ISSN: 2321-2152

IJMECE

International Journal of modern electronics and communication engineering

E-Mail
editor.ijmece@gmail.com
editor@ijmece.com

www.ijmece.com

IJMECE International Journal of modern electronics and communication engineering

ISSN2321-2152www.ijmece .com
Vol 8, Issue.3June 2020

DESIGN AND DEVELOPMENT OF AN IoT POWERED, FARMER-FRIENDLY AGRIBOT

Ms J SABITHA , Mrs. K V NANDINI, Dr K DAMODAR

Abstract:-*In a nation like India, where two-thirds of the population depends on agriculture for their livelihood, it has always been a significant occupation.The traditional agricultural system relies heavily on natural resources, which occasionally result in good production and occasionally in losses. Additionally, with a growing population and a decline in farming land, natural disasters like storms, drought, and unwelcome heavy rainfall worsen things. However, during the last few decades, numerous technological advancements have gradually altered the methods used in farming and agriculture. Smart farming practices combine IoT, AI, and machine learning techniques to get good crop production. An IOT-basedtechnology platform for farming is suggested in this article. The major sensor is included in the farming robot "Agri-bot" proposed in this research. An agricultural robot is used in this system to cutthe grass, plough the ground, sow the seeds, and detect obstacles. Choosing any of these Agri-bot features involves using a simple smartphone application. Agri-bot rotates wheels, rotates cutting blades, opens or closes the seeding valve, and moves the ploughing arm using Arduino and DC motors. On the Agri-bot's LCD, the user's chosen function is also shown. As a result, farmers' profit margins can be increased with less outlay of capital thanks to Agri-bot.*

Keywords: Smart farming, The Internet of Things (IoT), Agri-Bot, Ploughing, Seeding valve, Smartphone application, Arduino, LCD, Obstacles, DC motors.

1. INTRODUCTION

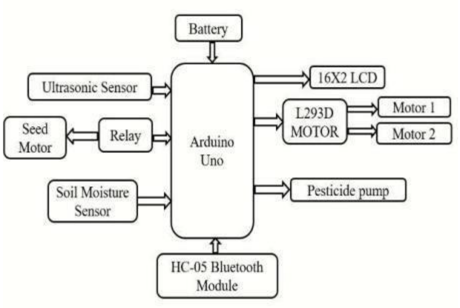
The most recent United Nations estimates published by World Meter place the current global population at 7.8 billion. In 2057, the world's population is expected tosurpass 10 billion, according to the UN. The explosion in global population will become a problem on a worldwide scale, leading to food scarcity, and urbanization, which will reduce farmland, and increase in demand for all resources. Food is a basic need, and producing it with adequate crop yields is essential for any nation's stability on a global scale. Rainfall, soil quality, temperature, and other environmental parameters are the key determinants of this profession. To determine a site's fertility, soil samples are manually tested. The amount of water needed for different types of vegetables and crops varies. Although drop irrigation techniques are often used, there are times when water is wasted in the fields. Productivity could suffer from abrupt changes in the weather. All of these issues can be partially resolved with creative automated methods. Thanks to the global development of smart cities, agriculture is now equipped with smartfarming. Monitoring atmospheric pressure, atmospheric moisture, amount of sunlight, rainfall, pestinfestation, soil moisture, and nutrition may all be donewith IoT- based sensors.

Assistant Professor[1,2] , Associate Professor[3]

Department of ECE,

Viswam Engineering College (VISM) Madanapalle-517325 Chittoor District, Andhra Pradesh, India

These sensors' collected data can be used for decision- making and data analysis. If sensors are linked to bots, the information



gathered can be used to take the necessary activities, such as watering crops and plants at the right time and in the right quantity, applying fertilizer in the right amounts, and taking photos of the plants to check their health and look for illness, among other things. Additionally, these intelligent Bots can be linked to cell phones, enabling global access to the data. Cell phones can be used as dashboards that provide all

the information about a specific area. The Keyadvantages of farmer-friendly Agri-bot are:

1. Proper water management prevents waterwaste is one of smart farming's main benefits.

2. Soil management, which measures the soil'smoisture content

3. Weather monitoring for real-time observationand timing of agricultural sowing.

2. LITERATURE REVIEW

1. A Low-Cost Smart Irrigation Control System," 2nd International Conference on Electronics and Communication Systems (ICECS), 2015, pp. 1146– 1152, doi:10.1109ECS.2015.7124763. This essay focuses on the adoption of a smart irrigation system by a middle-class planter in rural settings.

