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# Multipurpose Harvesting Robot for Agriculture

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**Abstract - The agricultural industry plays a vital role in meeting the world's growing demand for food. However, traditional harvesting methods often entail significant costs require considerable time and labour, and expose farmers to various risks. This research paper proposes the development of a robotic model that aims to revolutionize the harvesting process for fruits and vegetables. By incorporating an Arduino-controlled autonomous grab and collect arm, the envisioned solution offers a pick-and-place mechanism through a robotic arm, providing numerous benefits such as reduced costs, improved efficiency, and enhanced safety.**

***Key Words*: IOT in agriculture, energy efficiency, security measures, crop picking, and farm automation.**

## 1.INTRODUCTION

The main aim of this proposed work is to solve the harvesting issues faced by the farmers. This robotic or automatic field is focused for development of ideas, manufacturing & its entire process [1] national GDP it is by far the single largest industry in Bangladesh. So much contribution by an industry has seen little technological innovation in past 4 decades, but things are changing. Although Bangladesh has only seen imports as existing solution there is almost no technological innovation within the county. Throughout history technology has helped make human life easier.The main purpose is it complete all works more efficiently as a result bring down the cost of producing any good. [2]. World health organization recognized that earth's residents will touch 9 billion in 35 years which will lead to an astonishing demand in increase of growth of food crops[3].The different modules are responsible for navigation and localization, motor control, sensing, mechanical structure, and others [4]. robotics, farmers can now streamline their operations, increase efficiency, and enhance productivity, ultimately leading to a more sustainable and prosperous future.

## 2. LITERATURE REVIEW

**1**.Abhijeet Kekane (et.al) (2023) making of agricultaral harvesting simpler and smarter with iot the Android app-controlled pick-and-place agricultural robot agribot offers a viable alternative for improving agricultural operations

2.Aashish Arun Kumar (et.al) (2020) Review on Multipurpose Agriculture Robot In agriculture, by using the solar operated multi-purpose agriculture robot. We can easily reduce the man power, farming tools and time. The machine required less farmers and less time compared to the old working methods

3. Al Masum, S. M. (2021). A Review on IoT Applications in Agriculture: Robot In agriculture, by using the solar operated multi-purpose robot. **.** In 2021 International Conference on Robotics, Electrical and Signal Processing Techniques

4. Prof .Shweta Madiwalar (et.al) (2020) A Survey on Solar Powered Autonomous Multipurpose Agricultural Robot.The accelerated growth in the industries is one of the influencing factors for the people to immigrate to the cities. This leads to the shortage of agricultural labour as well as the demand for wages will also increase

**5**. Didarul Islam Sujon (et.al) (2018) Agribot: Arduino Controlled Autonomous Multi-Purpose Farm Machinery Robot for Small to Medium Scale Cultivation Our agribot was made keeping in mind of the poor and uneducated farmers. After working for eight months on the project we are sure that our agribot will be able to help the poor farmers of any developing country.

## 3. PROJECT OBJECTIVES

**Design and Develop a Robotic Arm for Agricultural Tasks:** The primary objective of the Multipurpose Harvesting Robot project is to design and develop a robotic arm system capable of performing various agricultural tasks. This includes activities such as seed planting, crop harvesting, and other repetitive actions involved in farming proceses.

**Enhance Agricultural Efficiency and Productivity:** Another objective of the project is to improve agricultural efficiency and productivity through the implementation of robotics. By automating labour-intensive tasks traditionally performed by manual labour, the Multipurpose Harvesting Robot system aims to streamline farming operations and reduce the reliance on human resources.

