GARDEN MONITORING SYSTEM

Submitted in partial fulfillment of the requirements

for the degree of

Bachelor of Technology

in

ELECTRONICS AND COMMUNICATION ENGINEERING

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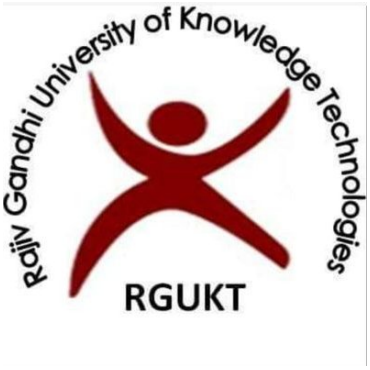

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RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOGIES

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Declaration

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Abstract

There will be no one in the world, who hates garden. We all will have a garden at our home. There will be physically challenged persons in some families. They can't move as normal people. To water the plants, we should need active person, who can walk. But that active person won't be available at home only to take care of garden as he is having many other works to do, to survive in the present society. Our project tells that we can monitor the garden without moving. which means Our project proves that a person, who can't walk, can also be a gardener. Our bot will monitor the garden using ESP32 CAM. It sends the video footage to our mobile. With the help of that video, we can control the bot movement with our mobile. We used soil moisture sensor to test the moisture levels. Based on these readings water pump will be operated automatically using Arduino. To dip this soil moisture sensor, we used robotic arm (using servos). We used L2938N motor driver to drive the bot.

Contents

Chapter 1

INTRODUCTION

1.1 *Problem statement*

We all will have a garden at our home. The active people, who can able to walk, will go to work outside.The inactive people, who can't able to walk(like physically challenged people,old people), will stay at home.They also have some small wishes like watching the garden, watering the plants... In real life they can't fulfill their wishes due to their disabilities. On the other side, there will be no one to monitor the garden specifically.

1.2 *Proposed Solution*

We related these both situations and made an effective solution. Our project can fulfill the dreams of inactive people. Actually a disabled person can't be a gardener.But, we can make a disabled person as a gardener.
No plant will die in the garden due to lack of water

1.3 *Technology implementation*

Here We used internet of things (IOT) technology. IOT is playing a key role in our present society and it will be everything in our future due to its efficiency and effectiveness of doing things.The Internet of Things (IoT) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.Over the past few years, IoT has become one of the most important technologies of the 21st century. We used Arduino uno to control the water pump automatically based on soil moisture sensor readings. We used ESP32 CAM to collect the video. Based on the video, we will operate the bot movement and hand movement with our mobile.

1.4 *Impact with this project*

Society believes that a person, who cant walk, is of no use. We broke that belief. No plant will die due to lack of water. Without moving from our bed, we can take care of our garden. This project will make a huge impact on physically challenged people's life (like .., they are not less than others in doing things).

Chapter 2

COMPONENTS USED

We have used various components in this project. We combined all the components together to get the most accurate and desirable output.

2.1 *ESP32 CAM*

The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera and provides onboard TF card slot. The ESP32-CAM can be widely used in intelligent IoT applications such as wireless video monitoring, WiFi image upload, QR identification, and so on.

