



Smartphone Operated Multifunctional Farming Vehicle

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Abstract : Many advances in technology have made the agriculture business a much less labor intensive industry. If we think back even only few years, farmers were just beginning to incorporate technologies into their farming techniques. When we take a look at the farming industry now, we can see that this is rapidly changing. Farmers are looking for new ways to implement technology to cut costs and reduce labor hours. The battery powered Smartphone operated Multifunctional Farming vehicle is something that is very new to the agriculture industry. Multifunctional robots are rapidly becoming more of a reality than an idea. When the Vehicle is moving on a surface, it is controlled by a WiFi technology based Mobile Application. This can be moved forward and reverse direction using geared motors. Also this vehicle can take sharp turnings towards left and right directions. Vehicle can able to do Seed sowing operation with the help of servo motor mechanism. And watering operation is done by high dc pump motor. Water sprinkler and pesticide sprayer added advantages in it. This project uses Arduino ATMEGA328 controller board to control all the operation.

Keywords – Arduino uno, Multifunctional, Seed Sowing, Pesticide spray, WIFI technology

I. INTRODUCTION

As we all know the main requirement in the agriculture industry is man power. So the main objective of our project is to reduce the need of man power. The agriculture sector is the one where not only number of labours is required but also they must have the required skill set for farming. Need of labours can be accomplish by automating the process of seed sowing, ploughing and water spraying by using Smartphone operated vehicle. The “Seed plantation , ploughing and watering” is one of the most important and day-to-day job of the farmers. Conventional method suffers from various problems. The main aim of our project is to reduce the human effort, time requirement and to increased accuracy of this battery operated Smart Multifunctional Farming Vehicle (Robot) project. When the vehicle is moving on a surface, it is controlled by a WiFi technology based mobile application. This can be moved forward and reverse direction using geared motors. The robot can move towards left and right directions using these geared motors. WiFi Module is used which converts the desired frequency into analog signals which is received by WiFi Decoder and given to Arduino. The Arduino microcontroller is used for controlling the vehicle according to the frequency received by the WiFi receiver. This project uses Arduno ATMEGA328 Microcontroller and comprises of performing seeding , watering, pesticide spraying mechanisms with WiFi decoder commands. whole system is powered through battery source.

II. LITERATURE REVIEW

We have searched and read different papers from Internet and other sources and also we have referred other conference papers to gather more information which would help us in designing and developing our project.

Table.1

Sr.no	Title	Authors	Methodology
1	Sensor And Vision Based Autonomous Agrirobot For Sowing Seeds	Palepu V. Santhi, Nelore Kapileswar, Vijay K. R. Chenchela, Venkata Siva Prasad	This paper presents the proposed sensor and vision based agricultural robot for sowing seeds. This prototype can navigate it on any agricultural land and perform seed sowing operation simultaneously. This paper also presents the proposed sensor based precision seed metering and sowing mechanism. The proposed robot is a micro planter whose primary task would be to sow seeds at prefixed seeding intervals in the field.
2	Smart Agriculture Robot	M. Arun, R. Prathipa, Priyanka S, Akshaya Anand, Chandrika	The Purpose of this preseted paper is to refuce the load of the farmers ,this smart farming technique can enhance the crop yield while simultaneously can generate more output with same amount of input.
3	Design and operation of agriculture based pesticide Spraying robot	Amruta Sulakhe, M.N. Karanjkar	This paper emphatically describes the structural design of the robot control system. this paper present a review of current robots controlled by mobile phone and discuss a closed loop control systems using audio channels of mobile devices. In this work, the robot moves upward, backward, left and right side by the android application such as Arduino Bluetooth RC Car. The microcontroller to be used in the project is PIC 16F877 from Microchip family.
4	Precision Agriculture Robot for Seeding Function	Neha S. Naik, Virendra V. shete, Shruti danve	In this proposed paper they approach a prototype of an autonomous Agriculture Robot which is specifically designed for seed sowing task. It is four wheeled vehicle which is controlled by LPC2148 Microcontroller. It also provides manual control when required. The main component here is the microcontroller that supervises the entire process
5	Multipurpose Agricultural Robot	B S Balaji, Shivakumara M C, Sunil Y S, Yamuna A S, Shruthi M	The paper aims on the design, development and the fabrication of the robot which can dig the soil and sprayer to spray water, these whole systems of the robot works with the battery and the solar power. The vehicle is controlled by Relay switch through IR sensor input. The language input allows a user to interact with the robot which is familiar to most of the people. The advantages of these robots are hands-free and fast data input operations. The base frame is made for the robot with 4 wheels connected and driven the rear wheel is dc motor.
6	Agricultural Pesticide Spraying Robotic System Controlled Using Android Application	Ashutosh B. Adhav, Vivek Jagtap, Rushabh r. Sonawane, Prof. Ganesh k. Gaikwad	The system proposes a brand new attempt to substitute humans in diverse agricultural operations like detection of the presence of pests, spraying of pesticides, spraying of fertilizers, etc. thereby providing safety to the farmers and accurate agriculture. This project involves usage of PIC Microcontroller to control the movement of robot with the help of joystick (transmitter) and a receiver. The wireless camera mounted on the top of the vehicle tracks the path taken by the robot. This cost effective robotic vehicle can improve productivity, safety in agricultural applications.