## 4.BLOCK DIAGRM

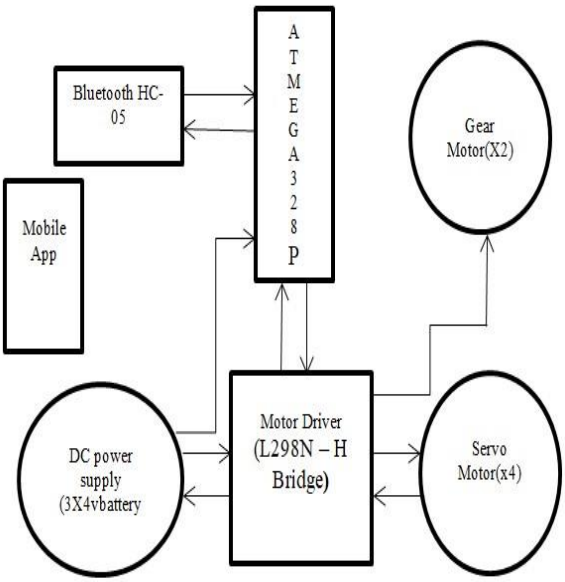


**Figure1**. Block Diagram of Multipurpose Harvesting Robot For Agriculture

## 5.CIRCUIT DIAGRAM

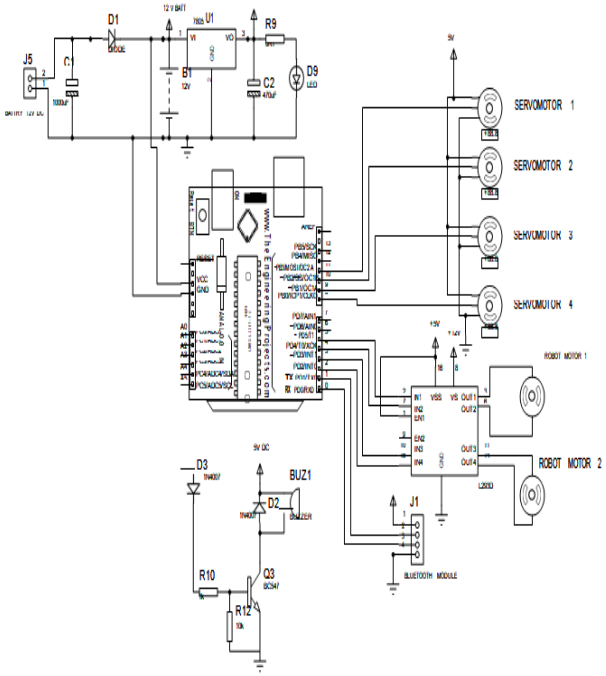


**Figure2**. Circuit Diagram of Multipurpose Harvesting Robot For Agriculture

## 6.HARDWARE REQUIRED

1:-ARDUINO UNO R3: -


**Figure 3.** Arduino UNO R3 Board

The Arduino Uno R3 with ATmega328P is a popular microcontroller board that is widely used in the field of electronics and prototyping. It is based on the ATmega328P microcontroller, which is a low-power, high-performance 8-bit AVR RISC-based processor. The board features 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal oscillator, a USB connection for programming and communication, an ICSP header for in-circuit programming, and a reset button

2.HC05 Bluetooth Module:

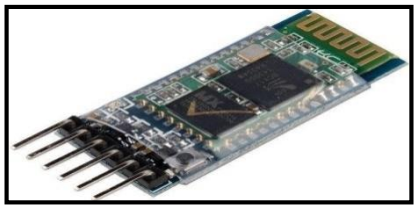

**Figure4**. HC05 Bluetooth Module

HC-05 is a Bluetooth module that is designed for wireless communication. This module can be used in a master or slave configuration. It is used for many applications like wireless headsets, game controllers, wireless mice, wireless keyboards, and many more consumer applications.

3.SERVO MOTOR :

**Figure5**. SERVO MOTOR

The SG90 servo motor is a small and lightweight motor commonly used in hobbyist projects and small-scale robotics. It offers precise control and smooth movement with a 180-degree rotation range. With a voltage range of 4.8V to 6V, it provides a torque of around 1.8 kg/cm.

