IoT BASED AGRICULTURAL ROBOTIC WATER SPRINKLER

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***Abstract* — we created the IoT-based agricultural robotic water sprinkler project to make life easier and more convenient for humans in the era of advanced electronics. This technology makes use of a robot that goes through the field while spraying water all over it. The obstacle identification feature on this robot is entirely autonomous. We have created an android-based robot application that can be used to control it manually. In this application, we manually move the robot left, right, forward, and backward. Improvement of the farmer's function as an off-field observer will be taken more seriously, especially in light of emerging robotic systems.**

Keywords—plant, irrigation, water, sprinkler, robot

I. INTRODUCTION

Since agriculture employs more than 60% of the population and contributes around 7% of the country's GDP, it is a significant sector of the Indian economy. The foundation of both developed and emerging nations is agriculture. Without the farmer present, we are able to give water to the farm field. We used an IoT-based agricultural robot in this project. The models that are currently in use by farmers are insufficient to meet their needs.

Agriculture has undergone a revolution thanks to IoT. This project primarily focuses on the numerous IoT applications in agriculture, like using sensors to sprinkle water. It facilitates the creation of robotic water sprinklers, which helps with the effective use of labor. Microcontroller and sensors are connected in the Internet of Things.

II. RELATED WORK

[1]. Automated plant watering system by Ayan Pahwa

The majority of individuals are too sluggish in the summer to regularly water the potted plants in their rooftop gardens. This section explains how to construct a quick and easy automatic plant watering system that takes just a few hours. It is an autonomous plant watering system powered by Arduino that measures soil moisture. Six different potted plants can be watered using the Arduino UNO board. Using the Arduino mega 2560 board, which has more analogue input pins, you can water even more plants by adding a few more lines of code. Additionally, you can use the Twitter library and an Ethernet or Wi-Fi shield to tweet messages like, "I need water," "The tank is empty, replenish it," "Thanks for the water," and other phrases from the perspective of your plants.

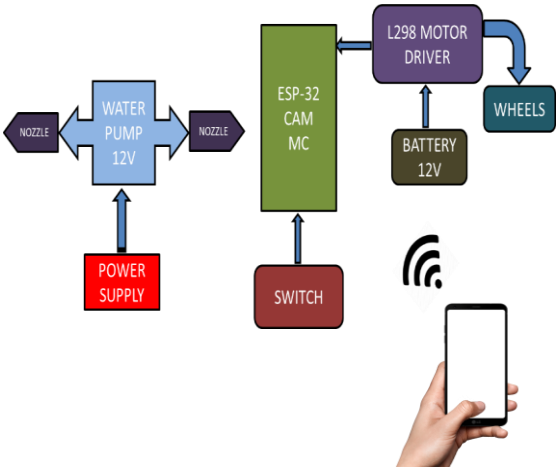
[2]. Plant watering robot “Plant O Bot” by Devdutt, Vimlesh Singh & Priyanka Bansal

Plant O Bot is a garden and plant acre-taker. Without humans, it will take care of our garden and the plants. If we are gone for a while, it also looks after our garden. Because the robot is powered by solar panels, which get their energy straight from the sun, it may also be employed in huge fields or gardens. It can operate continuously for up to four hours, and while working, its solar panel always tracks the sun. There is a low battery indicator on the robot to view the battery's status. For connecting the robot, an Android-based application is used. Ultrasonic sensors assist in identifying obstacles and communicate the signal for turning right or left to the controller. Turning and automatically moving in the shortest path are quite simple.

[3]. IoT based smart irrigation system using soil moisture sensor and ESP8266 NodeMCU by Abhimanyu pandit

The majority of farmers use huge tracts of land, making it quite challenging to get to all of their corners and keep track of them. Uneven water sprinkler is a possibility occasionally. This causes crops to be of poor quality, which further causes financial losses. The smart irrigation system in this situation, which uses cutting-edge IoT technology, is beneficial and makes farming easier. The potential for automating the entire irrigation system with the smart irrigation system is enormous. Here, we're constructing an Internet of Things-based irrigation system utilizing a DHT11 sensor and an ESP8266 NodeMCU module. In addition to automatically watering the plants based on the soil's moisture content, it will also send information to Things peak’s server to monitor the state of the land. The system will be made up of a water pump that will be utilized to sprinkle water on the land based on factors including moisture content, temperature, and humidity.

