International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 226-240 www.ijaem.net ISSN: 2395-5252

E- Agriculture in Action: Blockchain in Agricluture Food

Date of Submission: 28-05-2024 Date of Acceptance: 06-06-2024

ABSTRACT

Agricultural Robot or agribot is a robot deployed for agricultural purposes. Fruit picking robots, driverless tractor / sprayer, and sheep shearing robots are designed to replace human labour. In most cases, a lot of factors have to be considered (e.g., the size and colour of the fruit to be picked) before the commencement of a task. Robots can be used for other horticultural tasks such as pruning, weeding, spraying and monitoring. Robots can also be used in livestock applications (livestock robotics) such as automatic milking, washing and castrating. Robots like these have many benefits for the agricultural industry, including a higher quality of fresh produce, lower production costs, and a smaller need for manual labour. Our robotic vehicle is an agricultural machine of a considerable power and great soil clearing capacity. This multipurpose system gives an advanced method to seed sowing, ploughing, watering the crops and harvesting with minimum man power and labour making it an efficient vehicle. The machine will cultivate the farm by considering particular rows and specific columns at fixed distance depending on crop. Moreover, the vehicle can be controlled through Bluetooth medium using an Android smart phone. The whole process calculation, processing, monitoring are designed with motors and interfaced with Microcontroller.

I. INTRODUCTION

The discovery of agriculture was the first big step toward a civilized life. —is a famous quote by arthurkeith. This emphasizes that the agriculture plays a vital role in the economy of every nation. Since the dawn of history agriculture has been one of the significant earnings of producing food for human utilization. Today more and more lands are being developed for the production of a large variety of crops. The field of agriculture involves various operations that require handling of heavy materials. For example, in manual ploughing, farmers make use of heavy ploughing machines. Additionally, while watering the crops farmers still follow the traditional approach of carrying heavy water pipes. These operations are dull, repetitive, or require strength and skill for the workers. In the 1980‘s many agricultural robots were started for research and development. Kawamura and co-workers developed the fruit harvesting robot. Grand and co-workers developed the apple harvesting robot. They have been followed by many other works. Over history, agriculture has evolved from a manual occupation to a highly industrialized business, utilizing a wide variety of tools and machines. Researchers are now looking towards the realization of autonomous agricultural vehicles. The first stage of development, automatic vehicle guidance, has been studied for many years, with a number of innovations explored as early as the 1920s. The concept of fully autonomous agricultural vehicles is far from new; examples of early driverless tractor prototypes using leader cable guidance systems date back to the 1950s and 1960s. The potential benefits of automated agricultural vehicles include increased productivity, increased application accuracy, and enhanced operational safety. Additionally, the rapid advancements in electronics, computers, and computing technologies have inspired renewed interest in the development of vehicle guidance systems. Various guidance technologies, including mechanical guidance, optical guidance, radio navigation, and ultrasonic guidance, have been investigated. A robot is a machine that can be programmed and reprogrammed to do certain tasks and usually consists of a manipulator such as a claw, hand, or tool attached to a mobile body or a stationary platform. **Autonomous** robots work completely under the control of a computer program. They often use sensors to gather data about their surroundings in order to navigate.

Tele-controlled robots work under the control of humans and/or computer programs.

Remote-controlled robots are controlled by humans with a controller such as a joystick or other hand-held device. The word **"Robot"** came from the Czech word **Robota,** which means forced labour or work.

OBJECTIVE

As we all know the main requirement in the industry or any firm is man power. So, the main objective of our project is to reduce the need of man power. This paper is to develop a robot capable of performing operations like automatic seeding, irrigation, fertilization. It also provides manual as well as auto control. The main component here is the ARDUINO that supervises the entire process. At the present time, robots are increasingly being integrated into working tasks to replace humans specially to perform repetitive task. Seeding is one of the first steps in farming. During this process seeding is carried out in all the rows of the farming

- Automating ploughing
- Automating sowing
- Automating watering
- Automating soil leveling
- Reducing work of farmers
- Increasing yield by proper maintenance using sensors such as soil moisture, temperature, humidity, water

II. LITERATURE SURVEY

[1] SurajChavan, AnilkumarDongare, Pooja Arabale, Ushasuryanwanshi, SheetalNirve, et al.,(2017);_

Agriculture Based Robot (E-AGRICULTURE IN ACTION). Numerous nations in Asia including India are agrarian economies and the majority of their country populaces rely upon farming to gain their occupation. Planned for expanding the profitability and diminishing the work in question, this robot is intended to execute the fundamental capacities required to be completed in ranches. We intend to make a performing multiple tasks horticulture robot which will concentrate on essential work of estate. To plant the seeds a mechanical arm will burrow to an exact profundity with equivalent separation between the seeds. At base of robot water siphon will be put and according to the necessity water will be sprinkled.
The perfect measure of manure will be spread over the seed.