III. METHODOLOGY

The methodological procedure, the block diagram are included in this section. The development of the Multifunction Farming Vehicle consists of the integration of hardware techniques and software tools. Fig. shows the block diagram of Mobile Operated Multifunction Farming Vehicle.

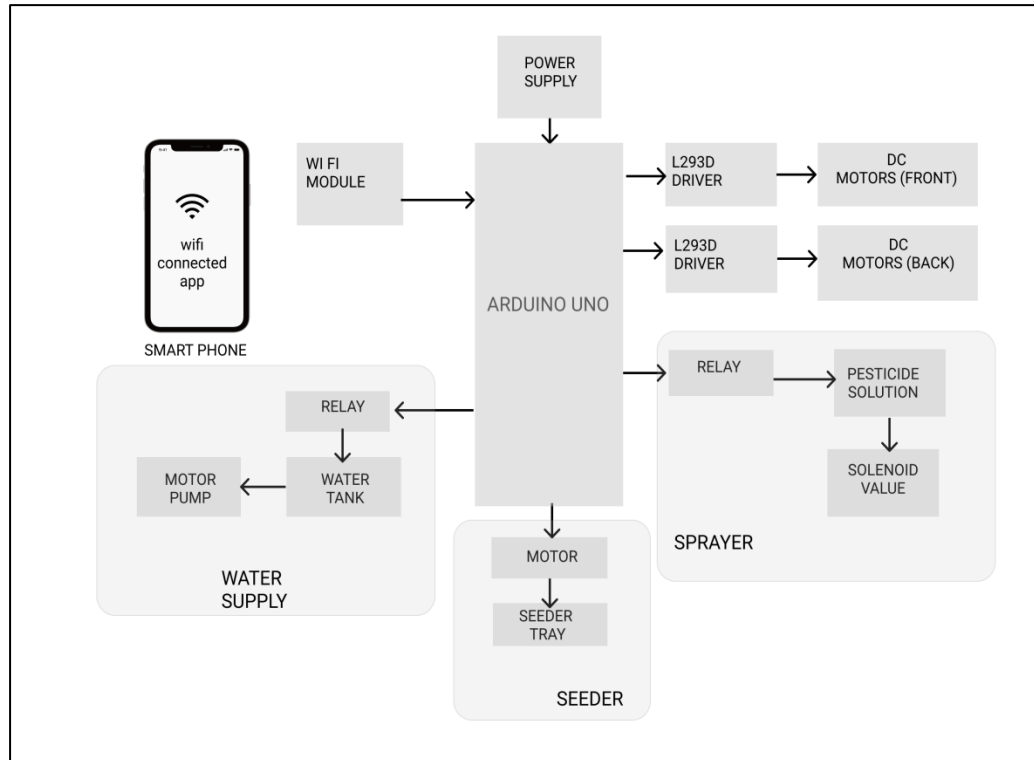


Fig 3.1 Block Diagram

The Block Diagram Consists of Arduino microcontroller which is controller of whole system. A 12v battery connectd to Arduino and other devices to give power supply. WiFi module ESP8266 is connected to Arduino and wirelessly with Wifi connected smartphone to gives commands. At next block there is L293D motor drivers and DC motors for the movement of vehicle. Next is a seed sowing mechanism this mechanism will work with the help of motor which is capable of rotating to 180 degrees. Another block is of water supply block, the watering mechanism will done with the help of relay and water pump. The last block consist pesticide spraying mechanism and this will be done by relay controlled solenoid valve

The flow chart in Fig.3.1 explains the algorithm of Mobile Operated multifunction Farming Vehicle. Algorithm for the robot is as follows:-

Step 1: Start

Step 2: To Switch on the Vehicle power supply will given to the arduino board and then further to wifi module.

Step 3: Pairing the WiFi device with the mobile phone

Step 4: Robot should wait until it receives signal from the app.

Step 5: If it receives signal, robot works accordingly like if signal is receive for movement then vehicle will move forward, backward, left & right. If signal receive for mechanisms, in mechanism if signal receive for seed sowing function then seed sowing mechanism will be activated or if signal receive for water supply then water supply mechanism will be on or if signal receive for pesticide spray function then spraying mechanism will activated.