2. System Using Arduino" at the National Conference on Arising Trends in Electrical, Electronics and Computer Engineering (ETEEC- 2018), April 2018, e-ISSN 2455-5703.

3. "IoT- grounded multiple detectors (DHT11, Soil Moisture Sensor) Monitoring System," Volume 6, Issue 2, April–June 2019, e-ISSN 2348–1269, by S. Praveen and Dr. N. Shenbaga Vadivu

3. PROPOSED SYSTEM

The multipurpose agricultural robot with an irrigation system and real-time monitoring is the major emphasis of the proposed system, which also focuses on its design, development, anddeployment. The sensor probes are set up at various locations to measure the important parameters. The information is saved in the internal memory before being transferred to a server.

Figure 1: Block Diagram

4. SYSTEM DESIGNHardware Module:

A] Arduino Uno Board

The Arduino Uno AT mega328P-grounded microcontroller board formerly has everything demanded to support the microcontroller; all you need to do to get started is connect it to a PC using a USB string and force power, either from an AC- DC motor or a battery." Uno" is an Italian word that means" one."

B] Soil moisture detector

To ascertain the volumetric content of water in the soil, a sensor of this sort called a soil moisture sensor is utilized. It is necessary to extract, dry, and weigh the straight gravimetric soil moisture measurement.

C] HC- 05 Bluetooth Module

For wireless communication, the HC-05 Bluetooth module was developed. This module has two configuration options master and slave. Whether Bluetooth is on or not, the red LED on the HC-05 indicates the connection status. Before being linked to the HC- 05 module, this red LED continuously and desultorily blinks. When a contrivance is within Bluetooth range it blinks for two seconds.

D] Object Detector (Ultrasonic Sensor)

piece of electrical ministry used to measure distance is called an ultrasonic detector. multitudinous operations, similar to robotic control and vehicle identification, depend on measuring outfits. Light and sound- grounded

ISSN2321-2152www.ijmece .com
Vol 8, Issue.3June 2020

detectors are the most practical.

As proximity detectors, ultrasonic detectors are employed. They're present in anti-collision safety systems and parking technologies. Robotic handicap discovery systems and product engineering both use ultrasonic detectors.

E] L293D Motor Driver

The appropriate medium-power motor driver for driving DC Motors and Stepper Motors is the L293D Motor Driver Module. The well-known L293D motor driver IC is used. Alternately, it might drive 4 DC motors on and off while controlling the direction and speed of 2 DC motors. The driver greatly improves and simplifies the process of using microcontrollers to operate relays, motors, and other devices. It can run at up to 600mA of DC current and power motors up to 12V.

Connect the two channels in parallel or series to double the maximum input voltage or current. For operating motors from microcontrollers, switches, relays, and other mechatronic and robotic systems, this motor driver is perfect.

F] Relay

Relays are basic electromechanical switches. Relays are switching that link or disconnect two circuits, much like how conventional switches are used to manually close or open circuits. An electromagnet is driven by an electrical signal in a relay instead of a human action, and the electromagnet connects or disconnects another circuit.

Software Module:

The motors, vacuum pump, servo, and other electronic components and sensors will all be controlled by an Arduino Uno. This platform was selected due to its inexpensive cost, wide availability, hackability, shield expansion potential, wealth of learning resources, existing DIY community, and open-source status. Additionally, C is the language used to write Arduino programs, which is widely known. WIFI, a RAMPS stepper driver, and an SD card shield are a few expansion shields that might be used.

5. METHODOLOGY

The proposed system will alter the functionality of AgriBot via a mobile user-interface application. The Bluetooth module will also extend the controlled range to 100 meters.

