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Farmbot

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Abstract
FARMBOT means simple eco-friendly Agricultural Robot. It is a 3 wheeled unmanned vehicle which can move in a linear direction. All the units (Water sprayer, Fertilizer Sprayer and Seeder) work independently. The robot employs mobile application systems and a range of mechanical aspects to guide the robot along the rows and perform the tasks accurately. The robot has been operated by Manual control and also be used as automated machine at low cost. The manual control of the robot is achieved by local web which can be used for long range up to 15metres.Most agricultural food production in the modern day is performed in large scale, monocrop farms on huge plots of land. While it has been streamlined to produce huge amounts of food at a relatively cheap price, monocrop farming puts a significant strain on the soil and the surrounding environment by using up specific nutrients for different crops, as well as using tremendous amounts of water. The idea with Farmbot is to shift dependence on large scale agriculture by giving people the ability to cultivate their own plants with little to no actual physical labor on their part.

Keywords: *Smart farming, NODEMCU, Real-time data monitoring,agriculture.*

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I. INTRODUCTION

The main motivation of the project is to do a machine which will be useful in field of agriculture.We have been designed a machine/robot that will be useful for farmers in the field to sow seeds, to spray water and to spray fertilizer. Our ultimate goal is to optimize the performance of the robot in an efficient manner. The idea of applying robotics in agriculture is very new. The agricultural industry is behind other industries in using robots because the sort of jobs involved in agriculture are not straight forward and many repetitive tasks are not exactly the same every time. In most cases, a lot of factors have to be considered (i.e.: environmental conditions and nature of crop) before the commencement of a task. This is based on a prototype FOR AGRICULTURE" an agricultural robot for pest control, fertilizer spraying, weeds removing in outdoor environments.The main objectives of the project are easy approach to farming and field monitoring and data collection.

P Jothimurugan et al.(2018) in this paper representsa 4 wheeled unmanned vehicle which can move in a linear direction and runs on solar energy.

SAmrutha R Patil et al. (2018) in this paper represents the robot architecture based on a vehicle carrying the picking arm and head with two microcameras.

II. METHODOLOGY

DC Battery is connected to the microcontroller,NODE MCU which is the common power supply to the vehicle.From the Microcontroller the power supply goes to the Diaphragm Pump, Seeding DC motor and to the DC motor of wheel driving system. Farmbot can be used in certain type of fields in which the each plant has a distance of 30cm distance between each. For example: All type of Shrubs (Tomato plantation, Brinjal,) etc.

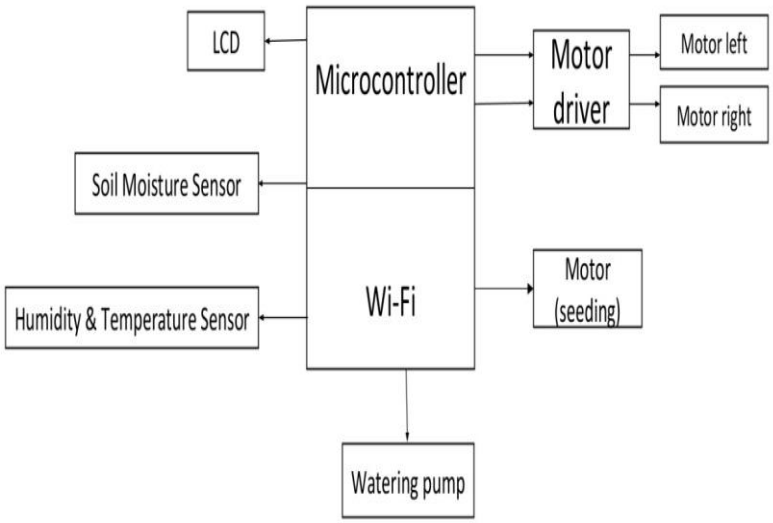

Figure 1: Block Diagram

The block diagram of movement control is given below in figure 2.The manual buttons consist of forward,backward,left,right and stop buttons.The movement is executed by clockwise and anticlockwise rotation of robowheels.When forward button is pressed,both the wheels move clockwise.When backward button is pressed,both move anticlockwise.For left and right movements,either of the wheel moves clockwise and the other moves anticlockwise.The motion is implemented by providing high and low inputs to the motor driver as required.The block diagram of function control is given below in figure 3.The manual buttons consists of seeding,watering and fertilizer buttons.The seeding is executed with the help of a dc motor which rotates a disc which is perforated at one end.A container with seeds is placed above the disc which is also having a hole.When the two holes coincide,the seed is released.As the farmbot moves in a linear direction the disc continues its rotation, as a result the seeds are sowed at regular intervals.Watering is done with a diaphragm pump which consists of check valves to prevent backflow of water.Fertilizer is sprayed using sprayer motor.The seeding motor is driven with the help pf a transistor which satisfies high current requirement of dc motor.