[2] Pavan T V1, Dr. R. Suresh2, Dr. K R Prakash3, Dr. C. Mallikarjuna et al(2017);-

.,Design and Development of E-Agriculture in action for Seeding. This paper is an exertion towards the computerization of seeding process. The created framework is fit for playing out the seeding activity in the rural field. The significant confinement that was found in the past frameworks is the seeding plan. The seeding course of action isn't adaptable and just one kind of seeds can be utilized. This impediment is defeated in the current framework. In view of the preliminaries done the framework is equipped for playing out the seeding activity. Uniform profundities for the seed situation and uniform separation between the two progressive seeds were gotten. The created robot is fit for playing out its activity with no human exertion and the human intercession in the process is fundamentally decreased. Building up a robot that can perform wide assortment of farming undertaking is a difficult procedure. The utilization of robots can be monetarily defended when they are fit for performing wide assortment of horticultural procedure without human mediation. Aside from the agrarian procedure these sorts of seeding robots can be utilized for mass manor, reforestation and afforestation.

[3] Mr. V. Gowrishankar, Dr. K. Venkatachalam et al(2018);

IoT Based Precision Agriculture utilizing E-Agriculture in action. In excess of 60 percent of the populace in the India, horticulture as the essential segment occupation. As of late, due increment in labor deficiency intrigue has developed for the advancement of the independent vehicles like robots in the farming. A robot calledE-Agriculture in action have been intended for rural purposes. It is intended to limit the work of ranchers notwithstanding speeding up and exactness of the work. It plays out the basic capacities engaged with cultivating for example showering of pesticide, planting of seeds, etc. Showering pesticides particularly significant for the laborers in the territory of conceivably unsafe for the wellbeing and soundness of the laborers. This is particularly significant for the laborers in the zone of possibly destructive for the security and soundness of the laborers. The Proposed framework targets structuring multipurpose self-governing rural automated vehicle which can be controlled through IoT for seeding and showering of pesticides. These robots are utilized to diminish human mediation, guaranteeing high return and effective use of assets.

[4] Dr. PremjyotiPatil, et al (2016);-

Wsn Based Advanced Agricultural Vehicle Operated Using Smart Phone – E-Agriculture in action, this venture presents remote innovation in the field of agribusiness. It diminishes difficult work and can work in any kind of climatic condition too as can work relentless not at all like people. The time required to complete the five functionalities lessens extensively in correlation with doing similar exercises physically.

Rural robot or E-AGRICULTURE IN ACTION is a robot sent of rural purposes. This multipurpose framework gives a propelled strategy to seed planting, furrowing, watering the yields and reaping with least labor and work making it a productive vehicle. The entire procedure count, preparing, checking are planned with engines and interfaced with Microcontroller.

[5] Ankit Singh, Abhishek Gupta, AkashBhosale, Sumeet Poddar.et al.(2016)"; E-Agriculture in action: An Agriculture Robot. This paper has set out a dream of how parts of harvest creation could be robotized one. Albeit existing kept an eye on activities can be proficient over enormous regions there is a potential for diminishing the size of medications with independent machines that may result in much higher efficiencies. The improvement procedure might be gradual yet the general idea requires a change in outlook in the manner in which we consider automation for crop creation that depends more on plant needs and novel methods for meeting them instead of altering existing strategies. E-Agriculture in action is a robot intended for agrarian purposes. As one of the patterns of improvement on mechanization and insight of horticultural hardware in the 21st century, a wide range of farming robots have been looked into and created to actualize various rural creations in numerous nations. This Bot can perform essential rudimentary capacities like picking, gathering, weeding, pruning, planting, joining.

III. METHODLOGY

In this project we have used a Robot for demonstration. Here we have selected a RF Robot with moving left right steering feature. After buying this Robot we have replaced its RF circuit with our Arduino circuit. This Robot have two dc motors at its front and rear side. Front side motor is used for giving direction to Robot means turning left or right side (like car steering feature).

And rear side motor is used for driving the robot in forward and backward direction. A bluetooth module is used to receive command from android phone and arduino UNO is used for controlling the whole system.

Bluetooth controlled robot moves according to button touched in the android bluetooth mobile app. To run this project first we need to download bluetooth app form google play store. We can use any bluetooth app that supporting or can send data. Here are some apps‘ name that might work correctly.

After installing app you need to open it and then search Bluetooth device and select desired Bluetooth device. And then configure keys. Here in this project we have used Bluetooth controller app.

Download and install Bluetooth Controller.Turned ON mobile Bluetooth.

