International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 07 | July 2022 www.irjet.net p-ISSN: 2395-0072

Multifunctional Agribot using Android for Small Plantations

Adarsh A koushik[1], Akash R[2], Archana B H[3], Likitha V[4], Chandru A S[5]

[1]*Adarsh A Koushik: Student, Dept. of ISE, NIE-IT, Mysore, Karnataka, India*
[2]*Akash R: Student, Dept. of ISE, NIE-IT, Mysore, Karnataka, India*
[3]*Archana B H: Student, Dept. of ISE, NIE-IT, Mysore, Karnataka, India*
[4]*Likitha V: Student, Dept. of ISE, NIE-IT, Mysore, Karnataka, India*
[5]*Chandru A S (co-author): Assistant Professor, Dept. of ISE, NIE-IT, Mysore, Karnataka, India*

Abstract –

Robotics in engineering is fascinating that provides many opportunities for research. In addition, the development of technology in recent years has led to intelligent mobile robots. They may be sent to hard places instead of people either because they are dangerous or because they are difficult to access. However, controlling these robots is a difficult task that involves knowledge in various fields such as robotics, automation, programming, electronics, etc. This project aims to develop a robot that can perform operations such as automatic plowing, seed dosing, fruit picking and pesticide spraying. For manual control, the robot uses a Bluetooth pairing application as a control device and helps to navigate the robot outside the field. Farmers today spend a lot of money on machines that help them reduce labor and increase crop yields, but the profit and efficiency are very low.

Key Words: **Robotics, Farming, Bluetooth, DC motor, Servomotor, automation**

1. INTRODUCTION

Robotics plays a significant role in agricultural production and management. In agriculture, time-saving autonomous technology is needed to make farm management efficient. Researchers are now focusing on various operational parameters of agriculture to design autonomous agricultural vehicles, as conventional agricultural machinery is dependent on crop and topology. Robots like these are pretty much perfect replacements for human power as they deploy unmanned sensing and machine systems.

The overall goal of this project is to provide a synthesis of research findings on the economics of field crop robotics. The specific objectives were to: a) list and summarize publicly available research on the economics of field crop robotics, b) identify research gaps and needs related to crop robotics, and c) suggest research topics that require urgent attention. This review contributes to the science by summarizing what has been accumulated about the economics of crop robots, proposing mechanisms for how these facts fit together, and identifying gaps in the science.

Primarily, this study focuses on profitability at the farm level, since without profitability, cropping robots will not be widely used and the expected environmental, social and food security benefits will not be achieved. When the benefits of potentially profitable autonomous crop technologies were identified, environmental, social and food security benefits were noted.

In this, robots are evolved to concentrate effectively and are also anticipated to perform operations autonomously. The proposed idea implements a robot to perform functions similar as planting, watering, fertilizing, watching crops. These functions can be integrated into one robot and latterly performed. The robot is anticipated to perform functions similar as planting, watering, fertilizing, covering, autonomously in the field.

The main goal of agricultural automation knowledge development is to alleviate labor energy. Advances in automation and artificial intelligence offer solutions in precision agriculture. Work related to scattering, collection, unwanted plant control. To restore effectiveness. The robots were designed based on flexible automatic bending joints. Instrumental robotics applications that are moving around the world to cover other fields with robotics required, replacing human operators are providing efficient results in myriad problems with higher competence. The advanced idea of our paper is to automate the process of planting, cultivating, pesticide spraying and tunneling to reduce humanoid effort and increase harvest. Seed cultivation is done robotically using a DC motor. The distance between two seeds is measured and varied using a microcontroller. It is also possible to grow different types of seeds with dissimilar spacing. The proposed idea includes a sprayer that would serve to reduce fertilizer wastage, which is done by spraying the appropriate amount of fertilizer required for a particular crop. The process mode can be changed using instructions existing in the robot application. Any nonlinear relationship between inputs and outputs is controlled by this system. The next step is to develop a more advanced GPS system that increases accuracy. The direction of the robot can be controlled using rectangular geometry

2. OPERATION OF AUTONOMOUS MULTIPURPOSE AGRICULTURAL ROBOT

1.seeding 2.glass land slicing 3.cultivating 4.reaping 5.shoveling 6.pesticide scattering 7. monitoring

1. The automation decreases the agriculturist labours with fast speed by propagating 4 discordances at a time with line shadowing. firstly, the seeds are stored in the vessel also it will be spread across the field with applicable detainments as mentioned in the corresponding program.

2. Grass slice and unwanted plant junking Undesirable plant in the estate damages the main crop and performance as a barricade for development of the crop also decreases the yield of the field.

3. The main perception of cultivating is to turn over the advanced bed of the slush, transferring superior nutrient contents to the face of the soil and making the nutritive soil for the purpose of husbandry.

