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Implementation of Real Time Farmer Assistive Flower Plucking Robot

Ganavi T M[1] Manushree G[2] Meghana[3] Chaithra C[4] Anusha R Swamy[5]
[5]*Assistant Professor*
[1,2,3,4,5]*Department of Electronics & Communication Engineering*
[1,2,3,4,5]*Vidya Vikas Institute of Engineering & Technology, Mysuru, India*

Abstract— *Indians are celebrating a greater number of festivals than any other country. In festival celebrations, flowers are used as a prime element. Without flowers we will not celebrate even single festival. Most popular flowers in south India are Nerium oleander, jasmine, rose, etc. These flowers are demanded high among the flowers due to its fragrance. Another added advantage is its less cost. Though it has many advantages, certain drawbacks limit the business. One major problem is plucking flower at the right time. It is very difficult task because the workers must pluck the flowers before its blossom. So, they must pluck early morning around 4'o clock under weak light condition. At weak light condition workers may not be able to identify the insects and snakes. Because of this workers efficiency is reduced as well as some of them died. To overcome this problem, we proposed a device for plucking and packing of flower buds. The proposed device can be able to move forward, backward and rotate. Camera with light is used to capture the image of the flower bud. Image processing technique is used to match the image of the bud. Robot arm is used to pluck the bud. Container is used to pack the buds. The proposed device is a waterproof device.*
Key words: *IoT, Robot, Image Processing, Raspberry,Arm processor, Plucking.*

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I. INTRODUCTION

In today's modern world technology has been increasing day by day. As flowers are used as a prime element for the celebrations in India, flowers are grown in large scale. One of the most popular flowers in India is Rose. Over the past twenty years, as robotics has become a scientific discipline, research and development have concentrated on stationary robotic manipulators, primarily because of their industrial applications. In many situations, autonomous robots can provide effective solutions to grueling tasks. The robot is designed around the platform and uses several different sensors including camera to collect information about the flower environment to allow the robot to react accordingly robotic arm used here is to pluck the flower. The robotic wheel moves forward, backward, left, and right directions.

Robotic arms move left and right, directions. Also, the robotic arm grab and release the flower. This system is very beneficial for places where there is a need to grab and pluck a flower safely. If the special flower is being picked by a human, there is a risk of damage to the flower look which is avoided by this system The system provides a robotic arm that is controlled by IOT. The system uses microcontroller that is interfaced to the IOT module. This IOT module receives commands that are sent by the Blynk app. As soon as the user give the commands, it sent to the IOT.

II. METHODOLOGY

The working of model will be divided into 2 parts.

Detection Part: In first part, create a database of rose flower images to train the model. Here take 10,000 images of rose flower as input to the pre-trained model. The raspberry pi will be trained to detects the rose flower. The input can be captured by the camera or give video of the flower. The pi camera captures the image and sends to raspberry pi. The input image will be compared with existing dataset and if the image matches the dataset, then displays as rose image otherwise it shows image is not found.

Robotic Movement part: In second part, develop and control movement of the robot. For movement of robot, it has the two sections are movement of wheel and movement of robotic arm. The robotic wheel movement controlled by the 4 DC motors. DC motor is used to control the movement of the base of the robot. The robotic arm controlled by two DC motors. The ESP8266 microcontroller to which all the robotic car motors and ARM motors are connected and using 2 different motor drivers to control the car and arm separately. Fig 1 shows the block diagram of flower plucking robot.

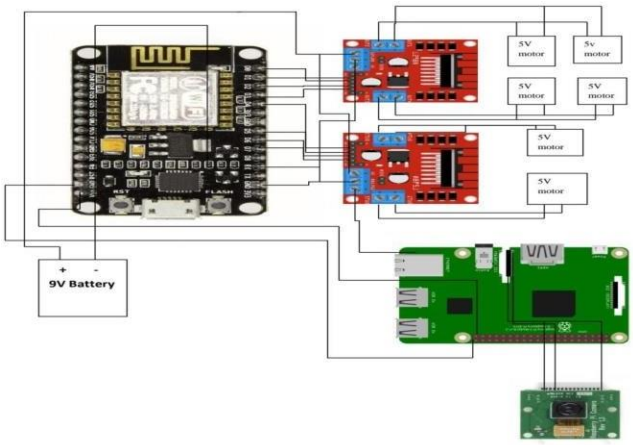

Fig 1: Block diagram of flower plucking robot.

