

# Review Paper on Multipurpose Agricultural Robot

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**Abstract**—The aim of the paper is on the design, fabrication, and development of the robot which can do grass cutting, seed sowing, and sprayer to spray the water and pesticides, these whole systems of the robot works with the battery. More than 42% of the total population in the world taken agriculture as the primary occupation, in recent years the development of robotic vehicles in agriculture has experienced increased interest. The robot is controlled by Node MCU and Wi-Fi model. The blynk app allows a user to interact with the robot which is familiar to most people. The advantages of these robots are hands-free, smartphone-controlled, and fast data input operations. In the field of agricultural robotic vehicles, a concept is been developed to investigate if multiple small robotic machines could be more efficient than traditional large tractors and human forces.

## I. INTRODUCTION

Agriculture has been the important part of Indian economy and it will continue to remain at the same for a long time. More than 40% of the total population in the world has chosen agriculture as their primary occupation. The special agricultural vehicle is gradually increasing its productivity in the agriculture field.

The major problems in Indian agriculture are high input costs, availability of skilled laborers, lack of water resources, and crop monitoring. To overcome those problems, automation technologies were used in the agriculture field. Automation in agriculture will help farmers to reduce their efforts and time. The vehicles are being developed for the processes for seed sowing, grass cutting, water, and pesticides spraying, and crop and soil monitoring. All of these functions and monitoring have not yet been performed using a single vehicle. These vehicles will be capable of working 24\*7 and whole year and in most weather conditions and have the AI within them to behave sensibly in a semi-natural environment over long periods of time.

There are a number of field operations that can be executed by autonomous vehicles, giving more benefits in production than conventional machines. The idea of applying robot technology in agriculture is very new. In the agriculture field, the opportunities for robot-enhanced productivity are great - and the robots are appearing on farms in various forms great - and the robots are appearing on farms in various forms and in growing numbers. Watching the farms day & night for a productive report, allowing farmers to reduce the environmental impact, increase accuracy and efficiency, and manage individual plants in novel ways.

The robot is controlled by Node MCU and Wi-Fi model. The blynk app allows a user to interact with the robot which is familiar to most people. The advantages of these robots are hands-free, smartphone-controlled, and fast data input operations. In the field of the agricultural robotic vehicle, a concept is been developed to investigate if multiple small robotic machines could be more efficient than traditional large tractors and human forces.

## II. MOTIVATION OF THE PROJECT

This project has huge scope in agriculture operations like Automatic seed sowing, grass cutting, water and pesticides spraying. It also reduces the human effort as well as time. It has large future scope, we can add number of operations to reduce human efforts.

## III. METHODOLOGY

The basic aim of this paper is to develop a multi-machine, which is used for seed sowing, grass cutting and leveler to close the mud and water sprayer to spray water with least changes in accessories with less cost. The total system of the robot works with the battery.

The base frame is made for the robot with 4 wheels connected and driven the rear wheel is 360° with front 2 wheels are dc powered

Wi-Fi Module – ESP-12E module same as ESP-12 module but with 6 extra GPIOs.

Node mcu have Wi-Fi module so we connected to our smart phone by using blynk app which is a big Iot platform.

Soil Moisture Sensor can be used to test the moisture of soil for seed sowing.

The robot requires the 12v battery to operate the system.

## IV. DESIGN CALCULATION

DC Motor selection:

Specification: Voltage = 12v

Current = 2.1A

RPM = 50

$V=IR$

$$I = 2.1 * R$$

$$R = 5.71 \Omega$$

$$P = I^2 R$$

$$= 4.41 * 5.71$$

$$P = 25.18$$

Approximate load on single motor = 5kg  
 Force required to move  
 $F = 5 * 9.81$   
 $F = 49.05N$

Torque required for motor  
 $T = f * r$   
 $T = 49.05 * 0.15$   
 $T = 7.36Nm$

$$P = 2 * \pi * N * T / 60$$

$$25.18 = 2 * \pi * N * 7.36 / 60$$

$$N = 32.7 \text{ rpm}$$

Speed of robot = rpm \* circumference  
 $S = 50 * 2\pi r$   
 $S = 50 * 2 * 3.14 * 7.5$  (size of tyre 15\*5 cm)  
 $S = 23.55 \text{ meter/min.}$

## V. ADVANTAGES

- It was made of durable and cheap material affordable for the small-scale farmers.
- Lesser maintenance cost.
- Requirement of labor also decreased.
- Provide proper compaction over the seed.
- Does not require any External Source of Energy avoid the farmer being exposed to toxic pesticide vapour produced during spraying.
- Reduce the work on the farmers and as it is easier to operate.
- The farmer need not spry in the hot sun, he can operate the robot while at home.
- By this robots, work of labor will also be decreased and the labor life will save from chemical.
- Improvement in planting efficiency. Increase in crop yield and cropping reliability.

### *Limitation*

- Controlling motors are difficult
- Large dc batteries required
- Complex connections
- Suitable for small Farms Only.
- Difficult to operate in moist condition.
- Seed Sowing for Cotton is Difficult.
- Experimental Result
- Speed of plantation machine depending upon moisture
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