International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

Implementation of Electric Vehicle for Agricultural Purpose

, Mr. R. Sundaramoorthi1, M.Mano2, K. Prabhakaran3, C. Vijay4, S. Hariharan5,

Final year UG Student Department of EEE, Kings College Of Engineering, Punalkulam .
Assistant Professor, Department of EEE, Kings College Of Engineering, Punalkulam.
Final year UG Student Department of EEE, Kings College Of Engineering, Punalkulam.
Final year UG Student Department of EEE, Kings College Of Engineering, Punalkulam.
Final year UG Student Department of EEE, Kings College Of Engineering, Punalkulam

Submitted: 15-04-2021 Revised: 28-04-2021 Accepted: 30-04-2021

ABSTRACT-In this paper Implementation of Electric vehicle is presented. In the past few years Agriculture has been growing fast. Many technologies associated in this field. Agriculture is the backbone of Indian Economy.Lot of technology's grow up very fast and advanced but the field of agriculture development of technology is very less. In this paper we proposed the concept of Automation of Agricultural processing Electric Vehicle. There are various process includes such as preparation of land, sowing of seeds, irrigation system, and fertilization, planting, harvesting of crops and packing of final product.

Keywords-photo voltaic cell, battery, Ultrasonic sensor, Node MCU, pumping motor, gear motor.

I. INTRODUCTION.

The electrical vehicle plays a major role in precision farming, which is to improve the efficiency of crop production without influencing the different agriculture variables and reducing production costs. This paper discusses the current developments and future perspectives of Precision Agriculture (PA) in the field of crop production in the construction of an autonomous vehicle. It offers a better solution which optimizes the quality and quantity of the crop by reducing costs, intervening humanly and changing environment as a result of unpredictable nature. Reducing environmental impacts and the dependency on fossil fuels are considered as important issues in energy policies globally. In many countries, the utilization of green vehicles, for example, battery electric vehicles (BEVs), power module vehicles

(FCVs), module half and half electric vehicles (PHEVs), and crossover electric vehicles (HEVs), is elevated by governments to supplant ordinary inside burning motor vehicles (ICEVs). For example, ranch structures, water system frameworks, crop treatment, item handling and capacity. The fundamental target of this paper is to talk about the future difficulties for farming vehicles from the perspective of joining elective sustainable power sources (RESs). This can improve the self-rule of vehicles by expanding the proficiency and lessening the reliance on petroleum product sources in the horticultural hardware division. At present the electric vehicles are either charged by the network or separate sustainable assets. They have their own sun-based board and are utilized for short separations. Charging from the network creates an additional heap on the age of power, inexhaustible sources are temperamental. Just a sun powered board on the vehicle isn't sufficient to control it altogether. Vehicle-to-Lattice innovation has been fruitful in utilizing electric vehicles for putting away overabundance vitality from the matrix during off-top burden request time and giving vitality during pinnacle request time. The proposed framework uses both the matrix just as the vitality from photovoltaic boards. The vehicles have their own PV boards. The batteries are charged utilizing both sun powered power and the vitality from the network which is used if all else fails and during off top occasions. The framework likewise encourages power move between vehicles without other vitality sources. Some of the researchers developed autonomous technologies to help with working in an agricultural field, to reduce human errors and being able to work continuously for example, autonomous steering, autonomous watering cars, plant growth measuring devices,etc.

II. LITERATURE SURVEY

For the past ten year many researchers have been involved in the field of Electric vehicle Technology. In this Literature Survey, various

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

types of electric vehicles, the types of vehicles commonly used in agriculture systems, and fuel vehicles have been investigated. We will also investigate battery management systems thermal management in electric vehicles a better understanding of the requirements.

In order to avoid various problems which affect agricultural fields, agricultural electrical vehicle is needed, to fulfil the objectives like weed detection, irrigation, crop protection and Bug Spray. This paper illustrates the design aspects of electric vehicle which is eco-friendly in nature and automated. The various technologies used are sensor technology and IoT. Sensors used are temperature, humidity, LDR, Ultrasonic, Soil moisture, IR, and Rainfall sensor. IoT technology includes Bluetooth module and image processing object detection. The embedded controllers used are Raspberry Pi and Arduino. Servo and Geared DC motors are used for traction. The designed EV not only uses battery power but also uses renewable energy in order to perform all its operations. The proposed model is cost effective and reliable, also suitable for linear agricultural applications.