The following constitutes the Agri Bot's architecture:

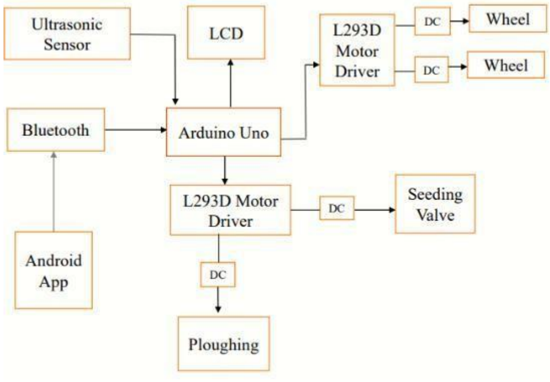


Figure 2: Functional Block Diagram

Figure 2: Functional

Block Diagram

fundamental robot

A DC motor will be attached to four of its wheels,and the motor driver L293 will be connected to theDC motor. A Renesas Microcontroller controls allactivities, while a Bluetooth HC-05 module establishes communicatio

When the Agri Bot's wheels are turned, a DC motor controls the version. The discharge of the seeds at regular intervals will likewise be accomplished using a straightforward valve open-close mechanism.

The way our Proposed System Operates:

Step 1: The user chooses a functional option fromthe mobile app.

Step 2: The Bluetooth module receives these commands and transmits them to the microcontroller for further processing.

Step 3: The Arduino engages the parts associated with the chosen functionality (ploughing, seeding) based on the command.

Step 4: Simultaneous obstacle detection; if any obstacles are found, the AgriBot will halt.

6. RESULTS AND DISCUSSION

AgriBot gets input from the app, which is received using a Bluetooth module with a range of 10 meters, and it executes all the user-selected tasks.

ISSN2321-2152www.ijmece .com
Vol 8, Issue.3June 2020

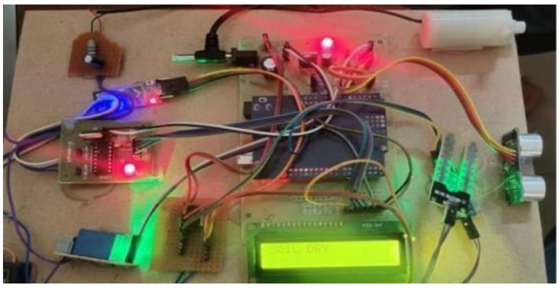


Figure 3: Top

View of AgriBotResults of

main modules in AgriBot

1. Detecting Obstacles:

When the robot detects an obstacle, it stops operation and waits for further instructions from the user. In my project design, we detect objects up to 35 meters with an ultrasonic sensor.

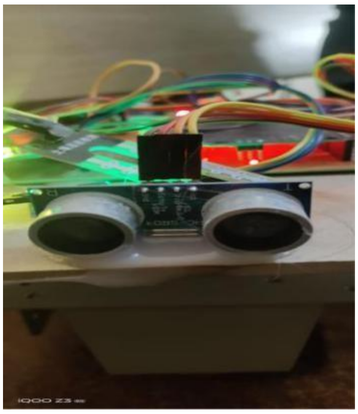


Figure 4: Ultrasonic sensor for detecting objects

2. Pesticide Spraying pump:

Pesticide spraying is done through the engine and the user must instruct the robot to perform spraying of pesticides.

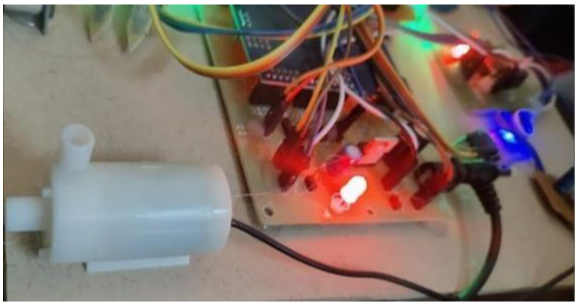


Figure 5: Pesticide Pump

4. Soil moisture Detector

The soil moisture sensor performs two operations.One checks the dry soil and the other checks the wet soil. Depending on the values entered by the user, then the result is output as wet or dry soil.

