Third International Conference on "Materials, Computing and Communication Technologies"
in association with International Journal of Scientific Research in Science,
Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Smart Ploughing System

Hema. P[2] Gokul. J[1], Devanand. R[2], Mathan Kumar. D[2], Thileep Kumar. M[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India

[2]UG Student, Department of Electrical and Electronics Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India

ABSTRACT

In India, near about 70% people are dependent upon agriculture. So the agricultural system in India should be advanced to reduce the efforts of farmers. Various numbers of operations are performed in the agriculture field like seed sowing, weeding, cutting,pesticide spraying etc. But the present methods of seed sowing are problematic. The real power required for machine equipment depends on the resistance to the movement of it. Even now, in our country 98% of the contemporary machines use the power by burning of fossil fuels to run IC engines or external combustion engines. This evident has led to wide spread air,water and noise pollution and most importantly has led to a realistic energy crisis in the near future. Now the approach of this project is to develop the machine to minimize the working cost and also to reduce the time for digging and seed sowing operation by utilizing solar energy to run the robotic machine.

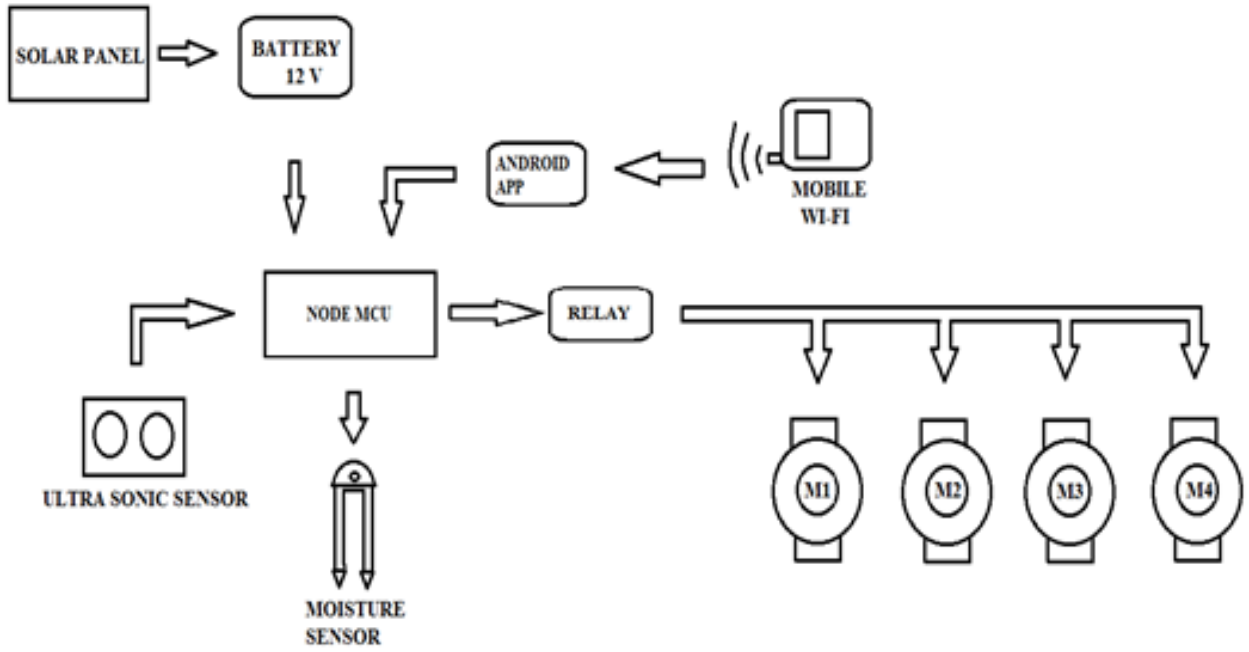
This work aims on the design, development of simple module to make agriculture smarter. Here two stages are involved: one is by monitoring the field by using moisture sensor and automatic monitoring by NodeMcu technology to maximize the plant growth and yield which makes the system portable, economical and less maintenance for irrigation applications. Second stage is to reduce human resource by making agriculture robot for plough, crop cutting, pesticides spraying and seeding applications. This robot is controlled by WIFI technology. The robot works with the battery and the solar power. More than 70% of the population in India chooses agriculture as the primary occupation, in recent years the development of the agricultural vehicle or robot in the agriculture has experienced enhanced interest .The vehicle is controlled by DC Motor driver through WIFI input. The advantages of these robots are minimum man power and labour making it an efficient vehicle. Considering the above problems in mind, a system with the above features is designed.