4.RECHARGEABLE LEAD-ACID BATTERIES:

**Figure 6**. RECHARGEABLE LEAD-ACID BATTERIES

A lead acid battery is a type of rechargeable battery that uses lead plates submerged in sulphuric acid to store and release electrical energy. A typical lead acid battery hasa voltage rating of 2 volts per cell, so a 4-volt lead acid battery would consist of two cells connected in series. A lead acid battery is a type of rechargeable battery that uses lead plates submerged in sulphuric acid to store and release electrical energy. A typical lead acid battery hasa voltage rating of 2 volts per cell, so a 4-volt lead acid battery would consist of two cells connected in series. Lead acid batteries are known for their reliability, low cost, and ability to provide high current output. They are commonly used in various applications such as automotive starting batteries, uninterruptible power supplies (UPS), electri c vehicles, and backup power system

5.GEAR MOTOR:

**Figure 7**. GEARMOTOR

This motor directly converts electrical energy from the battery to mechanicalenergy to rotate the wheels. They use 9 V to 24 Volts as input. Gear in it helps to control speed and operate within a defined speed. A gear motor is an all-in-one combination of a motor and gearbox. The most important parameters in regard to gear motors are speed (rpm), torque (lb-in), and efficiency (%). In order toselect the most suitable gear motor for your application, you must first compute the load, speed, and torque requirements for your application.

## 7. FUTURE SCOPE

In addition to fault detection for industry, they can be used for storing objects, grading objects, and checking the presence of data. The performance of the actual design may vary from the estimated design.

In the future, robots can be added with LEDs of different colors to indicate fault bots. In addition to it, a buzzer can be added to it to give the sound signal. This prototype hence proves that the original idea can be put into action. Thishybrid technology robot will be increasing the safety and efficiency of a manufacturing plant and can be implemented in the industry with fast technology-based systems.

## 8. ADVANTAGES

- Cost savings
- Safety
- Real-time monitoring
- Increased efficiency
- Early Fault Detection
- Improved Safety

## 9. APPLICATIONS

- Safety conditions in industry and send messages to safety service units autonomously.
- These types of Robots can be used for sorting of objects in industry.
- Mesh configuration of the Bluetooth module can be used for knowing the status of the control panel or machines.
- They can be mostly used These robots are been used for monitoring in small-scale and medium-scale manufacturing units.

## 10.CONCLUSION

Multipurpose Harvesting Robot is a prototype model developed for the fruitsand vegetables harvesting. In result which would help immensely in cost cutting for labour's, time and also protect farmers from hazardous insects and snake bites while manual harvesting. Being Eco-friendly it also provides an edge over IC engine based harvesters, asit works on electrical system. The robot is manually operated withthe help of mobile through wireless connection. The Bluetooth module is used for wireless connection can be operated in the range up to 100m in open space while 60m-70m in closed space.

## REFERENCES

[1].Alenyorege, E. A., Islam, M. R., & Al Masum, S. M. (2021). A Review on IoT Applications in Agriculture: Recent Advancements and Challenges. In 2021 International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST) (pp. 318-323). IEEE.

[2]. Didarul Islam Sujon,Rummn Nasir,Jayasree Baidya, (et.al) (2018) Agribot: Arduino Controlled Autonomous Multi-Purpose Farm Machinery Robot for Small to Medium Scale International Conference on Autonomous System(2018).

[3]. Prof .Shweta Madiwalar,Sunita Meti,Nikila Domanal (et.al) (2020) A Survey on Solar Powered Autonomous Multipurpose Agricultural Robot.(IEEE).

[4].Manuel F. Silva, Filipe N. Santos, Luis F. Rocha (et.al)(2021): A Review of Pruning and Harvesting Manipulators (IEEE).

[5]. Abhijeet Kekane, Kamal Kishor, (et.al) (2023) making of agricultaral harvesting simpler and smarter with Iot.