International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 5 Volume No.7 September - October – 2023
DOI:10.46647/ijetms.2023.v07i05.039 ISSN: 2581-4621

Automated Rover For Agriculture and Field Management

Jeevananthan P[1], Dharun P[2], Gladwin Rheno S J[3], Jagadeeshwaran S[4], Jayaprakash S[5]

[1] *Assistant Professor, Karpagam college of Engineering, Coimbatore, Tamilnadu*
[2] *UG – Electrical and Electronics Engineering, Karpagam college of Engineering, Coimbatore, Tamilnadu*
[3] *UG – Electrical and Electronics Engineering, Karpagam college of Engineering, Coimbatore, Tamilnadu*
[4] *UG – Electrical and Electronics Engineering, Karpagam college of Engineering, Coimbatore, Tamilnadu*
[5] *UG – Electrical and Electronics Engineering, Karpagam college of Engineering, Coimbatore, Tamilnadu*
Corresponding Author Orcid ID: https://orcid.org/0009-0004-2080-7079

ABSTRACT
Abstract — Modern software and communication technology have significantly advanced agriculture. This entails integrating automated technology into field monitoring and agriculture. We introduce our device, the Automated Rover for Agriculture and Field Management, to improve automation in agriculture. Using leaf colour as a gauge, this product primarily aids in determining soil quality and plant health. This tool analyses the field conditions, such as soil moisture, temperature, and humidity, and it also detects the environment, such as rainfall, and the field's objects. Introducing IOT and an Android application to operate the product is necessary to make this advancement. With the Android app, we can manage this product. By connecting to the rover with IOT Wi-Fi modules, this programme has made additional advancements, fixing the device has a camera, and we can use mobile applications to obtain updates from the camera. To keep the system running, the rover is made up of several sensors and microcontrollers. The Node Microcontroller units are also used to transport the signals, and the Arduino Uno is positioned in the centre to transfer 3 inputs and outputs. An LCD display is also included on the product to show several outputs notwithstanding the Android application. This product controls the initial forming and field condition identification phases. The study has also advanced by analysing the plant and providing images of it, particularly of its leaves. Using the colour of the leaves, this aids in analysing the health of the plant. The illness prediction portion of this study is still in its early phases. This product controls the initial forming and field condition identification phases. The study has also advanced by analysing the plant and providing images of it, particularly of its leaves. Using the colour of the leaves, this aids in analysing the health of the plant. The illness prediction portion of this study is still in its early phases. The health of the plant may be inferred from the leaf's colour. The wheels on this item allow it to be transported into the field. It is essential to boosting productivity by using the best agricultural practises and utilising all the available resources.
Keywords—IOT, Arduino UNO, sensors, Android application, Camera, Object sensing, Field condition.

1. Introduction

The most fundamental means of human subsistence is agriculture. Thus, preserving and expanding agriculture is crucial. There are numerous problems in the world of agriculture that have not yet been resolved since 14 most agricultural techniques are outdated and do not yield the intended outcomes. The crops are watered 1 without understanding their requirements, which may result 15

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 5 Volume No.7 September - October – 2023
DOI:10.46647/ijetms.2023.v07i05.039 ISSN: 2581-4621

in dryness or water waste. Water shortages can occur in emergency scenarios when crops are irrigated without regard to the water level in the tanks or wells. A low-cost 1 automated irrigation and fertigation system employing MATLAB-based image processing has been created with the aim of finding diseases and nutrient shortages.

Robotics is a cutting-edge technology that has uses in almost every industry, from space exploration to medical. Agriculture, however, is one sector that regularly falls short. This is a little perplexing because many farmers were acclimated to the tools, heavy gear, and conventional agricultural techniques. Automation and robotics-related technology adoption has a big positive impact on farmers and the agricultural industry.

Common tasks involving these instruments include planting, spraying, collecting fruit, classifying plants, and others. Automating agricultural chores has several advantages for the field, including preventing unexpected or hazardous consequences from chemical exposure and boosting overall effectiveness and output. Farmers and landowners benefit greatly from automation since it makes work more precise, consistent, and time-consuming.

A rover is used to document the crops' current state as it moves across the field gathering information. The camera's photos can be analysed using algorithms, and classifiers are 1 used to identify the ailment and choose the best course of action. When the yield hits its peak, there are instances production may be harmed by incidents like fire or animal intrusion.