I. INTRODUCTION

In olden days technology was not developed that much. So they were seeding plowing and plant cutting by hand. But nowadays technology is developed. So now it s not necessary to do seeding in sunlight. By using robot technology, one can sit in a cool place and can do seeding by monitoring the robot motion. Today s agricultural fielddemands to find new ways of agricultural operation to improve performance efficiency. In the

field of agriculture, various problems are faced by the farmers in the operations like seed sowing, plowing, and waste planet cutting,weeding. Also the equipment□s used to perform the operations are very heavy. Due to migration of human□s in the cities the labor problem occurs. Now day□s robotics technology plays a paramount role in all sections like medical field, industries and various organizations. In other countries robots are used to perform different operations in the agricultural field. We can make the use of available technologies and the robotics technology in the farming system to reduce the efforts of farmers and also to reduce time, energy and required cost.

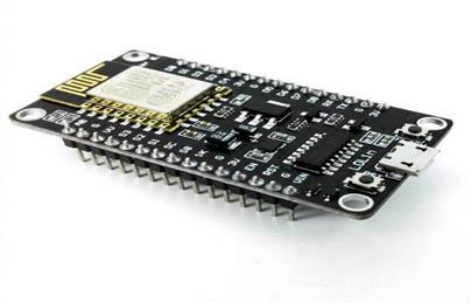
II. BLOCK DIAGRAM



Our project aims at developing an advanced system for agriculture monitoring and agribot which can be controlled wirelessly through Wi-fi communication. Here our project to develop a mobile operated ploughing machine, which is operated using solar power. In this system we used a solar panel, which convert the received sunlight into electrical energy and which is stored in 12v a battery which in turn supplies the energy required for operation. In our project we made efforts to use both mechanical and electrical as we explained.

The Robot which can plough the soil put the seeds and sprays required pesticides to land and finally cut the crops. To overcome the problem faced by the farmers. Since all four operations are perform simultaneously, thus the productivity also increased and mean while saves the time. To complete the large amount of work is completed in less time. It is the farmer friendly robot can be operated through wi-fi controlled mobile. The use of solar reduce the burden to farmer as robot works in field or farm always the sunrise falls on solar converts the solar energy to electrical and stores in battery. To enhance the efficiency and productivity and solar system is use and which in term help for increasing both of the problems.

1. Node MCU :



Node MCU is the major part of the system.Here we used Node MCU esp8266 Wi-fi inbuilt version..It provides the task to the individual element for different command. It connects to the Mobile through Wi-fi. All command provided with help of android application, where an individual tasks are assigned in the application. For example choose an option for move forward in application. Signal reaches Node MCU by Wi-fi and start respond to it.

Specifications:

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz

2. Controlling elements :

Controlling elements act as a heart of the system. Let see some of the controlling element used here.

- ✓ RELAY
- ✓ BLYNK APPLICATION

RELAY:

Here relay controls the various type of task. It means each relay response for each work. Relay module used here is 5v 4 channel relay. The 4 Channel Relay Module is a convenient board which can be used to control

high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay. Terminal □in□ connected to the Node MCU. When command Node MCU receives the relay becomes closed, then particular motor turn on. Likewise Ploughing, sowing, and seeding motor turned on and off by the relay.

Specification:

- Normal Voltage is 5V DC.
- Normal Current is 70mA.
- AC load current Max is 10A at 250VAC or 125V AC.
- DC load current Max is 10A at 30V DC or 28V DC.
- It includes 5-pins & designed with plastic material.
- Operating time is 10msec.
- Release time is 5msec.

