VERSATILE ROBOT FOR AGRICULTURAL PURPOSE

Girish Sahu[1] , Ketki Lanjewar[2] , Rashmi Udapurkar[3] , Sneha Shahu[4] , Utkarsh Puri[5] , Yashali Sonkusare[6]

Sachin Bankar[7]

Students ,Department Of Electrical Engineering,Priyadarshini J.L. College of Engineering , Maharastra, India.[1,2,3,4,5,6]

Asst. Professor, Department Of Electrical Engineering,Priyadarshini J.L. College of Engineering Maharastra , India.[7]

ABSTRACT

The Paper Aims On the design , development and the fabrication of robot . The advantage of the robot are hands free and fast data input operation. In the field of agriculture autonomous Vehicle a concept has been develop to investigate if multiple small autonomous machine Could be More efficient Than traditional Large tractor and human Efforts . This robot Can be used as a pesticide atomizer ,Real -Time monitoring of fields Via mobile and to detect the moisture content of the soil. This robot has an edge Over others that it works by utilizing Solar Energy. The main component Wemos Node Mcu is used for providing signal to the driver IC, DC motor, servo motor, Soil moisture sensor & Arduino via RF transmitter. The overall motor assembly is employed by Driver IC unit . The Feature of the robot are Light in weight ,compact ,Hassle Free Operation in Remote Location and can be controlled wirelessly via wifi Controllers.

KEY WORDS :- *WEMOS NODE MCU, DRIVER IC, AURDINO, GSM MODULE & SOLAR PLATE.*

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1. INTRODUCTION

Agriculture is the backbone of India.Today, India ranks second worldwide in farm output. The special vehicles plays a major role in various fields such as industrial, medical, military applications etc., The special vehicle field are gradually increasing its productivity in agriculture field. Some of the major problems in the Indian agricultural are rising of input prices, availability of skilled labourers, lack of water resources . To overcome these problems, the automation technologies are employed in agriculture. The automation in the agriculture could help farmers to reduce their labour work. The vehicles are being developed for the processes for ploughing, leveling, water spraying. All of these functions have not yet performed using a single vehicle. In this the robots are developed to work in an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the vehicle to perform the functions such as ploughing, seed sowing, mud leveling, water spraying. These functions can be integrated into a single unit and then performed.

The idea of applying robotics technology in agriculture is latest. In agriculture, the opportunities for robot-improves productivity are immense - and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as pesticide spraying, soil moisture detection. Watching the farms day & night for an effective report, allowing farmers to reduce the environmental impact, increase precision and efficiency, and manage individual plants in innovative ways.

The applications of instrumental robotics are spreading every day to cover further domains, as the opportunity of replacing man power provides effective solutions with return on investment. This is especially necessary when the duties, that need be performed, are potentially harmful for the safety or the health of the workers, or when more conservative issues are granted by robotics. Heavy chemicals or drugs atomizer, manure or fertilizers spreaders, etc.

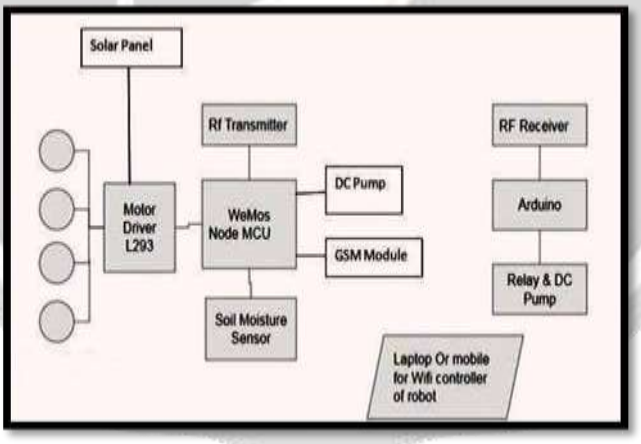
2. CONSTURCTION AND WORKING

2.1 CONSTRUCTION

Basic aim of this paper is to develop a multipurpose machine, which is used for Soil Moisture Detection, Spraying Pesticide ,On Field Monitoring, Automatic Switching of Irrigation System, least changes in accessories with minimum cost,. The overall system of the robot works with the battery and the solar power. Wemos Node Mcu & Arduino Uno is programmed in Embedded C Language By Arduino IDE software.

- The base frame is the made for the robot with 4 wheels connected and Each Wheel is Driven by using a DC motor.
- On one end of the frame, Soil Moisture Sensor is fitted which is driven by dc Servo Motor and it is made to Sense The moisture content of the soil.
- DC pump is used to spray the Pesticide.
- Solar is placed on top of the robot and is connected to the battery for charging the battery.
- Thus the maximum efficiency is utilized from the sun by the solar panel and to the battery.
- The entire robot requires the 12v battery to operate the system.
- RF transmitter and RF receiver is used to control the operation of the Irrigation System
- The overall unit is controlled Wirelessly via mobile/Laptop through Wifi controller.