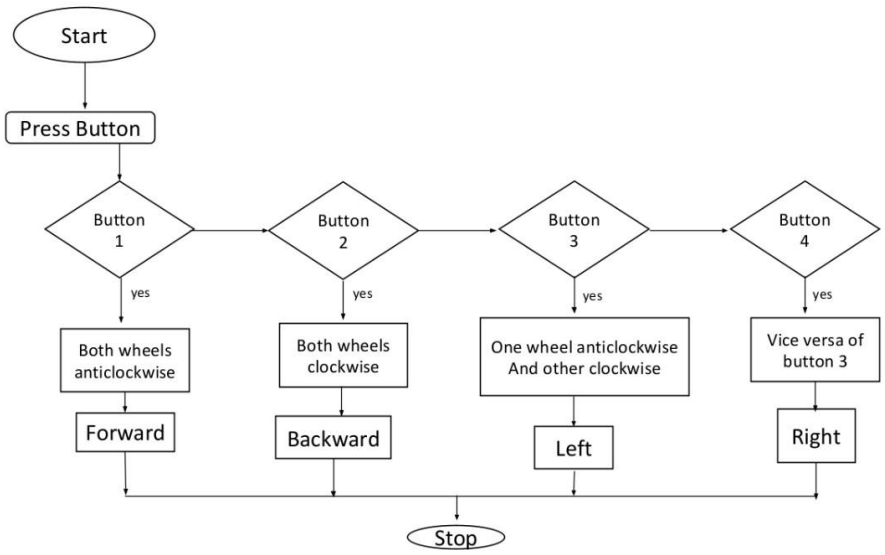

Figure 2: Flow chart of Movement control

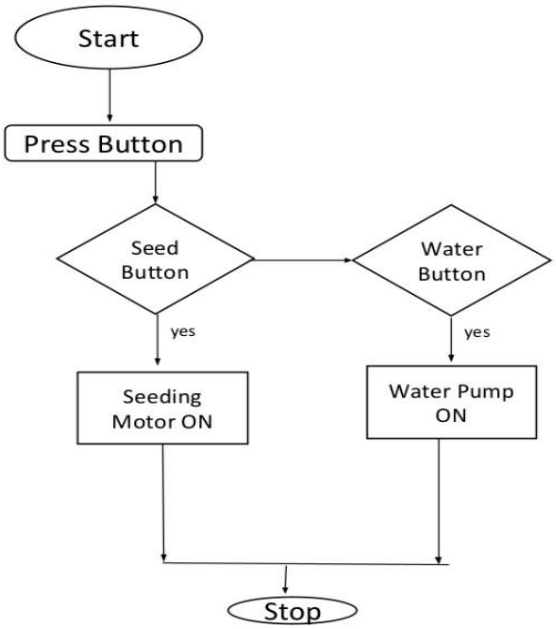

Figure 3: Flow chart of Function control

III. THE SIMULATION

It consists of four switches,RF1,RF2,RF3 and RF4 for controlling motors M1 and M2.When RF1 is switched ON,M1 and M2 will move in clockwise direction.When RF2 is switched on,M1 and M2 will move in anticlockwise direction.When RF3/RF4 is switched ON,either M1 or M2 moves clockwise and the other,anticlockwise.There are two switches,watering and seeding for respective functioning by switching on the water pump and seeding pump.In this simulation,we have used Arduino UNO as the microcontroller.A motor driver is used to drive M1 and M2.Water pump and seeding motor are connected to the microcontroller via a transistor.An LCD Display displays the status of the system.