III. METHODOLOGY



IoT-based agricultural robotic water sprinkler, as seen in the block diagram above. The sensors, microcontroller, wi-fi module, IoT applications, and android applications can all be used to manually or automatically control irrigation.

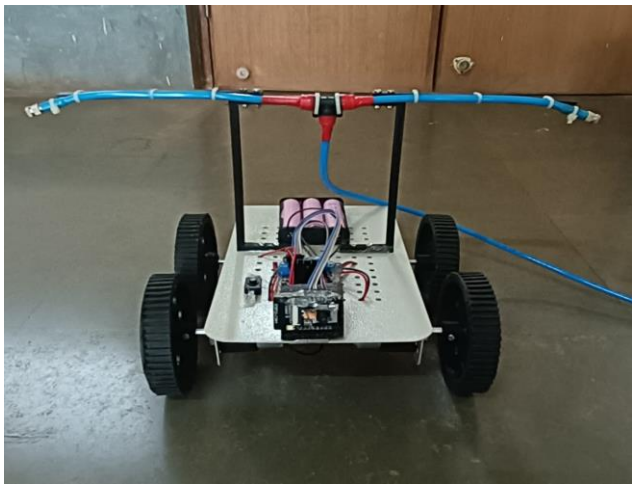
The robot is managed using an ESP-32 CAM microcontroller. It includes a camera, an integrated Wi-Fi module, etc. It can be connected to a mobile Wi-Fi network and managed using an IP address on a web server page. The camera has 2MP and 520 kb SRAM. This camera has the ability to take pictures as well as recognize and detect faces. With a minimum power of 3.3 volts and a maximum power of 5 volts, it includes two power pins. For proper operation, 5v power is supplied.

High voltage, high current, dual full bridge motor is L298 Motor Driver. For L298N and L298D, respectively, the needed external voltage ranges from 4.5 to 36 volts to operate the DC motor. L298N and L298D have operating voltages of 4.7 to 7 and 4.5 to 5.5 volts, respectively, for ICs.

The 12v battery was then added. ESP32 cam receives 5 volts from it via the L298 motor driver. Then, we have 4 wheels, each of which has 2 DC motors. In this, one DC motor is attached to one side of the wheels. Another DC motor is attached to the opposite side.

We have positioned a stand such that a pipe connection is made using a nozzle on the vehicle chassis. Also, the sprinklers at the two ends were fixed. The pipe is submerged on one side of the tank.

IV. RESULT AND CONCLUSION



We developed a low-cost water sprinkler robot for plant watering. Our project was an impressive undertaking in the sector of agricultural businesses. With this initiative, the cost of the issue has decreased. Watering plants or crops while seated in one spot is quite practical for individuals. Due to the extreme heat in the summer, laborers avoid working in the fields. At this point, a person can benefit from our project paradigm in various ways. Robots can walk on a variety of surfaces, and if they come across any obstructions in their path, they make sure to change their course and move in a different direction. We intended for our model to be this way.

V. FUTURE SCOPE

The goal of this product is to demonstrate to framers that less labour is required to complete the task. The near future will still require a significant amount of work, though. Both WI-FI and Bluetooth functionality are incorporated into the ESP-32. This model can be created for various types of crops and acreage, etc.

This prototype can be used to sprinkle water and pesticides. Our model can be programmed and developed in accordance with our needs. We can maintain the sprinkler's water flow while minimizing water waste. We can design our model so that it can run on renewable resources like sunlight, wind, and water. It is resistant to all types of weather. Our concept is used to water sprinklers so that we can create many models with additional features for various jobs.

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