The electrical vehicle plays a major role in precision farming, which is to improve the efficiency of crop production without influencing the different agriculture variables and reducing production costs. This paper discusses the current developments and future perspectives of Precision Agriculture (PA) in the field of crop production in the construction of an autonomous vehicle. It offers a better solution which optimizes the quality and quantity of the crop by reducing costs, intervening humanly and changing environment as a result of unpredictable nature. Reducing environmental impacts and the dependency on fossil fuels are considered as important issues in energy policies globally. In many countries, the utilization of green vehicles, for example, battery electric vehicles (BEVs), power module vehicles (FCVs), module half and half electric vehicles

(PHEVs), and crossover electric vehicles (HEVs), is elevated by governments to supplant ordinary inside burning motor vehicles (ICEVs). For example, ranch structures, water system frameworks, crop treatment, item handling and capacity. The fundamental target of this paper is to talk about the future difficulties for farming vehicles from the perspective of joining elective sustainable power sources (RESs). This can improve the self-rule of vehicles by expanding the proficiency and lessening the reliance on petroleum product sources in the horticultural hardware division. At present the electric vehicles are either charged by the network or separate sustainable assets. They have their own sun-based board and are utilized for short separations. Charging from the network creates an additional heap on the age of power, inexhaustible sources are temperamental. Just a sun powered board on the vehicle isn't sufficient to control it altogether. Vehicle-to-Lattice innovation has been fruitful in utilizing electric vehicles for putting away overabundance vitality from the matrix during off-top burden request time and giving vitality during pinnacle request time. The proposed framework uses both the matrix just as the vitality from photovoltaic boards. The vehicles have their own PV boards. The batteries are charged utilizing both sun powered power and the vitality from the network which is used if all else fails and during off top occasions. The framework likewise encourages power move between vehicles without other vitality sources. Some of the researchers developed autonomous technologies to help with working in an agricultural field, to reduce human errors and being able to work continuously for example, autonomous steering, autonomous watering cars, plant growth measuring devices, etc.

During the last years the interest in electric vehicles (EV's) grew strongly due to ecological aspects. However, the long charging times, which usually exceed 30 minutes for a full charge, as well as the range limitation of EV's due to the available battery technologies, are still challenging problems. In order to overcome the charging and the range limitation problem, the company Better Place [1] is proposing to quickly exchange the vehicle battery in exchange stations. This requires designing all electric vehicles in a similar manner, so that the battery could be automatically exchanged. Also in all vehicles the same or only a very limited number of

2 different battery types can be installed in order to limit the number of batteries, that must be on hand in the exchange stations. Furthermore, to avoid an accumulation of batteries, a system for distributing the batteries between the exchange stations is necessary. In total more batteries are necessary since besides the batteries in the vehicles also batteries in the exchange stations, which are recharged during the vehicle batteries are used for driving, are necessary. Another option to overcome the charging and range limitation, are ultra fast charging stations, which allow to refill the batteries within a few minutes [2]. With this concept, the vehicle battery is designed only for a limited range of 150- 200km, so that the volume and weight of the battery could be reduced and the driving range is extended by the short recharging process. Battery

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

technologies based on lithiumtitanate enable an ultra fast charging of up to 10C-12C as well as high cycle numbers in the range of several thousand.

