DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE & ISO 9001:2008 Certified) Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade, Shavige Malleshwara Hills,Kumaraswamy Layout, Bengaluru-560078.

MINI PROJECT REPORT

On

WAUTO DISPENSE

Submitted By:

BOYA UDAY KUMAR (1DS22AI009)
GURUNATH GOWDA (1DS22AI016)
SAMARTH DS (1DS22AI044)
VSS SAKETH REDDY (1DS22AI058)

Guide: RASHMI K

2022-2023
Department of Artificial Intelligence and Machine Learning
Dayananda Sagar College of Engineering Bangalore-78

DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE & ISO 9001:2008 Certified) Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade, Shavige Malleshwara Hills,Kumaraswamy Layout, Bengaluru-560078.

CERTIFICATE

This is to certify that the Mini Project work done on **"WAUTO DISPENSE"** is being submitted by **BOYA UDAY KUMAR (1DS22AI009), GURUNATH GOWDA (1DS22AI016), SAMARTH DS (1DS22AI044), VSS SAKETH REDDY (1DS22AI058)** is the record of the Mini Project carried out by him/her under our supervision. This report is submitted towards the partial fulfilment of 2nd semester of Bachelor of Engineering in Artificial Intelligence and Machine Learning during the academic year 2022-2023. It is certified that all the suggestions or corrections indicated for internal assessment have been incorporated in the report. This Mini Project Report has been approved as it satisfies the academic requirements under the rules prescribed for the Bachelor of Engineering Degree.

Signature of HOD

Dr. Vindhya P Malagi
(HOD, Dept. of AI & ML)
DSCE, Bengaluru

Signature of Principal

Dr. B G Prasad
(Principal)
DSCE, Bengaluru

DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE & ISO 9001:2008 Certified) Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade, Shavige Malleshwara Hills,Kumaraswamy Layout, Bengaluru-560078.

DECLARATION

We, **Boya Uday Kumar (1DS22AI009), Gurunatha Gowda (1DS22AI016), Samarth DS (1DS22AI044), VSS Saketh Reddy (1DS22AI058)** students of 2 Semester **B.E in Artificial Intelligence and Machine Learning from Dayananda Sagar College of Engineering WAUTO DISPENSE** declare that the Mini Project entitled is a bonafide work in a partial fulfilment of academic requirement of Bachelor of Engineering during the academic year 2022- 2023.

Team Members

BOYA UDAY KUMAR (1DS22AI009)

GURUNATH GOWDA (1DS22AI016)

SAMARTH DS (1DS22AI044)

VSS SAKETH REDDY (1DS22AI058)

Abstract

The abstract focuses on automated water dispensers, technologically advanced devices designed to provide convenient access to safe drinking water. These dispensers utilize sensors and microcontrollers to monitor water quality and quantity, while also offering user-friendly interfaces for customization. With the ability to reduce plastic waste by encouraging reusable containers and minimizing human contact for improved hygiene, these dispensers find applications in public spaces, educational institutions, workplaces, and homes. The integration of IoT technology enables remote monitoring and maintenance, making them a promising solution for ensuring clean water access, environmental sustainability, and enhanced user convenience.

Acknowledgement

We are pleased to have successfully completed the project **WAUTO DISPENSE**. We thoroughly enjoyed the process of working on this project and gained a lot of knowledge doing so.

We would like to take this opportunity to express our gratitude to **Dr. B G Prasad** Principal of DSCE, for permitting us to utilize all the necessary facilities of the institution.

We also thank our respected **Dr. Vindhya P Malagi**, HOD of Artificial Intelligence & Machine Learning, DSCE, Bangalore, for her support and encouragement throughout the process.

We are immensely grateful to our respected and learned guide, **Rashmi K,** Assistant Professor, DSCE For their valuable help and guidance. We are indebted to them for their invaluable guidance throughout the for their valuable help and guidance. We are indebted to them for their invaluable guidance throughout the process and their useful inputs at all stages of the process.

We also thank all the faculty and support staff of Department of Artificial Intelligence& Machine Learning, DSCE. Without their support over the years, thisw ork would not have been possible.

Lastly, we would like to express our deep appreciation towards our classmates and our family for providing us with constant moral support and encouragement. They have stood by us in the most difficult of times.