Now open Bluetooth controller app Press scan

Select desired Bluetooth device

Now set keys by pressing set buttons on screen. To set keys we need to press _set button‘ andset key according to picture given below:

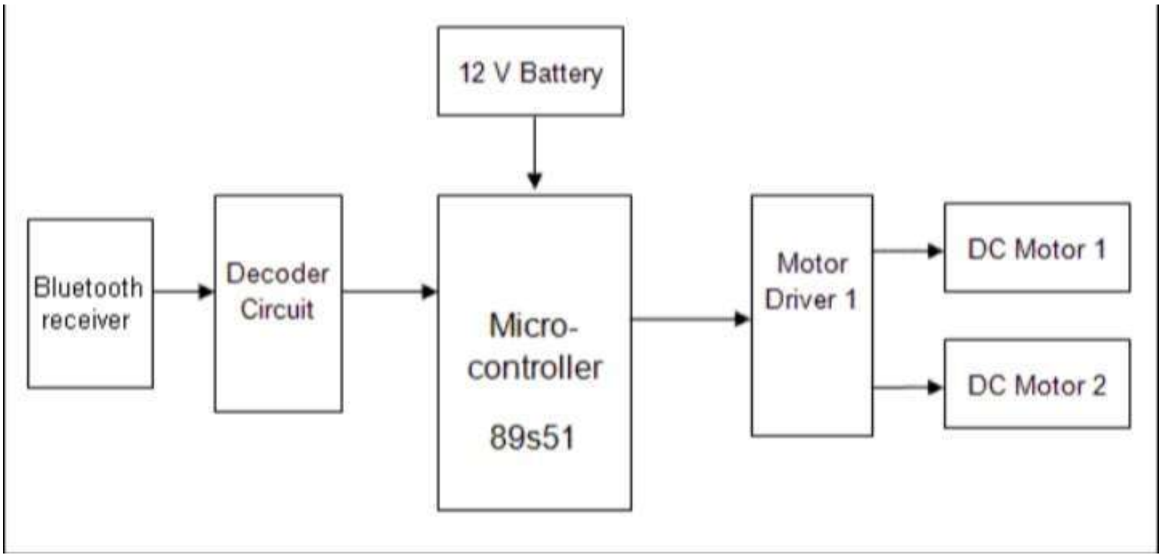
After setting keys press ok.

When we touch forward button in Bluetooth controller app then Robot start moving in forward direction and moving continues forward until next command comes.

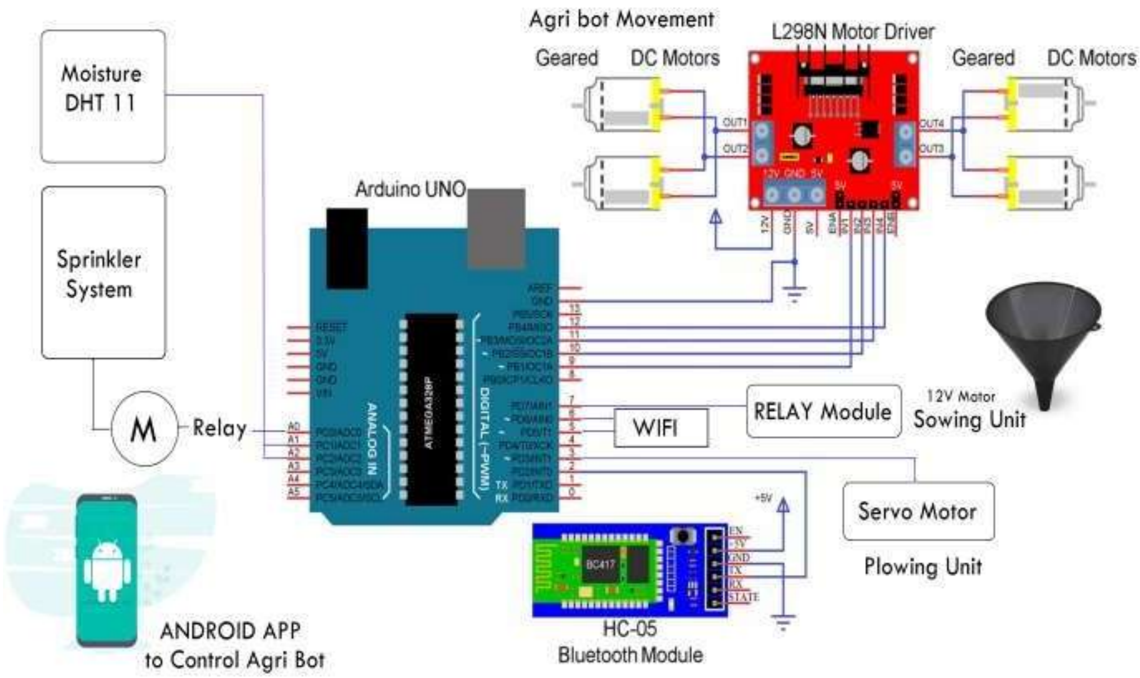
When we touch backward button in Bluetooth controller app then Robot start moving in reverse direction and moving continues reverse until next command comes.

When we touch left button in Bluetooth controller app then Robot start moving in left direction and moving continues left until next command comes. In this condition front side motor turns front side wheels in left direction and rear motor runs in forward direction.

When we touch right button in Bluetooth controller app then Robot start moving in right direction and moving continues right until next command comes. In this condition front side motor turns front side wheels in right direction and rear motor runs in forward direction.And by touching stop button we can stop the Robot.