Internal combustion engine (ICE) is a century-old scheme on which most of our transportation system is relaying presently. Now electrification of transportation is increasing day by day which is greener and cleaner innovation in the field of vehicle industry. Global warming and threat of vanishing fossil fuel has given a good chance to Electric Vehicle (EV) to be the part of transportation industry. This is the mean of reducing vehicular emission which in turns mitigates the risk of climate change but on the same time extra burden is going to be applied on grid system. So renewable energy sources especially Solar or Photovoltaic (PV) energy which is abundantly available during office timing is preferable energy source for Electric Vehicle (EV) charging with improved energy efficiency. The PV charging of EV not only reduces the fuel consumption but also the extra load of the grid. There is a need of designing a system which would be capable of diverting fast changes of PV output for direct charging of the battery. Activities to date include the work on investigations of PV performance, monitoring techniques [8] and Maximum Power Point Tracking (MPPT) in general. Universiti Teknologi Malaysia (UTM) Johor Bahru, Malaysia under the Faculty of Electrical Engineering (FKE) is going to install a large PV System, which will fulfil the requirements of multidimensional fields, such as energy needs, experimental setup for solar energy research and newly established Electric Vehicles (EV) Lab's testing and PV charging station. A substantial increase of photovoltaic (PV) power generators' installations has taken place in recent years, due to the increasing efficiency of solar cells as well as the improvements of manufacturing technology of solar panels. PV is still in the evolutionary phase and is expected to grow for several decades to come. Fuelled by environmental considerations, interest in PV is showing a healthy rise both in the minds of the public and in the planning realms of the electric power community. A Solar PV source is one of the most interesting technologies among the other renewable energy sources, with the annual growth rate of 25 – 35% over this recent decade. Photovoltaic (PV) panels, commonly called solar cells, are simply converters. When exposed to light, solar cells are capable of producing electricity without any harmful effect to the environment or device, meaning power can be generated for many years while requiring minimal maintenance and operational costs.

Conventional vehicles are driven by internal combustion engine (ICE) and thus they are also named internal combustion engine vehicles (ICEVs). The vehicle is named the electric vehicle (EV) if an electric motor or a few electric motors are used to drive wheels of a vehicle. In addition, the vehicle is named the hybrid electric vehicle (HEV) if both an electric motor and an ICE impel wheels of a vehicle. Electric vehicles are only discussed in this paper. In EVs, the battery is the original energy source and provides electric power to electric motor drives and other equipments, such as lighting devices. It can be observed that the typical control system of EVs includes five electric control units (ECUs), which are the Main ECU, Motor ECU, Battery ECU, Brake ECU, and Electric Equipment ECU. The main ECU controls the drive torque of EV by computing the motor torque based on information such as the accelerator opening and car speed command. The torque request value is sent to the motor ECU. In accordance with the drive output value requested by the main ECU, the motor ECU controls the motor drive to develop the desired torque. The motor drive can be used to achieve torque direct control (DTC). By coordinating the braking effort with the regenerative braking that is executed by the motor, the brake ECU controls such a manner that the entire 3 brake torque produced by both the regenerative brake system and the conventional hydraulic brake system. The battery ECU monitors the charging and discharging state of the battery. Generally, the monitor of the battery includes the leak detection, the detection of abnormal voltage, the detection of the abnormal temperature, the detection of the abnormal current. The electric equipment ECU controls the DC-DC converter to generate a variety of DC voltage levels for lighting and other equipments.

Electric motor technology involves machine constructions, materials, electronics, sensors and control technologies. A suitable converter and control techniques need to be developed for different kind of motors in order to generate a high performance drives. The important aspect of various converter designs is the converter efficiency and its dynamic response. Low power loss in converters is due to high efficiency. The 3rd harmonic and its corresponding multiples component are eliminated in the output due to this feature three phase power system is used in DC drive systems. Comparing 1- phase system with that of 3-phase, the ripple voltage is significantly less. Now a days we are facing lot of different crisis caused by high oil prices and obsolete designs which have prompted the search for more

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

efficient road vehicles, possibly based on environment friendly sources located in politically stable areas. This has led to the development of electric vehicles. Compared with a DC motor, the BLDC motor uses an electric commutator rather than a mechanical commutator, so it is more reliable than the DC motor. In a BLDC motor, rotor magnets generate the rotor's magnetic flux, so BLDC motors achieve higher efficiency. It has become possible because of their superior performance in terms of high efficiency, fast response, and weight, precise and accurate control, high reliability, maintenance free operation, brushless construction and reduced size, Torque to motor size ratio is high, Thermal overload & under load protection is provided. Microcontroller has more advantages than microprocessors. These ICs are cost effective and can be used for any applications ranging from appliances to automobile engines to text or data processing equipment.