2. Experimental Methods or Methodology

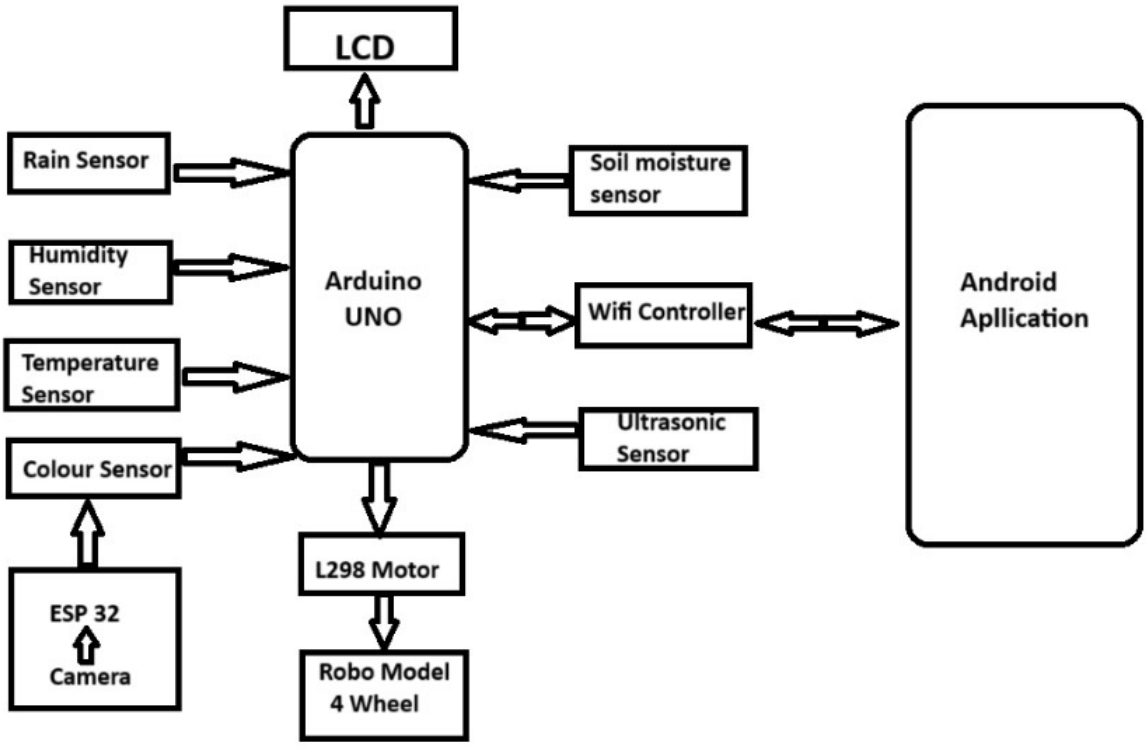

Figure: 1 Block diagram

This setup allows us to investigate the capabilities of a robotic rover in a controlled environment. We can observe the rover's performance as it navigates a simulated terrain and analyzes the data to gain insights into the potential of this technology. This experiment is a great way to explore the possibilities of robotic technology and its potential applications. The device was carefully constructed with small-scale farmers' financial situations and literacy rates in mind. The rover is an automated vehicle created for farms with zero pollution and sustainable agriculture.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 5 Volume No.7 September - October – 2023
DOI:10.46647/ijetms.2023.v07i05.039 ISSN: 2581-4621

3. Results and Discussion

To have a better approach for agricultural applications, it is developed as a moisture sensor, inertial measurement units, ultrasonic sensor, and digital camera. Therefore, it will be able to spray a designated area without any involvement from or control over people. The soil moisture sensor will be used by the proposed module of Argo Rover to measure the soil's humidity while it is cultivating crops. These can explore difficult terrain, dodging hazards, and gathering information for additional analysis.

Hardware design, in general, relates to the data and output that the system produces. Hardware is frequently the primary driver behind system development and the foundation upon which end users assess the app's functionality. A system's goal has physical form in terms of the hardware. The investigation of a system's objective results in the identification of its outputs. A system's outputs might come in a variety of shapes. The most typical types are reports, written forms, screen displays, graphical drawings, etc. The outputs differ regarding their format, frequency, timing, and content. Considerations include the audience for the output, its function, and the order of the details that will be printed.