BLYNK APPLICATION:

Entire system controlled through this application. In this **Smart Ploughing System**, we will control **4 home appliances** as ploughing, sowing, seeding, watering, harvesting connected to **Relay** using BLYNK Application. The Wi-Fi Module **Node MCU ESP8266** will receive commands from the smart phone wirelessly through the internet. To encode the **ON/OFF** signal and send it to Server and to ESP8266 Board we need the best IOT Platform. So we chose BLYNK as no other application can be better than this one. This application requires **internet connectivity.**

3. Sensing elements :

Sensor used to detect object or material, to analysis its state without contact. Here sensor such as

- ULTRASONIC SENSOR
- MOISTURE SENSOR

Ultrasonic sensor:

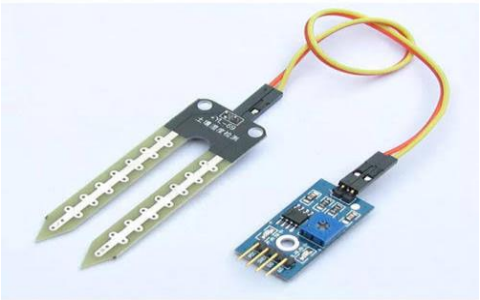
HR- SR04 ultrasonic sensor used in our project. HC-SR04 is a really common distance sensor available in the market. It is very easy to use and gives almost correct detection of distance. But as stated above, it sometimes gives some error in the distance. This sensor works on the principle of reflection of sound.

It works like this first a sensor sends a beam of sound for some time and then receives the sound back after it reflects it from any obstacle. Basically, it records the time in milliseconds during which ultrasonic sound has been sent and received. The pulse function is used for this purpose. But in this, we□ll use some manual commands to control the Ultrasonic sensor.

Specifications

1. Power Supply: 3.3V □ 5V.
2. Operating Current: 8mA.
3. Working Frequency: 40Hz.
4. Ranging Distance : 3cm □ 350cm/3.5m.
5. Resolution : 1 cm.
6. Measuring Angle: 15 degree.
7. Trigger Input Pulse width: 10uS TTL.
8. Dimension: 50mm x 25mm x 16mm.

Moisture sensor:



The Soil Moisture Sensor is a straightforward breakout for determining the moisture content of soil and other similar materials. The soil moisture sensor is simple to set up and operate. The sensor□s two big exposed pads serve as probes, and combined they operate as a variable resistor.The greater the amount of water in the soil, the better the conductivity between the pads will be, resulting in a lower resistance and a larger SIGout. It□s commonly used in greenhouses to regulate water supply and other bottle enhancements. Experiment in biology to track the amount of water in the soil.

Specifications:

- Working voltage: 5V
- Working current: <20 mA
- Interface: Analog
- Working Temperature: 10°C~30°C

4. Power system:

Power system is provides a required power to the Node MCU, motor and other components. Here two components provide a requiredpower for it. They are

- ❖ BATTERY
- ❖ SOLAR PANEL

Battery

A battery is a device that stores chemical energy and **converts it to electrical energy**. The chemical reactions in a battery involve the flow of electrons from one material (electrode) to another, through an external circuit. The flow of electrons provides an electric current that can be used to do work.

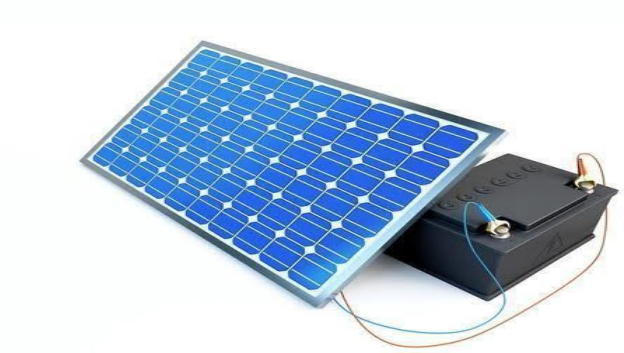
Lead acid batteries used in the RV and Marine Industries usually consist of two 6-volt batteries in series, or a single 12-volt battery. These batteries are constructed of several single cells connected in series each cell produces approximately 2.1 volts. A six-volt battery has three single cells, which when fully charged produce an output voltage of 6.3 volts.