The traditional methods available in literature depicts that the rotational speed of motors can be popularly controlled by either controlling voltage or frequency or both by controlling V/f ratio. But, now days, derive based application concept is becoming more popular for supervising the speed of rotation of an electrical machine and therefore, any electrical machine can be precisely controlled by implementing the driving system with machine. All the researches have been more or less focused towards the application of environmental friendly renewable energy sources. These renewable energy sources can be used as primary energy source for deriving the prime mover.

Transportation from one place to another place requires a large amount of energy that must be produced mainly from the different fossil fuels combustion for deriving the different vehicles. Electric vehicle are becoming more popular now a days due to the rapid depletion of fossil fuels, emission of enormous hazardous gases and continuous increasing fuel cost.

The vehicles require energy for operating them and so, any renewable energy source can be used as primary input energy source to derive the prime mover first and then to derive the vehicle finally. Derive systems have control systems in it that helps to adjust the required output from the electric vehicle. So, these derives can easily controlled the vehicle motion by adjusting the vehicle output through the optimization of control parameters and this is the main advantage of developing derive based vehicle. The simple definition for electric vehicles is that the system which controls the output characteristics of any electrical machine is known as electrical drive. In his initial testing, he developed a storage battery operated DC electric motor to propel a boat. Presently, electric drives are being used widely in almost all types of large medium and even small scale industrial applications.

III. HARD WARE COMPONENTS

a) ARDUINO UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development 4Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

b) NODE MCU

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP 12 module. Later, support for the ESP32 32-bit MCU was added.In this project we are using Node MCU for central control unit of the system.

The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna.

The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications (see related projects).Why we are using the Node MCU is that its a simple and small device its made up of advanced technology. The programming of the device is very simple and user friendly make a project efficient working.And its implementation process is very simple.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

Fig 1: Node MCU

c) MOTORS

An **electric motor** is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft. Electric motors can be powered by direct current (DC) sources, such as from batteries, or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates with a reversed flow of power, converting mechanical energy into electrical energy. so we need a motors in different categorizes

i. GEAR MOTOR

Geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all terrain robots and variety of robotic applications. A geared motor is a component whose mechanism adjust the speed of the motor, leading them to operate at a certain speed. Geared motor have the ability to deliver torque at low speeds , as the geared functions as a torque multiplier and can allow small motors to generate higher speeds.

Fig 2: Gear motor

In our electric vehicle gear motor is used as control vehicle and maintain vehicle balance and speed constantly.

ii. VIBRATON MOTOR

There are two basic types of vibration motor. An **eccentric rotating mass vibration motor (ERM)** uses a small unbalanced mass on a DC motor when it rotates it creates a force that translates to vibrations. **A linear resonant actuator (LRA)** contains a small internal mass attached to a spring, which creates a force when driven.. In this project the role of vibration motor is seeding.

Fig 3: Vibration motor

iii. PUMPING MOTOR

Pumping Motor is a Electro mechanical device that converts mechanical torque into hydraulic energy. It simply facilitates movement of fluids from one place to another using suction or pressure or both. **Motors**, on the other hand, are electro mechanical devices that are used to convert electrical energy into mechanical energy.

Fig 4: Pumping motor

In this paper fertilization is important part of the electric vehicle, so the fertilization process we are using the component is pumping motor. The pumping motor is a one of the type of electrical motor.

d) PHOTOVOLTAIC CELL

A **solar cell**, or **photovoltaic cell**, is an electrical device that converts the energy of light directly into electricity by the **photovoltaic** effect, which is a physical and chemical phenomenon. Photovoltaics is the conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect, a phenomenon studied in physics, photochemistry, and electrochemistry. The photovoltaic effect is commercially utilized for electricity generation and as photo sensors.