Figure 6: Output of Soil Moisture sensor

Soil Condition	Default values	Output
Dry Soil	1 to 3	When the water content is less than 3, it will show the dry soil on LCD
Moisture or Normal State	4 to 7	When the water content is 4 to less than 7, it will show the normal state on LCD
Wet soil	7 or above	When the water content is 7 or above, it will show the wet soil on LCD

Table1: Soil Moisture levels

After measuring the volumetric water content in the soil, the robot will perform functions such as sowing seeds, spraying pesticides, etc.

If an obstacle is encountered during the execution of the above functions, the robot will alter the process and wait for the user's instructions.

Mobile Interface:

IJMECE International Journal of modern electronics and communication engineering
ISSN2321-2152www.ijmece .com
Vol 8, Issue.3June 2020

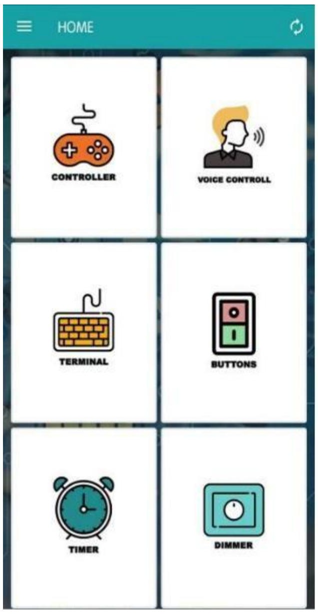


Figure.7: Input Page Figure 8: Output

6.1 Advantages

- The ability to automate tasks like watering, spraying, and seed spacing and the capacity to plant poly-crops efficiently.
- Complete automation and 24/7 operation.
- Practically limitless design options for farms.

6.2 Applications

- Working prototypes can be found both inside andoutside.
- A greenhouse can be used to cultivate it all yearround.
- It is useful for commercial use.
- It is suitable for commercial use.

CONCLUSION

AgriBot is built with calculations in mind and efficiently executes ploughing, and seeding. It performs soil tillage, followed by regular intervals of sowing and etc. Due to its usage of electric battery power, it is convenient and somewhatenvironmentally beneficial.

FUTURE SCOPE

- A solar panel that charges a battery to supplyelectricity.
- Rainwater can be collected in water barrels.
- Weather stations can be added to it to collectenvironmental data.

ACKNOWLEDGEMENT

We would like to use this chance to express our gratitude and respect to everyone who helped us complete our project. We genuinely and modestly express our gratitude to our guide Dr. P. Lakshmi Devi (Department of Electronics & Communication Engineering, St. Peter's Engineering College), and thank her for invaluable support, direction, encouragement, and cooperation, all of which were essential to the success of our project.

REFERENCES

[1] Kavita sapre, Shivani Savekar, Riya Sharma, Mayuri Chougule “IOT BASED AGRIBOT FOR BACKYARD FARMING” 2018, e-ISSN: 2395-0056, p-ISSN: 2395-0072, IRJET

[2] Ishita Deveshwar, Silvia Ghosh, Garima Goswami, Yashwanth B Kumar “Design And Development of Farmer Friendly Autonomous Agri-Bot with Soil Moisture and Light Intensity Detection for High Crop Yield Using Digital Image ProcessingTechniques” 2022, ISSN- 2278-0181, IJERT

[3] Vasudha Hegde, Sumathi M, Varsha Nagarajaiah, Yeshaswini M.C, Prof. Chandan Raj B R “IOT Based Agribot for Agricultural Farming”2019, E-ISSN: 2347-2693, DOI: 177182, JCSE

[4] Md. Didarul Islam Sujon, Rumman Nasir, Mahbube Mozammel Ibne Habib, Majedul Islam Nomaan, Jayasree Baidya, Md. Rezaul Islam “Agribot: Arduino Controlled Autonomous Multi-Purpose Farm Machinery Robot for Small to Medium Scale Cultivation”,2018 IEEE, ISBN: 978- 1-5386-6332-5 DOI: 10.1109/ICoIAS.2018.8494164

[5] Dasari Naga Vinod, Tripty Singh“Autonomous Farming and Surveillance Agribot in Adjacent Boundary”,2018, IEEE ISBN: 978-1-5386- 4431-7 DOI: 10.1109/ICCCNT.2018.8494137