Circuit Diagram



COMPONENTS

- ARDUINO (MICRO CONTROLLER)
- WHEELS (X4)
- CHASSIS (USING MDF BOARD)
- L CLAMP (FOR MOTOR AND WHEEL SUPPORT)
- 12V DC MOTOR (X 2)
- L293D MOTOR DRIVER MODULE
- WATER MOTOR PUMP
- WATER CONTAINER
- SEED DISPENSOR UNIT
- SERVO MOTOR (X3)
- JUMPER WIRES
- BLUETOOTH MODULE HC-05
- BATTERY/POWER SUPPLY
- IC 7805
- 1K Ohm RESISTANCE
- CAPACITORS 1000UF, 100UF
- DIODE 1N4007N
- ZERO PCB

International Journal of Advances in Engineering and Management (IJAEM)
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- LED‘s
- BERG STICKs (MALE HEADERS)
- SWITCHES
- SOFTWARE
- ARDUINO IDE
- EMBEDDED C
- ANDROID AP
- Wifi
- Esp 8266
- Bluetooth
- WSN
- Smart device
- Robot
- DC motors
- Bluetooth module HC-05
- Motor driver L293D
- Microcontroller
- LCD display

System

International Journal of Advances in Engineering and Management (IJAEM)
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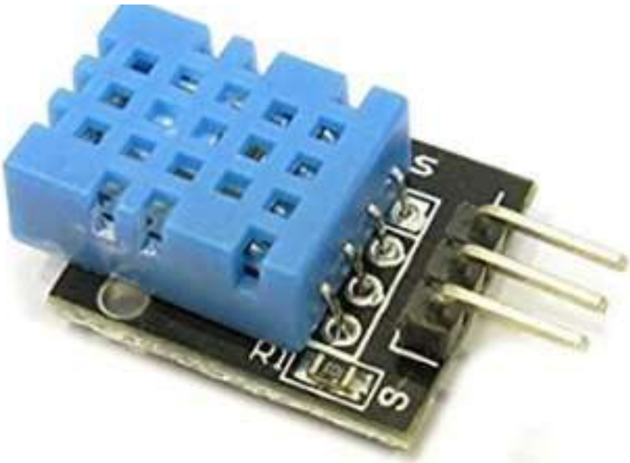
Humidity Sensor

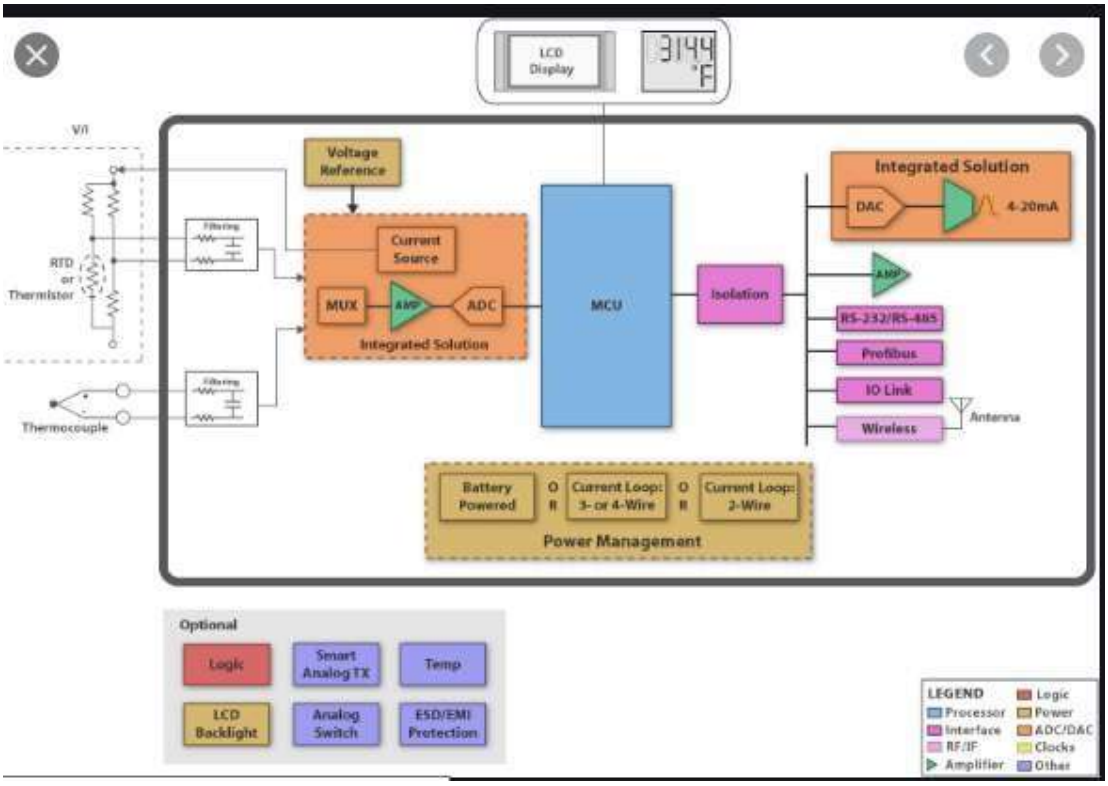


A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal. ... RH sensors must therefore measure temperature in order to determine relative humidity. In contrast, absolute humidity is measured without reference to temperature