Fig 5: PV panel

A photovoltaic system employs solar modules, each comprising a number of solar cells,

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

which generate electrical power. PV installations may be ground-mounted, rooftop mounted, wall mounted or floating. The mount may be fixed or use a solar tracker to follow the sun across the sky.

e) BATTERY

A battery electric vehicle (BEV), pure electric vehicle, only-electric vehicle or all-electric vehicle is a type of electric vehicle (EV) that exclusively uses chemical energy stored in rechargeable battery packs, with no secondary source of propulsion (e.g. hydrogen fuel cell, internal combustion engine, etc.). BEVs use electric
motors and motor controllers instead of internal combustion engines (ICEs) for propulsion. The concept of battery electric vehicles is to use charged batteries on board vehicles for propulsion. Battery electric cars are becoming more and more attractive with the higher oil prices and the advancement of new battery technology (Lithium Ion) that have higher power and energy density (i.e., greater possible acceleration and more range with fewer batteries). Compared to older battery types such as lead-acid batteries. Lithium-ion batteries for example now have an energy density of 0.9–2.63 MJ/ L whereas lead-acid batteries had an energy density of 0.36 MJ/L (so 2.5 to 7.3x higher). There is still a long way to go if comparing it to petroleum-based fuels and biofuels, however (gasoline having an energy density of 34.2 MJ/L - 38x to 12.92x higher and ethanol having an energy of 24 MJ/L -26x to 9.12x higher-).

IV. EXISTING SYSTEM

In agricultural field, lot of vehicles is available but it still all has a fuel vehicles. Few numbers of agricultural electric vehicles is existing for small number of applications, but they are not efficient and it has separate devices for the agricultural purpose. In majority of tasks in agriculture they have not able to good user convenience devices. And lot of agricultural works done by human hand use Equipment's.

V. PROPOSED SYSTEM

In our electric vehicle is designed by multi purpose agriculture usage. This electric vehicle is charged by normal charging technique and also renewable energy charging using PV cells. Our electric vehicle is totally controlled by central control unit is Node MCU. And also vehicle is communicated with user by WIFI integration, We using Node MCU. Our electric vehicle have a powerful battery for long time usage and fast charging technology is implemented in that vehicle . And our electric vehicle is concentrated seeding, fertilization, ploughing, pestiside spray.

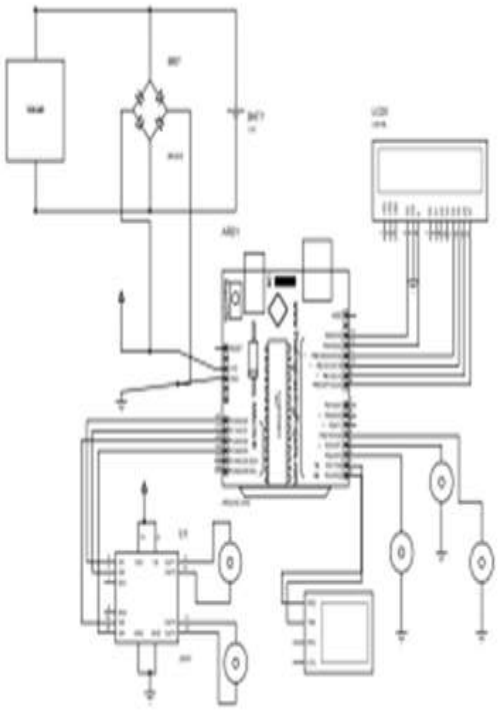

Fig 6: Circuit diagram

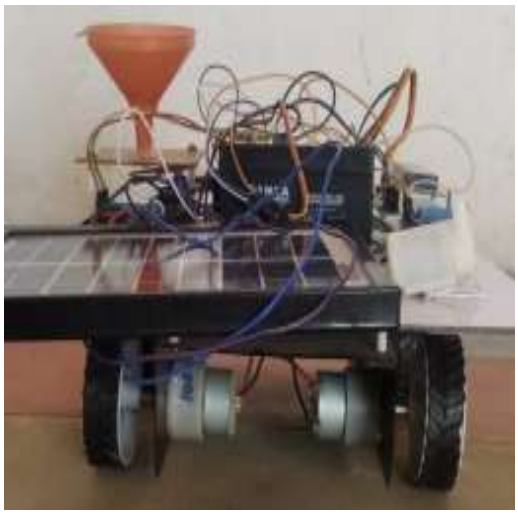

Fig 7: Hardware Implementation

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 4 Apr. 2021, pp: 473-479 www.ijaem.net ISSN: 2395-5252