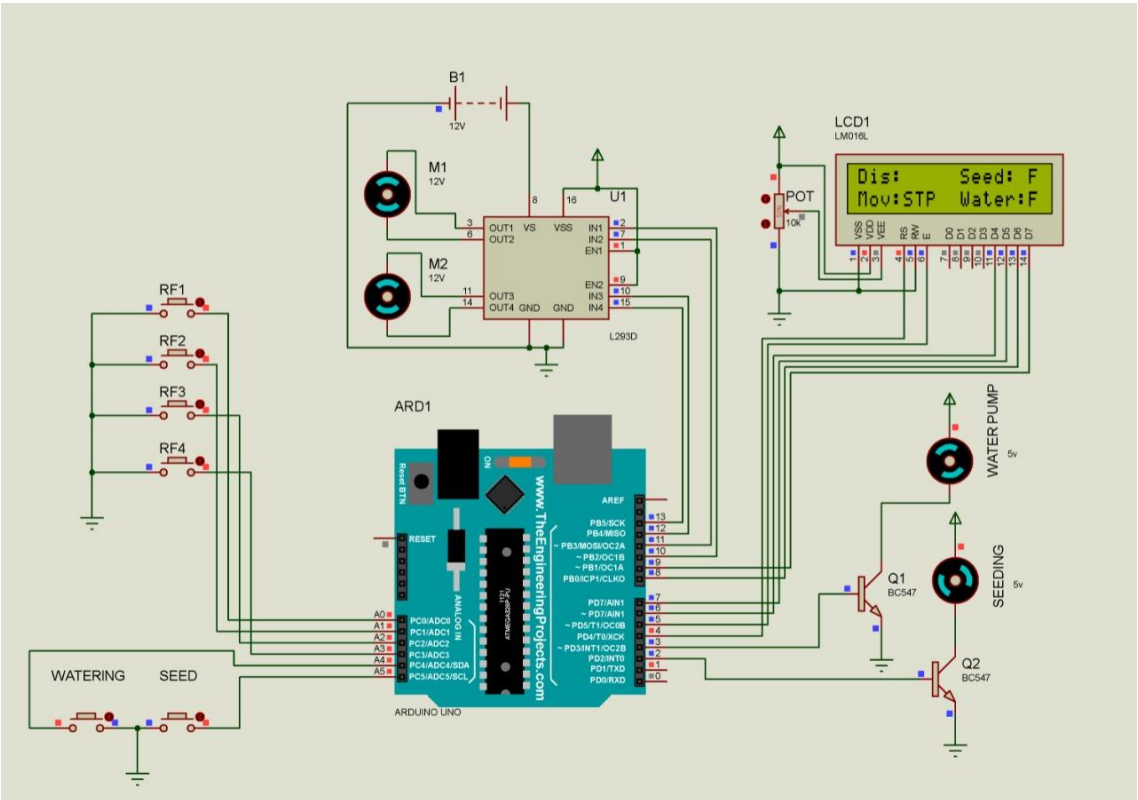

Figure 4: Farmbot simulation

IV. SOFTWARE IMPLEMENTATION

The webpage consists of various manual control buttons and also displays corresponding status of the farmbot.Foreg, Movement status shows FWD,BKD,LFT,RGT or STP and Pump,seeding and fertilizer is either ON or OFF.It also shows sensor datas-Humidity,Temperature,Soil moisture.