Step 6: If the signal is not received go to step 4

Step 7: universal OFF signal is used to deactivate..

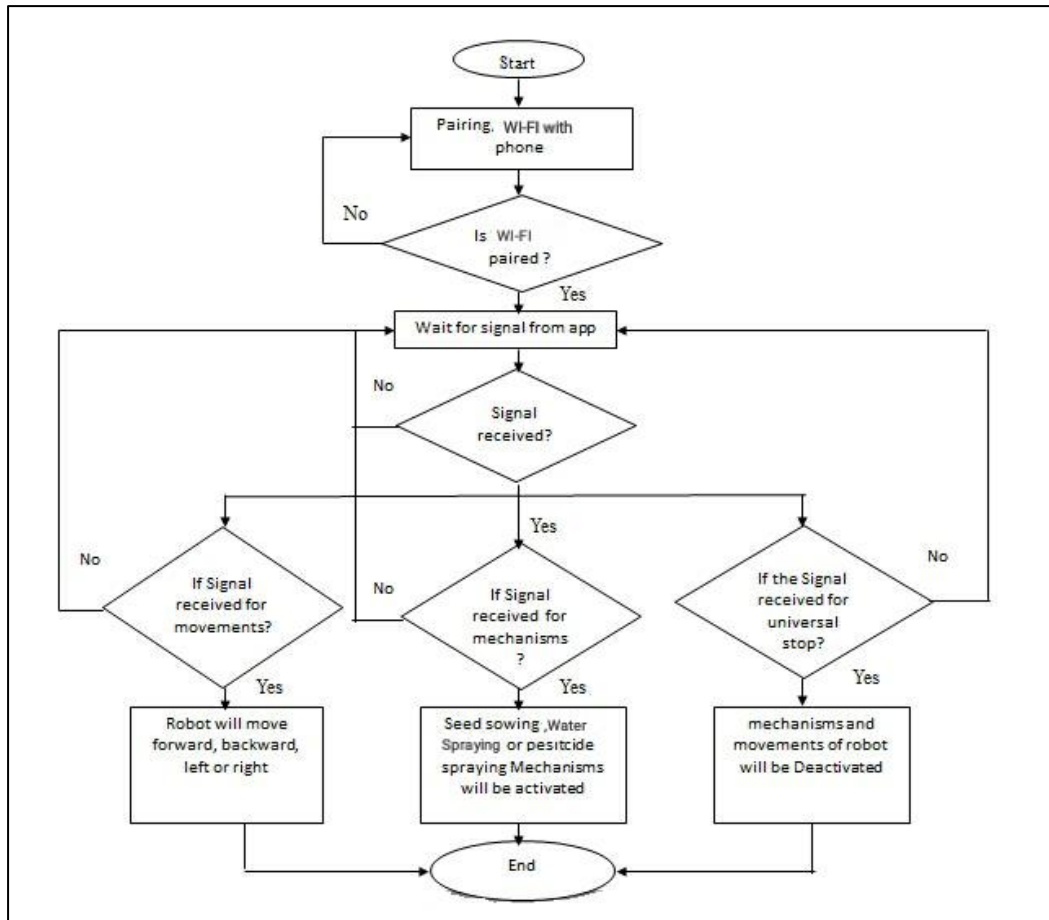


Fig 3.2 flowchart

IV. RESULTS

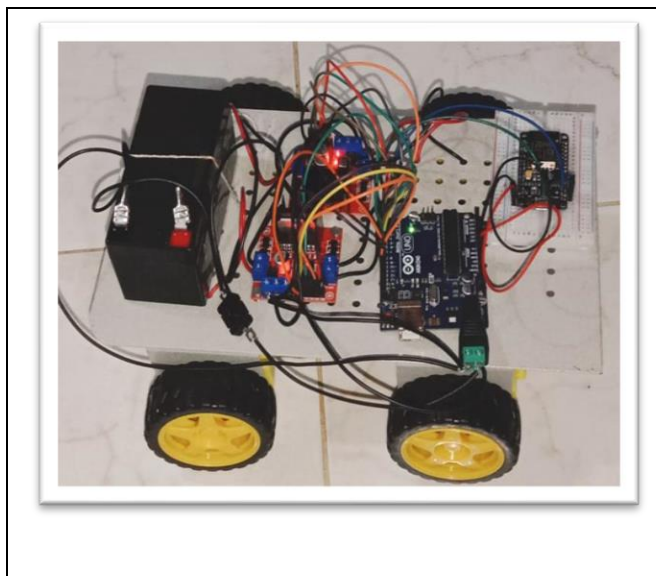


Fig 4.1 top view

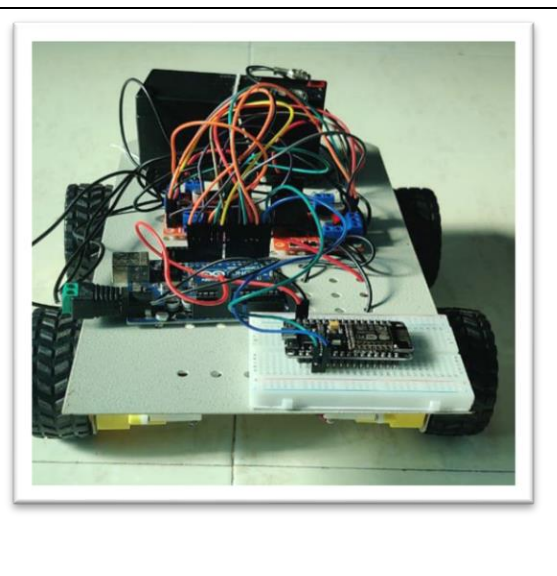


Fig 4.2 front view



Fig 4.3 Water supply

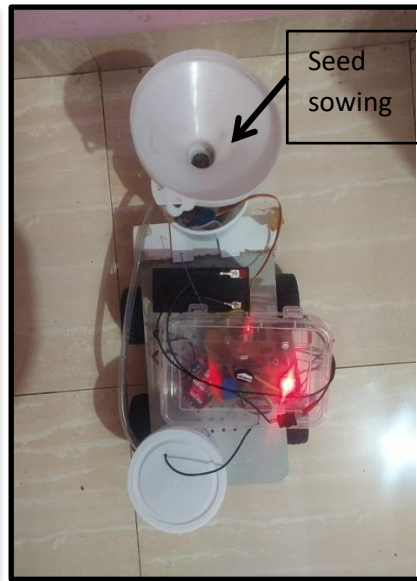


Fig 4.4

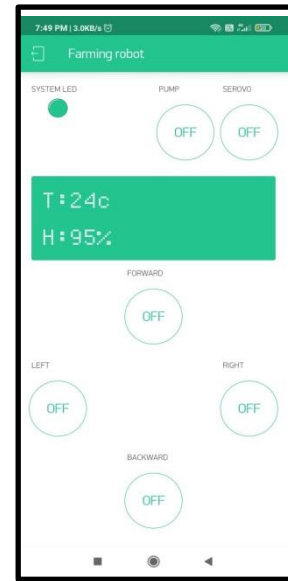


Fig 4.5

The above figures show the implementation of farming vehicle, in that we have designed the structure of vehicle, in this we have connected WIFI module to Arduino board. DC motors are connected to the L293D motor driver and then we have attached 4 wheels with DC motors to chassis, then motor drivers are connected to the Arduino and then we have assembled seed sowing mechanism with the help of servo motor and container to store the seeds and we also added water supply mechanism. lastly we have put the code in arduino and WIFI module respectively using Arduino IDE.

In fig 4.5 shows the interference of App, in that we have added four keys for movement of vehicle and one key for seed sowing and similarly one key for water supply function.

The vehicle can perform seed sowing, water supply and pesticide spraying mechanisms on farming land.

4.1 Seed sowing mechanism:

In seed sowing mechanism, we will use small container to store the seeds and it will be closed with a flip, the flip will be controlled by the servo motor to open and close the container. The servo motor is capable of rotating 180 degrees, when the servomotor is at 180 degrees it will automatically open the container and seeds will be sown into the field.

4.2 Water supply:

This mechanism will be done with the help of relay and motor pump to allow and stop the flow of water in the field.

4.3 Spraying mechanism:

The spraying mechanism will be done by relay-controlled solenoid valve. When the command will be given to the pesticide will pass through solenoid valve and spraying mechanism will work.

V. CONCLUSION

This project presents the implementation of farmer-friendly mobile-operated Farming Vehicle with seed sowing, watering, and pesticides spraying arrangement using wireless WIFI module. It has been designed and implemented with Arduino Uno board in the mechanical system domain.

The Vehicle for agricultural purpose is a concept for the near performance and cost of the product. Once optimized, it will prove to work through agricultural operations. This agriculture-based vehicle proves to be a productive and efficient machine that can be easily navigated and controlled. Mobile control of the vehicle is possible through wireless technology (Wi-Fi). The command for controlling the vehicle movement and other functions is done by using a mobile app. Hence control of the robot is user-friendly and is not very complicated; hence farmers can easily control this intelligent vehicle. Pesticide spraying is a tedious job in agriculture as it requires various protection equipment to protect the farmer.

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