4. Picking is the act of taking away crop from field it was growing and moving it to a defended point for processing, nursing or packing.

5. Digging is actually the combination of two processes, the first being the breaking or cutting the face of the soil and the alternate the dumping and redirection of the material set up there.

6. In order to give safety to the farmers from fungicide infections and its side goods, robots will be replacing workers for the estate exertion.

7. This bot also includes time to time monitoring of estate and give security alert to owner in case of buttinsky presence in farmland.

These functions can be integrated into a single vehicle and also be performed, which is more effective and cost effective.

3. METHODOLOGY

3.1 System Requirements

Hardware Specifications

- Weed cutter
- Planning plate
- Rotatory blade
- Flexible pipe
- IR(8051) Sensor and SST controller
- GSM(Global System for Mobile Communication)
- Control Unit
- Servo Motors
- Power supply circuit
- Perforated plough
- Water tank
- Submersible mini water pump
- IOT transmitter & receiver

Software Specifications

- Operating System : Windows 10
- Keil Microvision 4
- Embedded C
- SST Bootstrap Loader
- Android Sdk
- Eclipse
- Embedded Java

3.2 Problem Statement

- In traditional farming separate machinery need to be used for each cultivational activity like rotary tiller for ploughing, manual seeding, rollers for levelling the soil, pumping water, weed cutting machinery which includes more labour work.
- However, in recent years this has been overcome by robots that can perform only single or dual tasks but are not costeffective.
- As better yielding for crops is earned by farmers, there starts the risk of burglar activity which needs to be considered to save one's livelihood.

3.3 Proposed Methodology

- The proposed idea implements the vehicle to perform the functions such as **ploughing, seed sowing, mud leveling, creating heap, digging holes, water pumping, pesticide spraying** and **weed cutting**.
- These functions can be **integrated into a single** vehicle and then be performed, which is more efficient and **cost effective**.

This bot also includes time to time monitoring of farm and **provide security alert** to owner in case of intruder presence in farmland.

3.4 Architecture Diagram

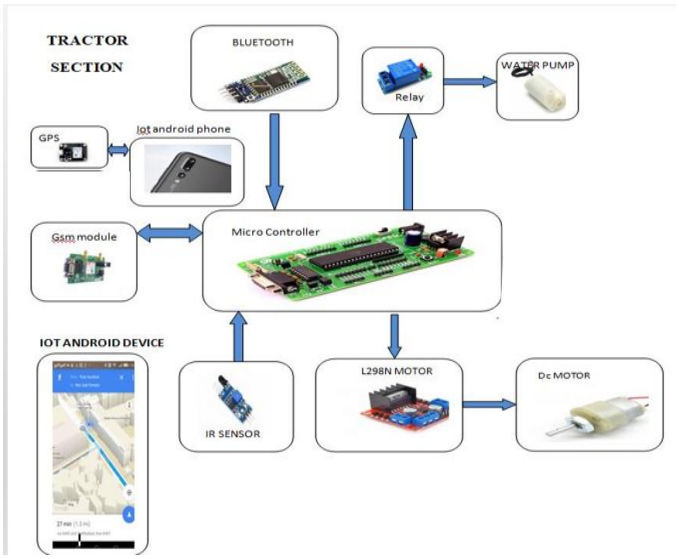

Fig. 1: Architectural Design of Agribot

3.5 Brief Circuit Diagram

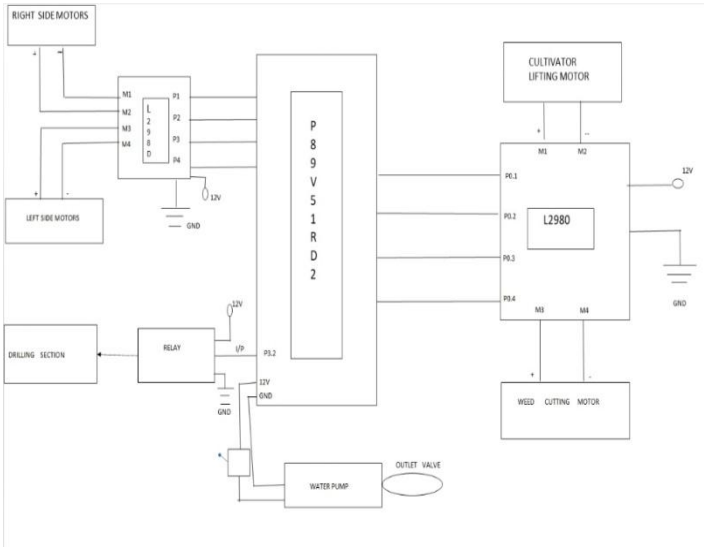

Fig. 2: Circuit Diagram

The microcontroller controls the four wheels agribot according to the input from the IR sensor. Android the application takes a command from the user, such as a selection mode (automatic and manual) or what the operation should be performed and is further sent to the Wi-Fi module. The the controller in turn receives the command from the Wi-Fi module (Esp32866). The microcontroller motor driver is also used to issue commands the respective engines that will perform the operations including ploughing, sowing, levelling, watering and fertilizing crops.

x Agribot will connect to Wi-Fi x Commands will be sent from the mobile application x Accordingly, the given specific task will be performed.