Team Members

BOYA UDAY KUMAR (1DS22AI009)

GURUNATH GOWDA (1DS22AI016)

SAMARTH DS (1DS22AI044)

VSS SAKETH REDDY (1DS22AI058)

Table of Contents

Table of Figures

List of figures

Chapter 1

Introduction

1.1 Overview

The Automated Water Dispenser Project is an innovative integration of IoT and sensor technology to provide an efficient and user-friendly solution for water dispensing. In a world where water conservation is paramount, this project aims to minimize water wastage while enhancing user convenience.

1.2 Problem Statement

The project aims to build and implement an automated water dispenser system using IoT Technologies ,The system must be capable of measuring and dispensing the right amount of water precisely.

Additionally, based on the amount of water consumed ,it must calculate the amount of water and establish the related cost. This project addresses these issues by automating the water dispensing process and offering a reliable method for tracking water usage.

1.3 Objectives

- **Automated Dispensing:** A device that can recognise and guage the size of the container being applied to the dispenser.
- **Size and Volume Calculation:** Calculate the the container's size and volume using formula or algorithms.
- **Accurate Water Dispensing:** Determine the correct amount of water to dispense using the container's measurements.
- **Accurate Cost Detection:** Using accurate measurements, the cost can be determined.
- **Water Conservation:** Encourage water conservation by ensuring precise water filling and minimizing wastage.

1.4 Advantages & Applications

Advantages

- **Efficiency**: Precise water dispensing eliminates overflows and underfills, reducing water wastage.
- **Cost Savings:** Real-time monitoring helps users manage their water consumption, ultimately saving costs.
- **User-Friendly:** The system is easy to use, making it accessible to people of all ages, no need to lift or tilt the bottle, avails water easily from the jar with a single touch.
- **IoT Connectivity:** Optional IoT connectivity enhances remote control and monitoring.

Applications

- **Homes:** Ideal for residential use, ensuring efficient water filling for various containers.
- **Offices:** Promotes water conservation and facilitates accurate billing in workplace environments.
- **Commercial Spaces:** Suitable for cafes, restaurants, and public spaces where water dispensing accuracy is vital.
- It is designed to make life easier than manually operated systems.
- The silicon tube present inside requires cleansing periodically for safe and easy water dispensing.

1.5 Organization Of Report

This report is organized into the following sections:

- **Introduction:** Providing an overview, problem statement, objectives, advantages, and the report's structure.
- **Project Description:** Detailing the project's components, sensors, and hardware.
- **Methodology:** Explaining the approach, algorithms, and programming languages used.
- **Results:** Presenting the project's outcomes, including efficiency and cost-effectiveness.
- **Challenges:** Discussing the challenges faced during implementation.
- **Societal Relevance:** Analyzing the project's significance in terms of water conservation and user convenience.
- **Conclusions:** Summarizing the project's achievements and future potential.
- **Appendices:** Including code snippets, circuit diagrams, and additional technical details.

Chapter 2

System Requirements

2.1 Software Requirements

Arduino Sketch: Write an Arduino sketch (code) to control the entire system. This includes reading sensor values, controlling the pump and , interacting with the LCD display.

We are using Arduino Libraries and functions to make sure that the functionality of the components is proper.

2.2 Hardware Requirements

Arduino Uno: The microcontroller to control the dispenser's various functions.

Water Storage Tank: A container to hold the water supply.

DC Air Pump: A small air pump to move water from the storage tank to the dispensing nozzle.

Flow Sensor: A flow sensor to measure the amount of water being dispensed. This could be an external component or integrated into the pump.

Ultrasonic Sensor: An ultrasonic sensor to detect the presence of a container under the nozzle.

LCD Display: An LCD screen to display information such as water level, selected dispensing amount, and instructions.

Relay: A relay is a electro magnetic switch that is commonly used to control high-power or high-voltage circuits using a low-power signal.