This system is not automated it must be controlled by the users. By using BLYNK software it can connect to Node MCU module by just giving the token address of our project which is generated by the Blynk server for the project. Once all the set up in the Blynk server is done we can just give the token address and project name to the esp8266, to connect the esp8266 model to Blynk server. Must provide internet service to the esp8266 but just providing the hotspot from the mobile phone or the router, once sp8266 connected to the internet it will just go to the Blynk server by taking the token address and project name. After connecting to the server user can control the robot by just pressing the buttons provided in the Blynk server to move the robotic wheel forward, backward, left, and right buttons. To move the robotic arm, there are buttons left, right, up, down, buttons. Also have the buttons to grab the things and buttons to realize the grabbed things these all buttons are present in the Blynk server so user can just control the robot wirelessly. After getting the command from the remote user, robot extends the arm of it and plucks the flower buds. Flower buds are collected safely.

i. NodeMCU

The NodeMCU (Microcontroller unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

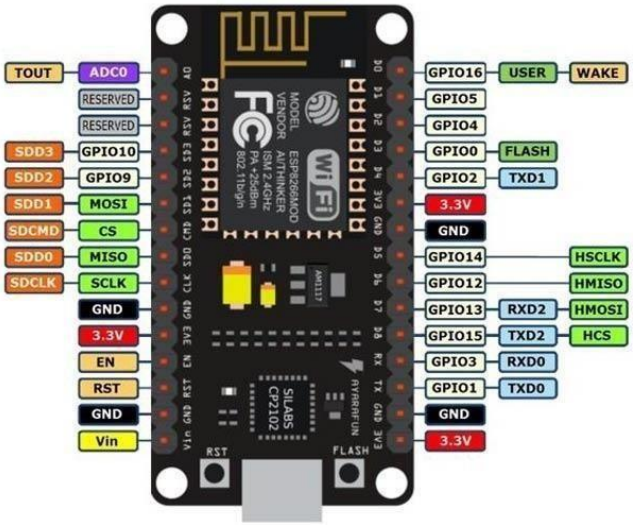

Fig 2: NodeMCU ESP8266 pins

ii. Raspberry Pi

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boosting a 64- bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT.

Fig 3: Raspberry Pi

iii. Motor controlled drivers L293D

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoides, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input.

Fig 4: L298N motor driver

iv. DC Brushless Geared Motor

A brushless DC electric motor (BLDC motor or BL motor), also known as electronically commutated motor (ECM or EC motor) and synchronous DC motors, are synchronous motors powered by direct current (DC) electricity via an inverter or switching power supply which produces electricity in the form of alternating current (AC) to drive each phase of the motor via a closed loop controller.

Fig 5: DC Brushless Geared Motor

v. Blynk Application

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things the Blynk application is shown in Figure 6.

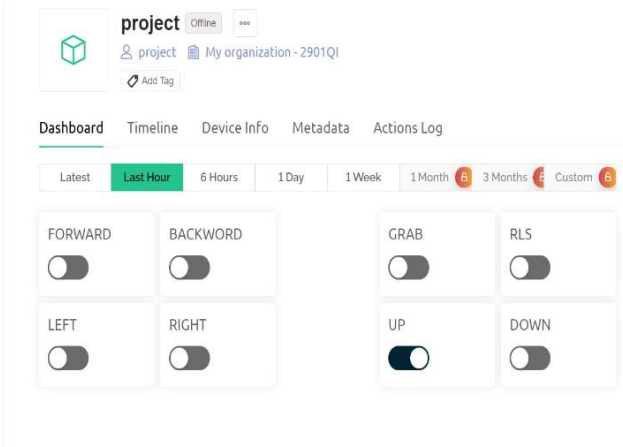

Fig 6: Blynk Application

Fig 7: Blynk console contain template ID, tokenaddress.

vi. Pi Cam

The Raspberry Pi has had a connector on it to attach a camera to the GPU (the Video Core 4 Graphics Processing Unit on the Raspberry Pi). This connection uses the CSI -2 electrical protocol and is a standard used in most mobile phones. I t is an extremely fast connection, which on the Raspberry Pi can send 1 080p sized images (1 920x1 080 x1 0bpp) at 30 frames per second, or lower resolution at even higher frame rates.