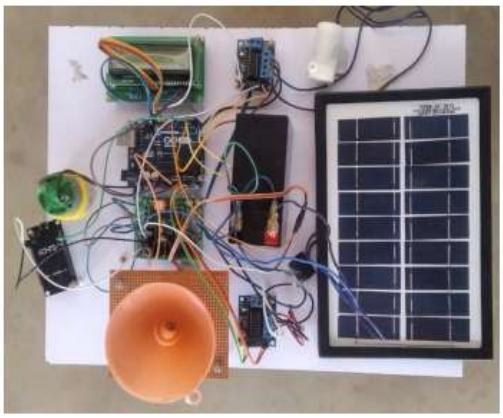

Fig 8: Hardware Implementation

VI. BLOCK DIAGRAM-INITIAL DESIGN: EV STRUTURE

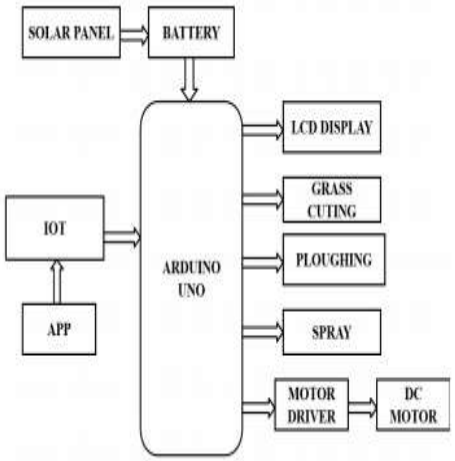

Fig 9: Block diagram

VII.ADVANTAGES

 Powerful fast charging battery is used and it is very long life and long time usage

 Multiple tasks done by one electric vehicle. Electric vehicle is Integrated of renewable energy is PV cells.

 Most powerful and efficient converters and hence the output result will be more accurate.

 Entire system are connected and controlled by central control unit using micro-controller. Hence it is easier to operate any single part of the system in smart ways.

VIII. DISADVANTAGES

 Battery management is more complexity Wet Lands are smaller difficult to run vehicle. Maintenance is must

IX. CONCLUSION

In this paper, we conclude that new electric vehicle has been designed which would help to gain more profit for their yield. Farmers can operate this vehicle easily, to gain more profit for their yield. In a small village collectively in group of 3-4 farmers can utilize it at their convenient time. India being an agriculture country, the development in agriculture can make its transformation from developing country to developed country. The solar multipurpose electric vehicle can be commercialized and subsidized by the government. The multipurpose solar integrated electric vehicle can be proven like a boon to the farmers of India.

REFERENCES

[1]. Anil, M.D. Sangeetha, S. Divya, B Niranjana, B. Shruthi, K.S. (2014) 'Advanced Railway Accident Prevention System Using Sensor Networks' International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 5.

[2]. Kuncham Viswa Teja, Suresh Angadi, (2013) 'Fire Detection and Notification System in Trains' International Journal of Innovative Research in Science, Engineering and Technology Issue 4, Vol. 2.

[3]. Nagamani, M. Siva Prasad, B.V. Suresh, M. Ramya Sree,P. Sumanth, G. (2014) 'Fire Accident Avoidance System in Trains Using GSM Technology' IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 9, Issue 4, Ver. III.

[4]. Lim, Y. Lim, S. (2007) 'A Fire Detection and Rescue Support Framework with Wireless Sensor Networks' Convergence Information Technology.

[5]. Pitchai Ramasamy, R. Praveen Kumar, M. Sarath Kumar, S and Raghu Raman, R. (2013) 'Avoidance of Fire Accident on Running Train Using ZigBee Wireless Sensor Network' International Journal of Information and Computation Technology ISSN 0974-2239 Vol.3, No.6

[6]. Sambamurthy, N. Hasane Ahammad, S.K. (2013) 'Prevention of Train Accidents Using Wireless Sensor Networks' Int. Journal of Engineering Research and Applications. ISSN: 2248-9622, Vol. 3, Issue 6, pp.1592-159