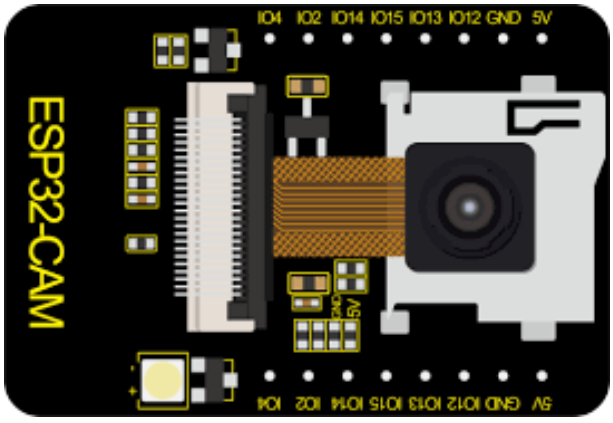

Figure 2.1: ESP32 CAM

2.2 *ARDUINO UNO*

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

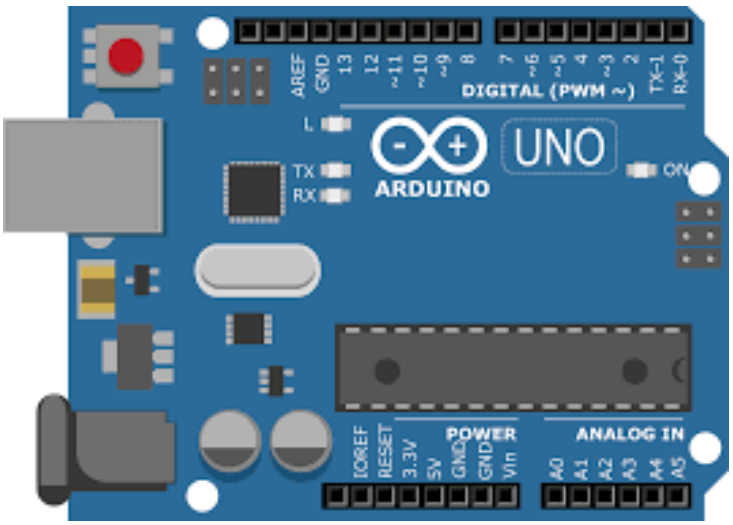

Figure 2.2: Arduino Uno

2.3 *L298N MOTOR DRIVER*

L298N module is a high voltage, high current dual full-bridge motor driver module for controlling DC motor and stepper motor. It can control both the speed and rotation direction of two DC motors. This module consists of an L298 dual-channel H-Bridge motor driver IC. This module uses two techniques for the control speed and rotation direction of the DC motors. These are PWM – For controlling the speed and H-Bridge – For controlling rotation direction. These modules can control two DC motor or one stepper motor at the same time.

Figure 2.3: L298N Motor Driver

2.4 *DC MOTORS*

A DC motor or direct current motor is an electrical machine that transforms electrical energy into mechanical energy by creating a magnetic field that is powered by direct current. When a DC motor is powered, a magnetic field is created in its stator. The field attracts and repels magnets on the rotor; this causes the rotor to rotate. To keep the rotor continually rotating, the commutator that is attached to brushes connected to the power source supply current to the motors wire windings.

Figure 2.4: DC motor

2.5 *SERVO MOTOR*

A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just made up of a simple motor which runs through a servo mechanism.

Figure 2.5: Servo motor

2.6 *SOIL MOISTURE SENSOR*

The soil moisture sensor (SMS) is a sensor connected to an irrigation system controller that measures soil moisture content in the active root zone before each scheduled irrigation event and bypasses the cycle if soil moisture is above a user- defined set point. Soil moisture sensors, like rain sensors, are considered rain shut off devices, but while rain sensors measure evapotranspiration rates, soil moisture sensors measure real time soil moisture.

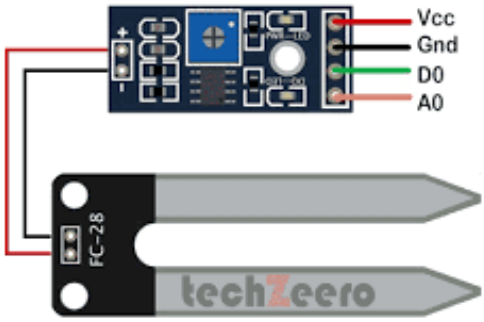

Figure 2.6: Soil Moisture Sensor

2.7 *WATER PUMP*

Water pumps are mechanical or electromechanical devices that are designed to move water through pipes or hoses by creating a pressure differential. The two most common types of pumps used for pumping water are centrifugal pumps and positive displacement pumps. Centrifugal pumps, as their name implies, make use of centrifugal force to take water that enters an impeller and uses the rotational energy generated from spinning that impeller to produce hydrodynamic energy.

Figure 2.7: Water pump

2.8 *CHASIS KIT*

4-Wheel Robot Chassis Kit, an easy to assemble and use robot chassis platform. The Chassis kit provides you with everything you need to give your robot a fast four wheel drive platform with plenty of room for expansion to add various sensors and controllers. Just add your electronics - Arduino/Raspberry Pi and Motor Driver and you can start programming your robot. It offers a large space with predrilled holes for mounting sensors and electronics as per your requirement. This robot chassis lets you get your mechanical platform ready in minutes and quickstart your robot building process.