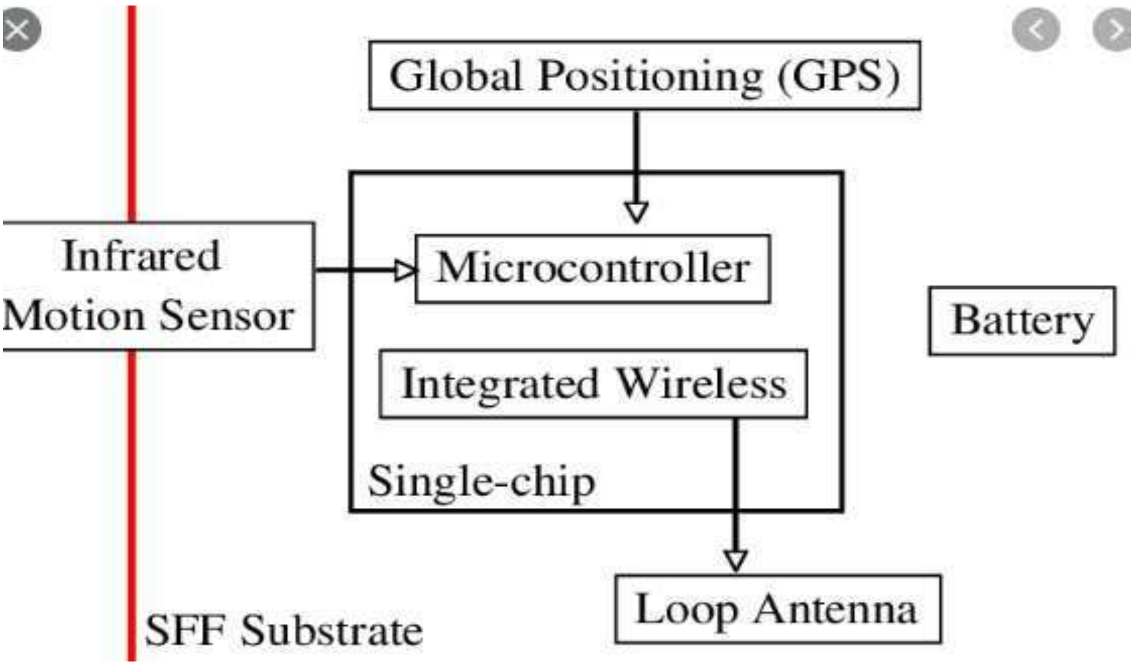
Moisture Sensor

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content

LCD CONNECTION



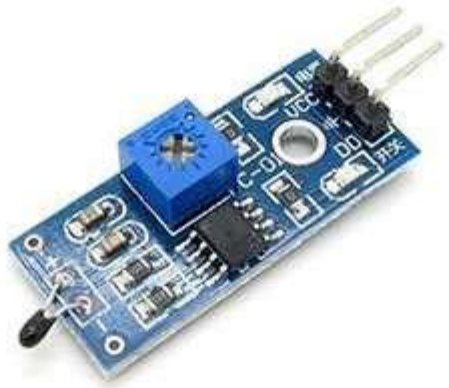
Gpss System



International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 226-240 www.ijaem.net ISSN: 2395-5252

Temperature Sensor

A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors.



Bluetooth Module HC-05

Specifications

- Serial Bluetooth module for Arduino and other microcontrollers
- Operating Voltage: 4V to 6V (Typically +5V)
- Operating Current: 30mA
- Range: Works with Serial communication (USART) and TTL compatible
- Follows IEEE 802.15.1 standardized protocol
- Uses Frequency-Hopping Spread spectrum (FHSS)
- Can operate in Master, Slave or Master/Slave mode
- Can be easily interfaced with Laptop or Mobile phones with Bluetooth
- Supported baud rate: 9600,19200,38400,57600,115200,230400,460800

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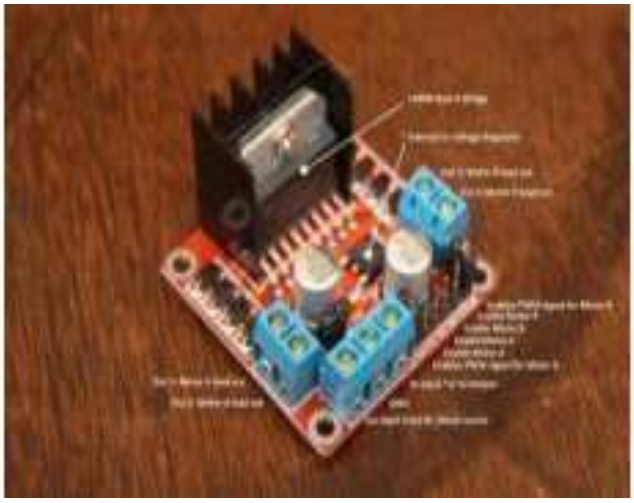
Motor driver:- L298N



Specifications

- Motor driver: L298N
- Motor channels: 2
- Maximum operating voltage: 46V
- Peak output current per channel: 2A
- Minimum logic voltage: 4.5V
- Maximum logic voltage: 7

Dc gear Motor

300RPM 12V DC motors with Metal Gearbox and Metal Gears.6mm Gearbox diameter 40 mm.
Motor Diameter 28.5 mm. Length 63 mm without shaft. Shaft length 30mm.
180gm weight.
9.06kgcm Holding Torque.
No-load current = 800 mA, Load current = up to 7.5 A (Max).
Recommended to be used with DC Motor Driver 20A or Dual DC Motor Driver 20Aiameter shaft with M3 thread hole.