The system analyst must decide what information will be provided, whether it will be shown or printed, and which output media will be used to deliver the output to the target audience while building the hardware. The term "internal outputs" refers to products that have an internal audience. Since they serve as the user's primary point of contact with the system, they must be carefully constructed. Interactive outputs are those that the user utilizes to interact with the mobile application directly. A microcontroller, sensors, and motor drivers are part of the system, along with a decision- making system. A system's outputs might come in a variety of shapes. Screen displays are the most typical.

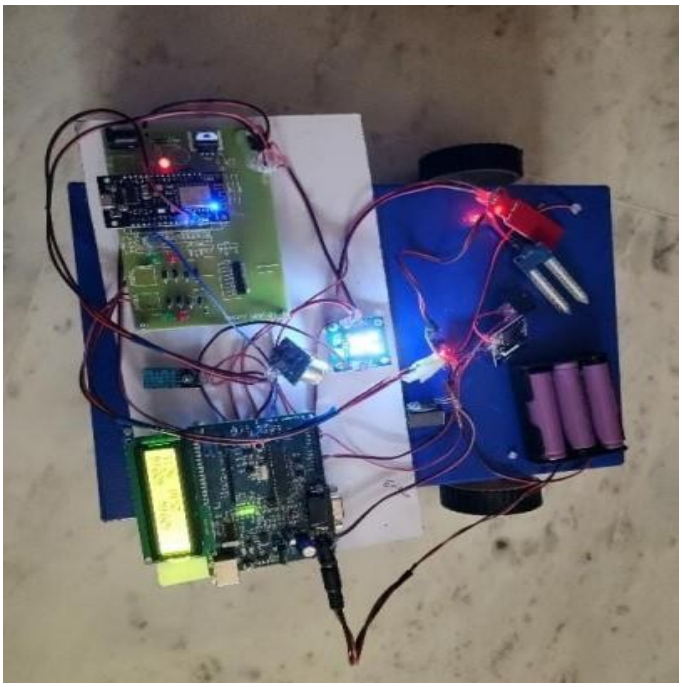

Figure: 2 Prototype of the rover

This project additionally has an android application connected with the rover. This application framework is obtained from the predesigned framework. After getting the framework we need to design the interface of the application as per our requirement. This design is done through the embedded c programming language. This application has the details of the data from the sensors. This application is connected to the rover through Node MCU WIFI modules. This also has the

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 5 Volume No.7 September - October – 2023
DOI:10.46647/ijetms.2023.v07i05.039 ISSN: 2581-4621

buttons to control the rover movements, we can control thereover by using this application. By using the application, we can view the pictures which are sent by the camera in the rover and also, we can show the live video from the field by the rover camera. Figure 5.2 shows an image of an Android application screenshot.