3.6 Flow Chart

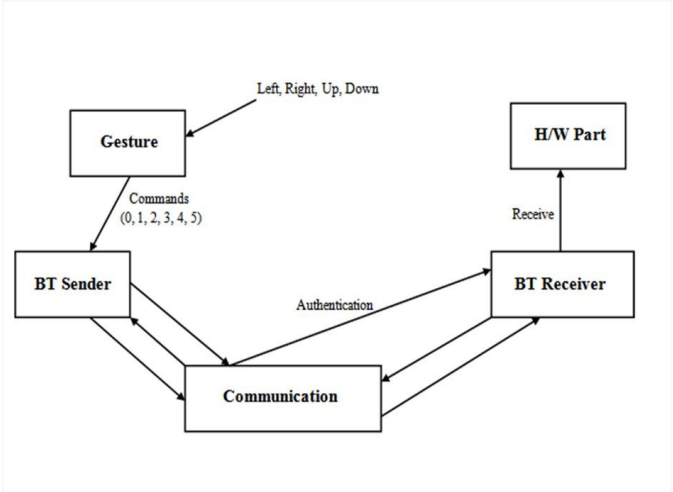

Fig. 3: Agribot Movement Flow Chart

At the user end, when a person opens the application the Bluetooth will be enabled and the connection will be established. The user can select the preferred activity from the list and performs it. At the end of the activity, the agribot MSP430F5529IPN will perform activate the appropriate DC motor DRV10983QPWPRQ1 (30W, 20V automotive 3-phase sensor without BLDC motor driver with load tipping support 24 – HTSSOP – 40 to 125) a the selected operation is performed by the train driver. When MSP430F5529IPN receive stop signal, activity will be stopped.

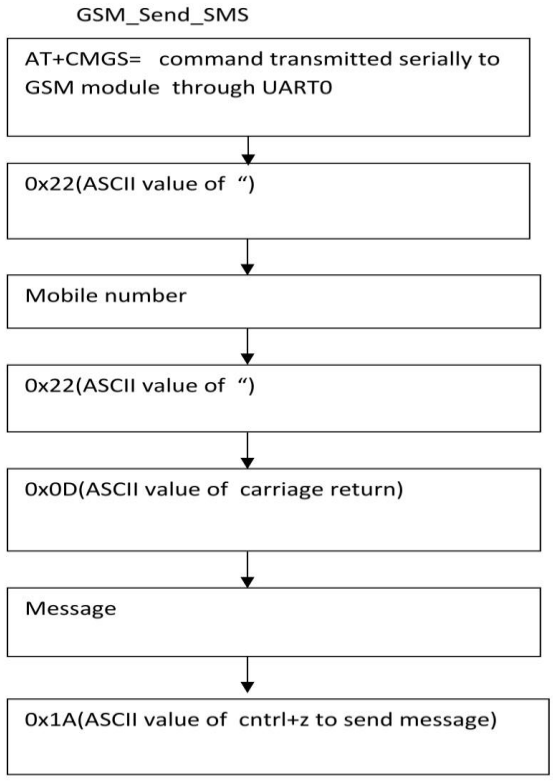

Fig. 4: GSM Flow Chart

GSM, a digital mobile communication standard developed by the European Telecommunications Standard Institute(ETSI), has been espoused by further than 100countries worldwide. GSM standard outfit occupies more than 80 of the current global cellular mobile communication outfit request. It's presently the most extensively used mobile phone standard. China has established a GSM mobile communication network covering the entire country. Short communication service(SMS) is a value-added service of the GSM system. It uses the signaling channel to transmit information, and its transcharge mode is to be stored and encouraged first, that is, after the short communication is transferred out, it'll be stored in the short communication center(SMC) first and also for- shielded by SMC to the receiver. SMS are transmitted through a wireless control channel, which can be stored and encouraged through SMC. The system of getting SMS about the vehicle position on the mobile outstation is to set up a short communication broadcast monitor on the Android outstation. When a new communication is received, the monitoring system can cover the content of the SMS latitude/ longitude that has been formatted on the tackle, parsed it, and uprooted the latitude and longitude in the content by using the word housekeeper-acter prisoner. After that, it's passed to the exertion in the display chart.