Figure 2.8: Chasis kit

2.9 *LI-ION BATTERIES*

A lithium-ion battery is a type of rechargeable battery that is charged and discharged by lithium ions moving between the negative (anode) and positive (cathode) electrodes. (Generally, batteries that can be charged and discharged repeatedly are called secondary batteries, whereas disposable batteries are called primary batteries.) Because lithium-ion batteries are suitable for storing high-capacity power, they are used in a wide range of applications, including consumer electronics such as smartphones and PCs, industrial robots, production equipment and automobiles.

Figure 2.9: Li-ion battery

2.10 *SWITCH*

A Single Pole Single Throw (SPST) switch is a switch that only has a single input and can connect only to one output. This means it only has one input terminal and only one output terminal. A Single Pole Single Throw switch serves in circuits as on-off switches. When the switch is closed, the circuit is on. When the switch is open, the circuit is off. SPST switches are, thus, very simple in nature. SPST switches are commonly used in a variety of electrical circuits and applications, such as turning on and off lights, fans, and other appliances. They can also be used to control the flow of electricity to different parts of a circuit, or to switch between different circuits altogether.

Figure 2.10: Switch

2.11 *JUMPER WIRES*

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard,

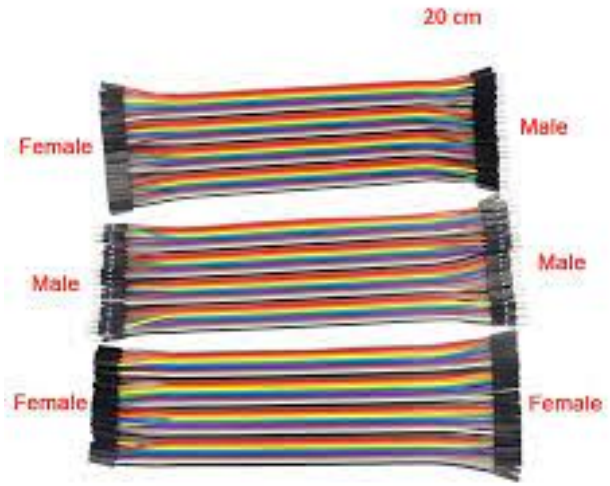

Figure 2.11: Jumper Wires

Chapter 3

BLOCK DIAGRAM

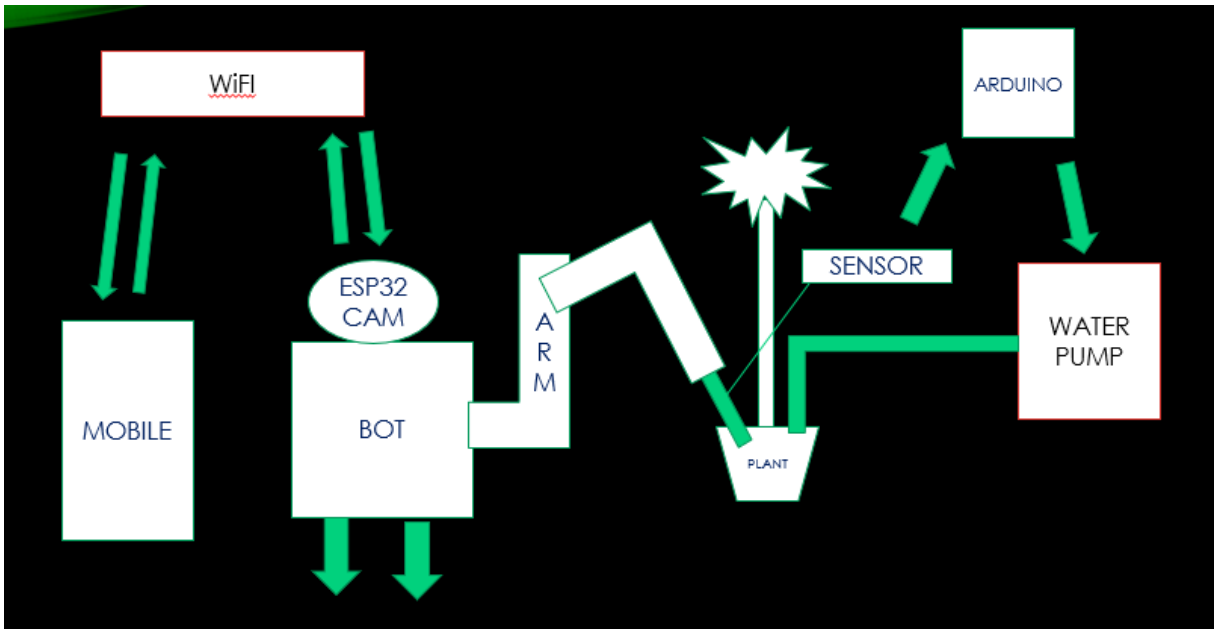

Figure 3.1: Illustration of entire process.

Chapter 4

PROCEDURE

1. assemble the chasis car by connecting 4 dc motors with the L298N motor driver.

2. Upload the code into ESP32 CAM using Arduino Uno by connecting the pins as follows

ESP32 Cam Pins	Arduino Uno pins
VOR	Rx
VOT	Tx
5V	5V
GND	GND
IO0->GND	
	Reset->GND

Figure 4.1: ESP32 CAM –> Arduino Uno

3. Connect the ESP32 CAM with L298N motor driver.

ESP32 Cam Pins	L298N Driver pin
IO2	enA
IO12	IN1
IO13	IN2
VOT/IO1	IN3
VOR/IO3	IN4
IO2	enB
5V	5V
GND	GND

Figure 4.2: ESP32 CAM –> L298N motor driver

4. connect the servo motor with ESP32 CAM.