Servo Motor

Operating Voltage is +5V typically Torque: 2.5kg/cm
Operating speed is 0.1s/60°Rotation: 0°-180°
Weight of motor: 9gm

International Journal of Advances in Engineering and Management (IJAEM)
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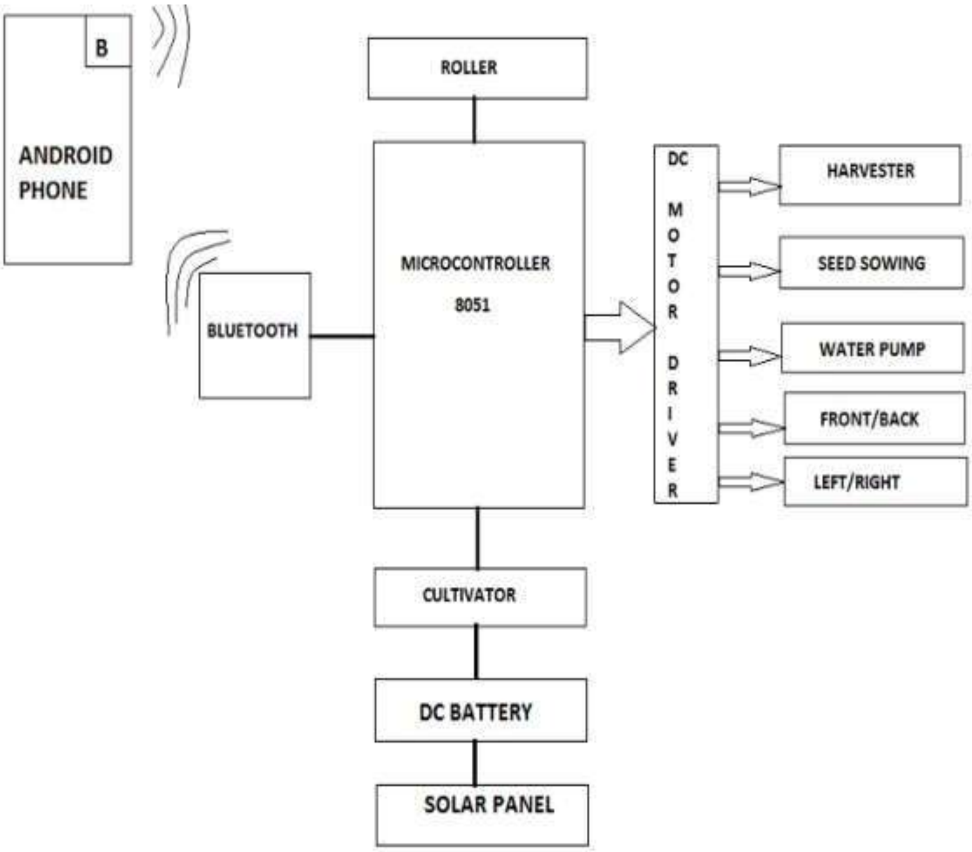

Deployed on a metal sheet developed with inbuilt roller and cultivator. The front end of the metal sheet is given the harvesting feature, while both Water pump used to water the crops and seed sowing will be added at the cultivator end. We use two motors to control the forward, backward, left and right movement. One motor each is used to control harvesting, seed sowing and watering the crops. The working begins when the Farmer opens the application and can press the options provided on the display screen. This android application is developed using Java. The Bluetooth on the android phone will send the RF signals serially, on the other hand the Bluetooth present in the robot will take actions according to the instructions given by the Farmer. We use Embedded C and Keil Vision compiler. The Interfacing is done using Microcontroller 8051. The heart of our robot is Intel‘s most powerful family of microcontroller 8051,we are using AT89C2051 Two microcontrollers IC2 is first microcontroller which acts as master controller decodes all the commands received from the transmitter and is responsible for executing all the commands received from the remote and also generating pwm pulses for the speed control .LD293 motor driver IC which drives two motors these two motors are vehicle driver motors and it also runs the motors for all other attachments of agriculture in the vehicle.