The communication between the GSM module and the main chip is realized through a periodical harborage, and the program prosecution inflow is shown in Fig. 4.

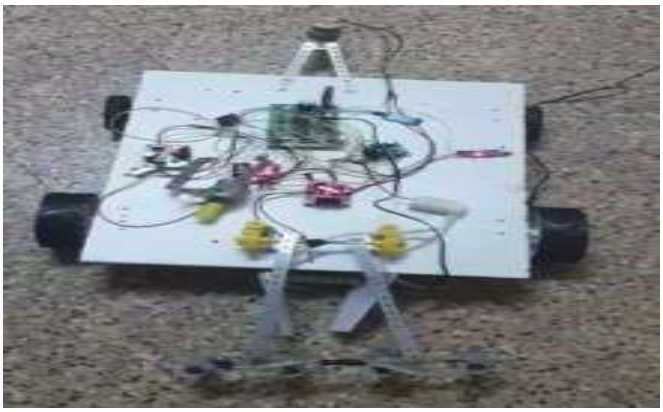

Fig. 5: Model of the Agribot

Table I: Comparison Between Traditional And Modern Method

Sr. No.	Parame Ter	Traditio nal	Tractor	Robo tic
I	Speed	Slow	High	Very high
II	Man power	More	Moderate	Less
III	Time required	More	Less	Less
IV	Sowing technique	Manuall y	Manually	Automatic ally
V	Required energy	High	Very high	Less
VI	Yield of crop	Low	Moderate	High

4. CONCLUSION

This project is primarily based on minimizing manpower and equipment costs. An attempt has been made to develop a Bluetooth-controlled agricultural robot that performs ploughing, sowing seeds and levelling mud. The proposed system is powered by a battery and controlled by a Bluetooth device. With the help of this robot, the farmer can do other side work in addition to operating the robot. By doing multiple activities simultaneously, a farmer can increase his income, resulting in the development of the Indian economy.

The advantage of this system is the reduction of labour costs and time. In this work, a robot is built and established to perform automatic and manual sowing, irrigation and fertilization in the field of agriculture. The robot is expected to support farmers in making their farms more efficient.

It can help farmers in the initial stage of farming.

REFERENCES

[1] Siddharth gupta, pooja a Kulkarni “IoT Based Multipurpose Agribot with Field Monitoring System” in IEEE on 2020

[2] Shweta Madiwalar,Sunita Meti, Nikhila Domanal, Kaveri ugare "A Survey on Solar Powered Autonomous Multipurpose Agricultural Robot" in IEEE conference on 2020

[3] Dr. Chanda V Reddy, Anudheep R, H M Vishal,Harshitha S, Sai Spoorthi N "Agro bot" in on International Advanced Research Journal in Science, Engineering and Technology Vol. 8, Issue 8, August 2021

[4] Chandana R, Nisha M, Pavitra B "A Multipurpose Agricultural Robot for Automatic Ploughing , Seeding and Plant Health Monitoring" on IETE – 2020 Conference Proceedings

[5] Arpit Sharma,Reetesh Verma,Saurabh Gupta and Sukhdeep Kaur Bhatia "Android Phone Controlled Robot Using Bluetooth" on International Journal of Electronic and Electrical Engineering.

[6] 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 " on 2018 International Conference on Intelligent Autonomous Systems

[7] Akshay Y. Kachor,Ketaki Ghodinde "Design of microcontroller based agribot forfertigation and plantation" on e International Conference on Intelligent Computing and Control Systems (ICICCS 2019)

[8] Gowtham kumar S N, Anand G Warrier, Chirag B Shetty, Gerard Elston Shawn D'souza "Multipurpose Agricultural Robot" on International Research Journal of Engineering and Technology (IRJET) Volume: 06 Issue: 04 | Apr 2019

[9] Vishnu Prakash K, Sathish Kumar V, Venkatesh P, Chandran A, "Design and fabrication of multipurpose agricultural robot", International Journal of Advanced Science and Engineering Research, Volume: 1, Issue: 1, June 2016, ISSN: 2455 9288.

[10] Nithin P V, Shivaprakash S, "Multipurpose agricultural robot", International Journal of Engineering Research, ISSN: 2319-6890)(online),2347-5013(print) Volume No.5 Issue: Special 6, pp: 1129 - 1254.

[11] Mahesh.R.Pundkar, a seed-sowing machinea review, IJESS Volume3, Issue3 ISSN:2249.

[12] Mr.Sagar R. Chavan, Prof. Rahul D. Shelke, Prof. Shrinivas R. Zanwar, "Enhanced agriculture robotic system", International journal of engineering sciences & research technology, ISSN: 2277-9655.