), and the figures regarding the time, latitude, longitude, etc., will be displayed on LCD.

4.16 R303

Fig: Finger print module

R307 fingerprint module is a fingerprint sensor with a TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person.

5. Results:

Fig: Electric Vehicle Using Renewable Resources

- Design a hybrid vehicle using self-charging dynamo and solar.
- When the finger print matches with the predefined stored fingerprint, The results of the microcontroller will access the vehicle.
- The results of the microcontroller will display the battery voltage on LCD module.
- The results of the microcontroller will track location of the vehicle through GPS and will be display on LCD.
- The results of the microcontroller will be sent the SMS along with location to the required person through GSM.

6. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

7. CONCLUSION:

This research lays the foundation of the understanding of good engineering by following the procedure of understanding, evaluation, and study of the existing technology. This project is designed to improve the normal trike and make it extra efficient. The EV vehicle battery charge in two method so it can run electrically and can also display the battery voltage on LCD.

The vehicle are also stolen while they are stand in front of house and in parking area due to weak security. The Key based start of vehicle ignition can be easily start by joining the wires than there no need of key. We have improved the security of vehicle by starting the vehicle ignition using fingerprint. As fingerprint system are secure and reliable it accepts only authentic user finger image to start the vehicle. The fingerprint take the image, convert it into binary and match with the

stored image in database if it is matched then vehicle ignition start otherwise not

These systems keep a good control on the thefts and help avoiding them to some extent. Basically in all these systems the GPS and GSM are used to track the vehicle. The GSM modem was configured and we tested and implemented the tracking system to monitor the vehicles location via SMS and online on Google map. The user is able to access the position of their vehicle at any instant of time. This system is reliable any very secure. GSM module used in this paper to send and receive SMS. GSM module can supported 2G, 3G and 4G but only 2G can supported in this country. Because each country used different frequencies bands for GSM sim 900A.

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