    a. Provide 5V and GND to the servo motor
    b. attach the SIGNAL pin of servo motor to IO14 pin of ESP32 CAM.
5. connect the soil moisture sensor and water pump with Arduino Uno.
    a. Provide 5V and GND to the Soil moisture sensor.
    b. attach A0 pin of soil moisture sensor to A0 pin of Arduino Uno.
    c. attach GND pin of water pump with GND pin of Arduino uno.
    d. attach VCC pin of water pump with 4th pin of Arduino uno

Chapter 5

RESULTS

1. Bot moved successfully by controlling from mobile based on the video we get. Managed to move the bot from the corner of garden to the plant,which we want to water, without our presence in garden.
2. Water pump turned on/off automatically based on the moisture readings, which were taken by soil moisture sensor.

Chapter 6

CONCLUSIONS

1. Successfully monitored the whole garden from sitting at one place and watered the plants in garden.
2. Physically challenged person became a gardener with the help of our project and fulfilled their dreams.
3. No active person is required to monitor the garden specifically. We should not be worried of garden even though we are not at home.

Chapter 7

REFERENCES

1. J. Kumar, N. Gupta, A. Kumari And S. Kumari, "Automatic Plant Watering And Monitoring System Using Nodemcu," 2019 9th International Conference On Cloud Computing, Data Science Engineering (Confluence), Noida, India, 2019, Pp. 545-550

2. Sambath, M., Prasant, M., Bhargav Raghava, N., Jagadeesh, S. (2019). IoT Based Garden Monitoring System. Journal Of Physics: Conference Series, 1362, 012069. Doi:10.1088/1742- 6596/1362/1/012069

3. Mohamad Syafiq Mohd Rafi , Nur Irwany Ahmad , Diyya Hidayah Abd Rahman , Nazrul Azril, 2019, Monitoring And Controlling Water Pumping System Using IoT For Agriculture Purpose, Journal Of Advanced Research In Applied Mechanics, Issue 1 (2019) 1-15.

4. Ardiansah, Irfan Bafdal, Nurpilihan Suryadi, Edy Bono, Awang. (2020). Greenhouse Monitoring And Automation Using Arduino: A Review On Precision Farming And Internet Of Things (IoT). International Journal On Advanced Science, Engineering And Information Technology. 10. 703. 10.18517/IJASEIT.10.2.10249.

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