1. Developed Program:-

```
#include<Servo.h> #include< SoftwareSerial.h>
Software Serial Nerial(11,12);
{ int servoPin = 10;int IN1 = 2;
int IN2 = 3; int IN3 = 4; int IN4 = 5; int IN5 = 6; int
IN6 = 7;
char Incoming_value = 0;Servo Servo1;
boolean seed = false; boolean direct = true; void
setup()
{

Serial.begin(9600); Nerial.begin(9600);
pinMode(IN1, OUTPUT); pinMode(IN2,
OUTPUT); pinMode(IN3, OUTPUT);
pinMode(IN4, OUTPUT);

pinMode(IN5, OUTPUT); pinMode(IN6,
OUTPUT); Servo1.attach(servoPin);
Servo1.write(180);
}

void loop()
```

```
{
if(Nerial.available() > 0)
{
Incoming_value = Nerial.read();
```

// Code for Direction control of RC if(direct)

```
{
if(Incoming_value == 'F')
{
digitalWrite(IN1, HIGH);digitalWrite(IN4, HIGH);
} else if(Incoming_value == 'B')
{ digitalWrite(IN2, HIGH); digitalWrite(IN3, HIGH);
}
else if(Incoming_value == 'K')
{ digitalWrite(IN1, HIGH);
} else if(Incoming_value == 'J')
{ digitalWrite(IN4, HIGH);
} else if(Incoming_value == 'R')
{ digitalWrite(IN1, HIGH); digitalWrite(IN3, HIGH);
} else if(Incoming_value == 'L')
{ digitalWrite(IN2, HIGH); digitalWrite(IN4, HIGH);
} else if(Incoming_value == 'M')
{ digitalWrite(IN3, HIGH);
} else if(Incoming_value == 'N')
{ digitalWrite(IN2, HIGH);
} else digitalWrite(IN1, LOW); digitalWrite(IN2, LOW); digitalWrite(IN3, LOW); digitalWrite(IN4, LOW);
}
} else { if(Incoming_value == 'F') { digitalWrite(IN2, HIGH); digitalWrite(IN3, HIGH);
} else if(Incoming_value == 'B')
{ digitalWrite(IN1, HIGH); digitalWrite(IN4, HIGH);
} else if(Incoming_value == 'K')
{ digitalWrite(IN3, HIGH);
} else if(Incoming_value == 'J')
{ digitalWrite(IN2, HIGH);
} else if(Incoming_value == 'R')
{ digitalWrite(IN1, HIGH); digitalWrite(IN3, HIGH);
} else if(Incoming_value == 'L')
{ digitalWrite(IN2, HIGH); digitalWrite(IN4, HIGH);
} else if(Incoming_value == 'M') digitalWrite(IN1, HIGH);
} else if(Incoming_value == 'N')
{ digitalWrite(IN4, HIGH);
} else { digitalWrite(IN1, LOW); digitalWrite(IN2, LOW); digitalWrite(IN3, LOW); digitalWrite(IN4, LOW);
}
}
```

// Code for Pump

```
if(Incoming_value == 'C')
{ digitalWrite(IN6, HIGH);
} else if(Incoming_value == 'c')
{ digitalWrite(IN6, LOW);
}
```

// Code for Pump

```
if(Incoming_value == 'D')
{ digitalWrite(IN5, HIGH);
} else if(Incoming_value == 'd')
{ digitalWrite(IN5, LOW); }
```

// Code for Grass Cutter Module

```
if(Incoming_value == 'A')

{ digitalWrite(IN6, HIGH);

} else if(Incoming_value == 'a')

{ digitalWrite(IN6, LOW);

}
```

// Code for Seeding Module

```
if(Incoming_value == 'E')

{ Servo1.write(90);delay(1000); Servo1.write(180); delay(1000); }
```

// Code for Setting Direction of RC

```
if(Incoming_value == 'W')

{ direct = false;

} else if(Incoming_value == 'w')

{ direct = true;
```

sis headquartered in San Rafael, California, and features a gallery of its customers' work in its San Francisco building. The company has offices worldwide. The company was founded in 1982 by JohnWalker,whowas a co-author ofthe first versions of AutoCAD .AutoCAD,which is the company's flagship computer-aided design (CAD) software and Revit software are primarily used by architects, engineers, and structural designers to design, draft, and model buildings and other structures.Autodesk software has been used in many fields, and on projects from the One World Trade Centre to Tesla electric cars. Autodesk became best known for AutoCAD, but now develops a broad range of software for design, engineering, and entertainment—and a line of software for consumers, including Sketchbook. The manufacturing industry uses Autodesk's digital prototyping software—including Autodesk Inventor, Fusion 360, and the Autodesk Product

Scope of Future Work

Since the designed E-Agriculture in action is used only for sowing of seeds and spraying of pesticides controlled through internet of the thing, the following features can be added for enhancing the current project work: pH meter can be in order to determine the pH of the soil which helps to identify the suitable pesticide/fertilizer to be employed Moisture level sensor can be employed to know about the moisture content present in the soil of the farmland.

ADVANTAGES

1. Increased Efficiency and Productivity:

24/7 Operation**: Robots can work around the clock without needing breaks, increasing the overall productivity of farming operations.

Precision Agriculture**: They can perform tasks with high precision, such as planting seeds, applying fertilizers, and spraying pesticides, reducing waste and ensuring optimal use of resources.