2.2 BLOCK DIAGRAM



The block diagram of multipurpose agriculture robot is shown in the Figure.It consists of

- Node Mcu Microcontroller
- Arduino UNO
- Soil Moisture Sensor
- DC Motor Driver L293D
- RF Transreceiver Module
- Relay

- DC Water Pump
- Solar Panel & Battery

2.3 WORKING

This Robot Entirely Works on solar Energy Which Receives Energy from solar panel mounted at the top of Robot .The Battery is charged by solar panel which provides supply to the Wemos Node Microcontroller unit.The Node Mcu is connected to the two motor Drivers L293D IC, DC Servo Motor, Soil Moisture Sensor, DC pump Through Relay & RF Transmitter. The base of the Robot consist of 4 DC series Motor whose shafts are attached to the wheels. This Dc motors Are Driven by L293D Driver IC. The servo motor is placed at the bottom of the base whose shaft is coupled to the Probes of the soil moisture sensor . when command is given to the Node Mcu via Mobile the servo Motor change its shaft position at 90 deg Downwards,Thus The soil moisture Sensor gets Penetrated in the Soil . This Sensor Examine Whether The soil is Dry Or Wet, If it Detects the moisture in the soil ,,It Transmits the Signal to the Node MCu. As The Node MCu Receives The signal from the sensor, it immediately Transfer the signal to the receiver section Through the RF transmitter module.

After Receiving The Signal by receiver section this signal gets transmitted to the arduino UNO , The arduino is connected to the DC pump through Relay , soil moisture detector & GSM Module . A Separate supply is Given to an Arduino & GSM Module Through the Battery, The signal From Arduino Actuates The Dc pump by relay Switching , An additional soil moisture detector is Placed in the Water so as to detect the water level . If the water level is below the preset limit then it transmit the signal to GSM module via Arduino And the module sends the SMS to the Registered mobile no. about the water level.

The Operation of pesticide atomizer is done by a DC pump connected to Node Mcu through Relay .As Supply from the Node Mcu is not sufficient to Drive the pump so An External supply of +12v is provided by using Battery mounted at the base of the Robot.The real time monitoring of the field is done by placing a mobile at the top of the Robot which simply acts as close circuit Television.This Overall unit is Controlled By Mobile/Laptop through WiFi controller.

3. ADVANTAGES

- Protection against harmful effect of chemicals
- Reduces human effort required for agricultural activities.
- It rotates in 360 direction.
- The size of the robot is compact as it can more between two plants easily.

4. APPLICATION

- Robot has four DC motor which rotate in 360 direction.
- It has automatic operation for turn ON and turn OFF of water pumping motor .
- It also has spraying of pesticide.
- The receiver section totally works on the wifi network.

5. FUTURE WORK

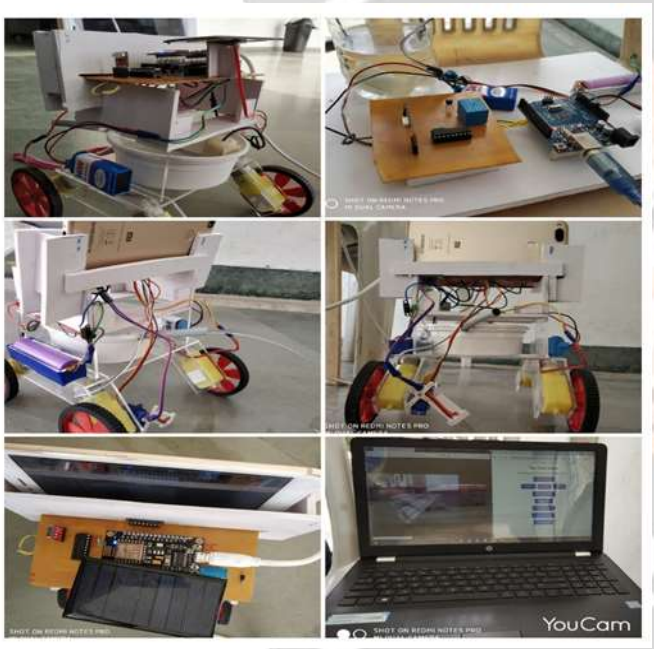
Robotics is playing a important role in agricultural production and management. There is a need for autonomous and time saving technique in agriculture to have efficient farm management. The researchers are now paying attention towards various farming operational framework to design autonomous agricultural vehicles as the traditional farm machineries are crop and topological dependent. Till date the agricultural robots have been researched and developed basically for harvesting, and cutting of crops. This type of robots are perfect substitute for manpower to a great extent as they deploy unmanned sensing and machinery systems. The prime welfare development of autonomous and intelligent agricultural robots are to improvise repeatable precision, efficiency, reliability and reduction of soil compaction . The Agrobot have potential for multitasking, sensory acuity,

operational consistency as well as suitability to odd operating conditions. The study on agricultural robotic system had been done using model structure design merge with different precision farming machineries. Some models were architectured by European Union named CROPS, USA-ISAAC2 & Michigan- Hortibot, Australia-AgBot, Finland-Demeter, India-Agribot and many other countries. The agricultural robots are developed using different localization technologies which are vision, GPS, laser and sensor based navigation control system. In this paper, comparative study including an overview of Robotics approach for accurate Agriculture in India and worldwide development is explored .

6. RESULTS AND CONCLUSION

6.1 RESULTS

Sr No.	Time	Voltage
1.	10:00 AM	3.09V
2.	10:30 AM	3.25V
3.	11:00 AM	3.49V
4.	11:30 AM	3.90V
5.	12:00 AM	4.45V



6.2 CONCLUSION

From this we conclude that the robot is basically design for agricultural purpose, because it can easily move between two plants as a compact size. This robot will help the farmer to spray the pesticides, to check the moisture content in the soil and spraying water which reduces the human effort. This is low cost machine which is easy to handle and no extra cost is require for fuelling. By using solar energy, battery is charged and work can be done as per the command. It also reduce the labour cost. In this era of automation we need to develop the machine related to the farming application.

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