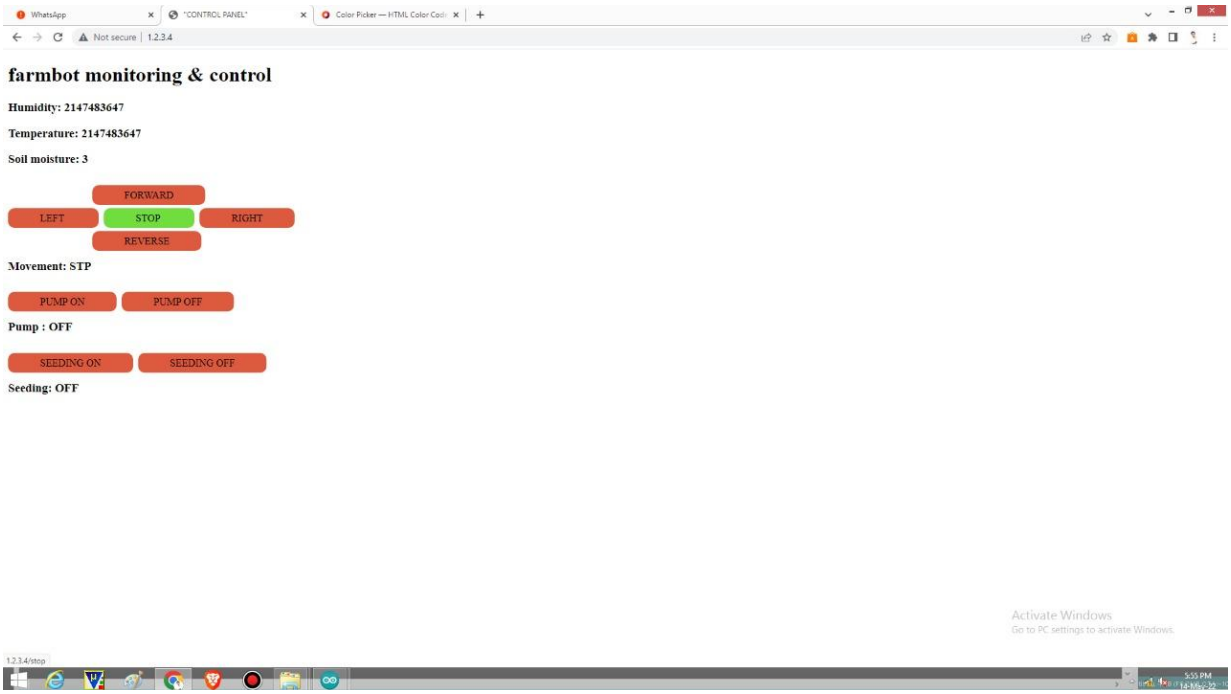

Figure 5: Farmbot Web page

V. HARDWARE IMPLIMENTATION

A wooden board is used as the support.Two wheels are attached to it.Anomniwheel is attached to the front.Wheels are connected to a motordriver and then to NODE MCU.Two 9V batteries are used.LCD is connected to NODE MCU via I2C Shield.Two diaphragm Pumps are used, one for watering and one for adding fertiliser.A seed container is provided which containing the seeds.A dc motor is used to rotate seeding disc.A hole is provided on the board for releasing the seed.A moisture sensor and a DHT sensor are used for real time data monitoring.

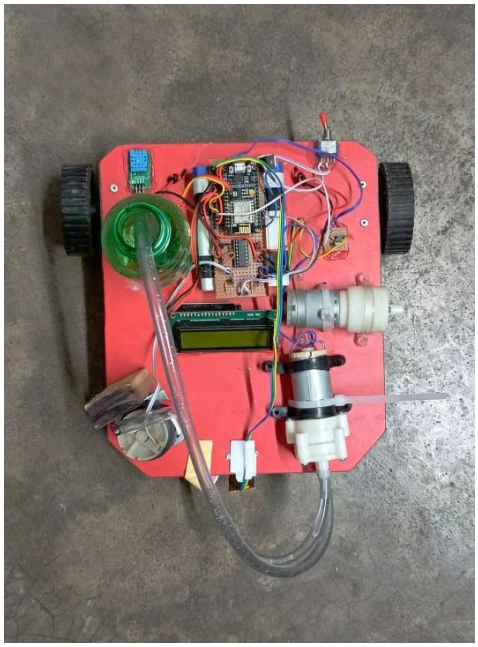

Figure 6:Hardware

VI. CONCLUSION

FarmBot was mainly designed to work in the agriculture field in order to reduce the work of the farmers.Farmbots reduce the work load of farmers. The main strength of the E-Bot is it can be upgraded further in future with the necessary devices like seed sower, Temperature sensor, Soil fertility unit etc., Limitation is that it can be used only for certain type of fields like shrubs plantation and house gardening etc., We planned to design a completely set which could be used in agriculture fields such as ploughing, seed sowing etc., in future.Watering and Seeding are the main functions done here including fertilizer.Watering is done automated.Soil moisture sensor,Humidity and Temperature sensor are also included.In the future,local web can be switched with internet which enables data collection over a period.This data can be used for monitoring the field characters and crops suitable for certain areas.

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