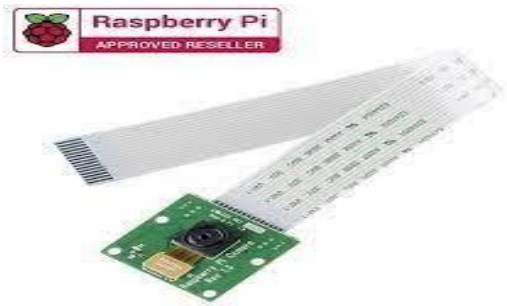

Fig 8: Pi Cam

vii. Robotic Arm Design

A degree of freedom is a joint on the arm, a place where it can bend or rotate or translate. We can typically identify the number of degrees of freedom by the number of actuators on the robot arm (in case of serial arms). The gripper is often complex with multiple DOF or can be a toll for welding etc., so for simplicity it is treated as separate subsystem in basic robot arm design.

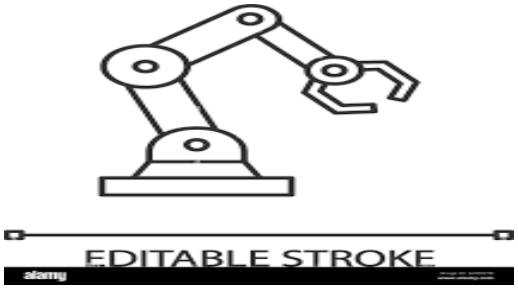

Fig 9: Robotic Arm

viii. Arduino IDE

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards.The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++.

Fig 10. Arduino uno

III. RESULT & CONCLUSION

A. Result:

Real-time Farmer Assistive Flower Plucking Robot implementation using Raspberry Pi microcontroller with camera to capture images. The image processing technique is used to match the image, the robotic arm is used to pluck the flower buds, and the buds are collected in a container. The proposed model is as shown in Fig 11.

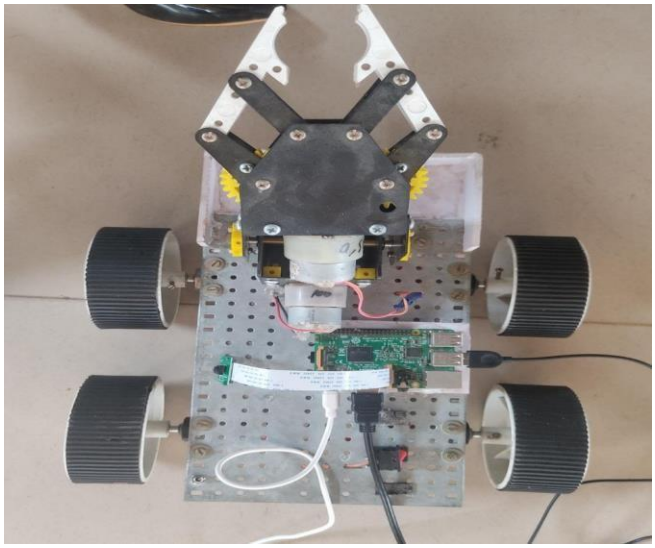

Fig 11: Proposed Model

The Robotic arm is placed on the front end of the Robot vehicle. Robot uses ESP32 as Wi-Fi module, Motor controlled driver L293D, DC motors and raspberry pi B+ are placed. Robot control model by the IOT online communication through mobile Phone. The ESP32 serves as the controller unit to the system. The motor-controlled drivers, raspberry pi and battery are directly interfaced to the controller. The motor-controlled driver has two channels where each channel relates to 2 geared motors. Is to pluck flowers with a robotic arm. The robotic arm can level up and down for flower plucking at different cutting levels, and it can pluck flowers in both clockwise and anticlockwise directions. It ensures that only authorized individuals operate the robot.

B. Conclusion:

Agriculture provides a living for approximately 58% of the Indian population. India's floriculture industry is the world's second largest. Floriculture production and trade have increased steadily over the last decade. Flower plants are the most profitable plants in India, with one of the highest returns. The most significant advantage is that flowers require far less land and water to grow. The net profit from flower cultivation can be 10 to 20 times that of most field crops per unit of land. If the floriculture must cut the flower when it reaches certain cutting levels, then manpower is required to reduce the work pressure and time consumption of the floriculturist, which aids in the development of a flower plucking robot. Flower plants will have harmful thorns that will harm flower plucking laborers while they pluck the flowers. This risk can be reduced by using an IoT- controlled robot.

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