A twelve-volt battery has six single cells in series producing a fully charged output voltage of 12.6 volts.A battery cell consists of two lead plates a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between. The plates are enclosed in a plastic battery

case and then submersed in an electrolyte consisting of water and sulfuric acid. Each cell is capable of storing 2.1 volts.

Voltage:	12 Volt
Capacity:	7 Ah
Type:	Sealed Lead Acid
Length:	5.95"
Width:	2.56"
Height:	3.71"
Shipping Weight:	7.00Lbs

Solar panel



Photovoltaic directly convert solar energy into electricity. They work on the principle of **the photovoltaic effect**. Solar panels make 100w / 12v = **8.33 amps of charge per hour during sunlight**. An average of 2 amps is used to power the fridge leaving 6.33 amps to charge the battery. ... This means we have a positive additional charge during the day to ensure the battery is 100% before the sun goes down.

Specification:

- Poly crystalline Cells type Panel.
- Capacity - 40 W, 12V.
- Voltage: Voltage at Max Power (Vmax) - 18V, Open Circuit Voltage (Voc) - 22V.
- Current: Current at Max Power (imax) - 2.23A, Short Circuit Current (isc) - 2.42A.

III. FUTURE SCOPE

The main focus of this research is theimplement of smart tractors in agriculture. Weunderstand the present manual work, texture andcontour of the terrain and detect the color samplefrom the terrain. We design and

gesture of vehicle using IoT and insert the color sensor in vehicle.Then the vehicle is testing and determines the performance. In future, this technology may be implemented in real tractor.

IV. CONCLUSION

The smart farming system gives an advanced method to sow plough and cut the crops with minimal man power. The mechanism includes the cultivation of crops by considering the specific rows and specific column at fixed distance depending on crops. The sensors are used to collect the detailed information regarding the environmental changes and crop conditions. The obstacle detection problem will also be considered, sensed by sensor. The information are directly transmitted to the farmers through IOT. In agriculture, the opportunities for robot enhanced productivity are immense and robots are appearing on farms in various increasing numbers. This technology makes the agriculture crop productivity easy and efficient.

V. REFERENCES

[1]. S.BlackmoreandK.Apostolidi,"TheEuropeanfarmoftomorrow,"TransactionsoftheASABE,vol.18,no.1,p.6,2011

[2]. Y. Chen, X. Peng, and T. Zhang, "Application of wireless sensor networks in the field of agriculture," in Proceedings of the ASABE Annual International Meeting, publication no. 1110617, Louisville, Ky, USA, 2011.

[3]. Ryerson A E F, Zhang Q. Vehicle path planning for complete field coverage using genetic algorithms. Agricultural Engineering International: the CIGR Ejournal. Manuscript ATOE 07014.Vol. IX (July). 2007.

[4]. J. A. Heraud and A. F. Lange, "Agricultural automatic vehicle guidance from horses to GPS: how we got here, and where we are going," in Proceedings of the Agricultural Equipment Technology Conference, vol. 33, ASABE publication no. 913C0109, pp. 1-67, Louisville, Ky, USA, 2009.

[5]. T. Bakker, K. Asselt, J. Bontsema, J. Muller, and G. Straten, "Systematic design of an autonomous platform for robotic weeding," Journal of Terramechanics, vol. 47, no. 2, pp. 63.73, 2010. View at Publisher "E View at Google Scholar "E View at Scopus

[6]. C. Cariou, R. Lenain, B. Thuilot, and M. Berducat, "gAutomatic guidance of a four-wheel-steering mobile robot for accurate field operations,"h Journal of Field Robotics, vol. 26, no. 6-7, pp. 504.518, 2009. View at Publisher "E View at Google Scholar "E View at Scopus

[7]. Y. Nagasaka, H. Saito, K. Tamaki, M. Seki, K. Kobayashi, and K. Taniwaki, "gAn autonomous rice transplanter guided by global positioning system and inertial measurement unit,"h Journal of Field Robotics, vol. 26, no. 6-7, pp. 537.548, 2009. View at Publisher "E View at Google Scholar "E View at Scopus