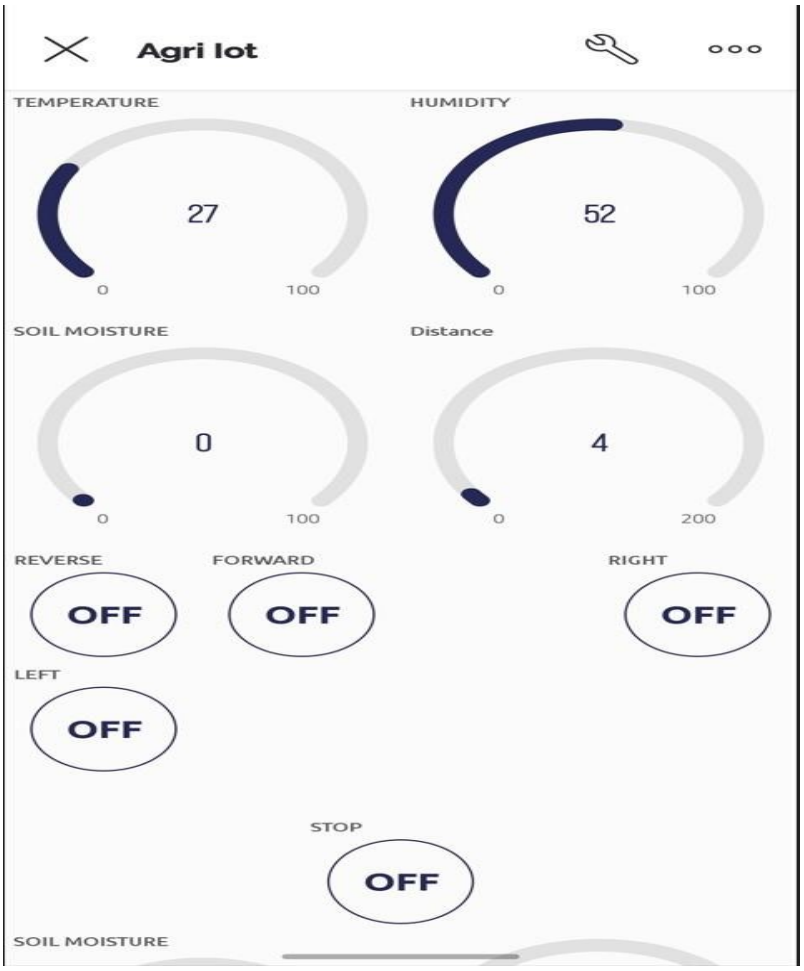

Fig. 3 ANDROID APPLICATION SCREENSHOT

CONCLUSION

Currently, the agricultural rover's charging time depends on the availability of electricity. In the future, a solar panel might be added to ensure the rover and its supplementary tools always seem to have power. We can have multipurpose agricultural equipment for a lifetime of use by maximizing the equipment's strength and quality. The battery unit could be improved to produce a longer-lasting power supply. A more effective motor could be utilized. This project might be expanded to include other tools like soil testing activities. High-quality cameras may be mounted on the front and back of the rover for improved monitoring of the agricultural operations. Additionally, this will help with crop health monitoring. Agricultural rover's future iterations have generally good room for adaptation and development.

REFERENCES

[1] Statistics Times report, published on 8th February 2019, powered by the Ministry of Statistics and Program Implementation.
[2] Comparative study of Bullock driven tractors by Technology action group IIT

DOI:10.46647/ijetms.2023.v07i05.039 ISSN: 2581-4621

Delhi.
[3] Swetabh, Manish Kashyap, Yash Yadav, Ashutosh Singh, Dhruv Kumar "Multi-tasking agricultural machine tool" Vol. (11) Issue (3), IJLTET e-ISSN: 2278-621X.
[4] Annual Report of 2018-19, Department of Agricultural Research and Education, Ministry of Agriculture Farmers Welfare Government of India.
[5] Planters and their Components – J R Murray, J N Tullberg and B B Basnet, School of Agronomy and Horticulture, University of Queensland, Australia.
[6] Handbook of Agriculture, Indian Council for Agriculture Research, New Delhi.
[7] Gopal Chandra de, 2008, Fundamentals of Agronomy, Oxford & IBH Publ. Co., New Delhi.
[8] Rathore, P.S., 2002 Techniques and Management of Field Crop Production, Agrobios (India), Jodhpur.
[9] Indian agriculture – an- introduction by MM Pandey Director Central Institute of Agricultural Engineering Bhopal, India.
[10] Swapnil Lagad, Swapnili Karmore, "Algorithms of Wheat Disease Identification in Spraying Robot System", IEEE-2017.
[11] Zhihua Diao, Chunying Diao, Yuanyuan Wu, "Algorithms of Wheat Disease Identification in Spraying Robot System", IEEE-2017.
[12] Ronberestein, Yael Edan, "Automatic Adjustable Spraying Device for Site-Specific Agricultural Application", IEEE-2018.
[13] Chin-Mu Wu, Ju-jitsu Lu,": Implementation of remote control for a spraying robot", IEEE-2017.
[14] I.F. Akyildiz, W. Su, Y. Sankara Subramaniam, E. Circa, A survey on sensor networks, IEEE Communications Magazine 40 (8) (2002) 104–112.
[15] L. Atzori, A. Iera, and G. Moratorium, "The Internet of Things: A survey," Computer Networks, vol. 54, pp. 2787-2805, 10/28/ 2010.