2. Labor Cost Reduction:

Reduced Dependence on Human Labor: Robots can perform labor-intensive tasks, reducing the need for human workers and associated labor costs.

Addressing Labor Shortages: In regions with labor shortages or an aging farming population, robots can fill the gap and maintain productivity levels.

3. Improved Crop Quality and Yield:

Consistent Monitoring: Robots equipped with sensors and imaging technology can continuously monitor crop health, soil conditions, and pest activity, allowing for timely interventions and better crop management.

Optimized Resource Use: Precision application of water, fertilizers, and pesticides ensures that crops receive the necessary inputs in the right amounts, leading to healthier plants and higher yields.

4. Sustainability and Environmental Benefits:

Reduced Chemical Use: Precision spraying and targeted application of pesticides and fertilizers minimize environmental contamination and reduce the overall use of chemicals.

Soil Health Management: Robots can monitor soil conditions and help implement practices that maintain or improve soil health, such as precise tillage and crop rotation strategies.

5. Data Collection and Analysis:

Real-time Data: Robots collect vast amounts of data on crop conditions, weather, soil health, and pest presence, which can be analyzed to make informed decisions and improve farming practices.

Predictive Analytics: The data gathered

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Volume 6, Issue 06 June 2024, pp: 226-240 www.ijaem.net ISSN: 2395-5252

can be used to predict crop yields, identify potential issues before they become serious, and optimize planting and harvesting schedules.

6. Safety Improvements:

-Reduced Exposure to Hazards: Robots can handle tasks that are dangerous or involve exposure to harmful chemicals, reducing the risk to human workers.

Accident Prevention: With consistent performance and adherence to safety protocols, robots can reduce the incidence of accidents in farming operations.

7. Scalability:

Adaptability to Different Farm Sizes: Robots can be used on farms of various sizes, from small family farms to large industrial operations, making advanced technology accessible to a broader range of farmers.

Flexible Deployment: Different types of robots can be employed for specific tasks, allowing farms to scale their use of robotics based on their unique needs and constraints.

8. Cost-Effectiveness:

Long-term Savings: While the initial investment in robotic technology can be high, the long- term savings from reduced labor costs, increased efficiency, and higher yields can make it a cost-effective solution for many farmers.

Reduced Resource Waste: Efficient use of inputs like water, fertilizers, and pesticides can lower costs and reduce environmental impact, contributing to overall cost savings.

Agriculture robots represent a significant technological advancement in modern farming, offering multiple benefits that can help address some of the major challenges in the agriculture industry.

APPLICATIONS

- Android application which is used in this project to control the robot. This application has 9 keys / commands (9 numbers of keypad). We have used 7 commands. Command 7 and 9 are not used and are reserved for future scope. User can even rename these key text as forward / reverse using the set keys option. User needs to turn on the bluetooth on his/her mobile and press scan button as shown below.
- Then connect to the bluetooth receiver on robot. Once the connection is established then the application will show connected status as shown below.
- Low range mobile surveillance devices
- Military applications (no human intervention)
- Assistive devices (like wheelchairs)
- Home automation
- The robot is small in size so can be used for spying.
- With few additions and modifications, this robot can be used in the borders for detectingand disposing hidden land mines.

The robot can be used for reconnaissance or surveillance.

IV. CONCLUSION

- Hence, the E-Agriculture in action is successfully implemented as per results. This has reduced human participation. System can work autonomously as well as in controlled manner. It has uniform drill depth which is good for same type of crops. Uniformity in the seed placement therefor growth in uniform manner. Increased land utilization and higher productivity can be achieved by our proposed method. Also there is increase in yield/productivity. Human accident reduced and it is easy to maintain and repair. There is no fear of poison. The method has low maintenance and cost.
- In this work IoT controlled robot, named, E-Agriculture in action has been designed, builted and demonstrated to carry out seeding and spraying pesticides in an agriculture field. The E-Agriculture in action will assist the farmers in increasing crop yielded and protect them from harmful chemicals of pesticides.

This project introduces wireless technology in the field of agriculture.

- Exploits features of Android platform to help Farmers Significantly.
- Provides a flexible user interface to farmer to control the machine effectively.
- It reduces manual labour requirement which is a boon to the farmers as finding labourers is a very difficult job today.
- The E-Agriculture in action can work in any sort of climatic condition as well as can work nonstop unlike humans
- The time required to carry out the five functionalities reduces considerably in comparison with carrying out the same activities manually.

International Journal of Advances in Engineering and Management (IJAEM)
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- It is a onetime investment which reduces the overall farming cost considerably.
- This E-Agriculture in action acts as a gateway to automated smart farming.
- An initial outcome of this study indicates that most of these systems that which work autonomously are more flexible than traditional systems. The benefits of reduction in labor costs and restrictions on the number of daily working hours significantly improved. Thus it has made possible to automate the most significant working routines. The project presents a low cost, low power & simple system for device control. This system will have high application in farming, gardening and Agro University. By implementing this system, agricultural, horticultural lands, gardens can be irrigated. Thus, this system is cheaper and efficient when compared to other type of automation system. In large scale

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