Chapter 3

System Design

Pin Diagram/System Diagram

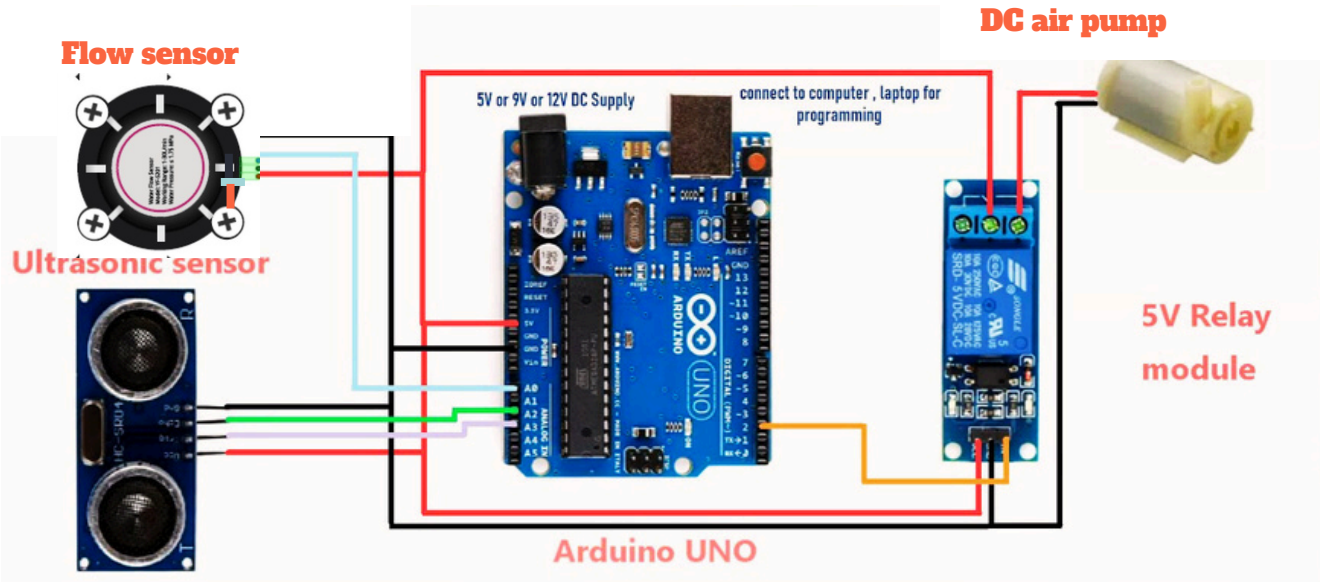

Figure 3.1 – Pin Diagram of WAUTO DISPENSE

Figure 3.1 – Pin Diagram of Wauto Dispense is designed to automate the process of watering plants based on their moisture levels. It utilizes various components and a microcontroller to control the irrigation system. The circuit diagram illustrates the connections between these components. The NodeMCU is connected to the soil moisture sensor to receive moisture level readings. Based on the readings, the NodeMCU determines whether to activate the water pump relay.

3.1 Implementation

```
#include <Wire.h>
#include <LiquidCrystal.h>
#include "LCD_Functions.h"

//WATER DISPENSER
#define trigger 5
#define echo 4
#define Relay 6

LiquidCrystal lcd(7, 8, 12, 11, 10, 9);

float time=0,distance=0;

volatile int flow_frequency; // Measures flow sensor pulses
unsigned int mL_sec; // Calculated litres/hour
unsigned char flowsensor = 3; // Sensor Input
unsigned long currentTime;
unsigned long cloopTime;

void flow () // Interrupt function
{
  flow_frequency++;
}

void setup()
{
Serial.begin(9600);
```

```
pinMode(trigger,OUTPUT);
pinMode(echo,INPUT);
pinMode(Relay,OUTPUT);

delay(2000);

pinMode(flowsensor, INPUT);
digitalWrite(flowsensor, HIGH); // Optional Internal Pull-Up
Serial.begin(9600);
attachInterrupt(0, flow, RISING); // Setup Interrupt
sei(); // Enable interrupts
currentTime = millis();
cloopTime = currentTime;

lcd.begin(16, 2);
lcd.print("Hello, World!");
}

void loop()
{
measure_distance();

if(distance<5)
{
  digitalWrite(Relay,LOW);
}
else
{
  digitalWrite(Relay,HIGH);
}

delay(500);
  currentTime = millis();
```

```
  // Every second, calculate and print litres/hour
  if(currentTime >= (cloopTime + 1000))
  {
    cloopTime = currentTime; // Updates cloopTime
    // Pulse frequency (Hz) = 7.5Q, Q is flow rate in L/min.
    mL_sec = (flow_frequency * 1000.0 / 3600.0); // (Pulse frequency x 60 min) / 7.5Q =
flowrate in L/hour
    flow_frequency = 0; // Reset Counter
    Serial.print(mL_sec, 2); // Print litres/hour
    Serial.println(" mL");
  }
}

void measure_distance()
{
 digitalWrite(trigger,LOW);
 delayMicroseconds(2);
 digitalWrite(trigger,HIGH);
 delayMicroseconds(10);
 digitalWrite(trigger,LOW);
 delayMicroseconds(2);
 time=pulseIn(echo,HIGH);

 distance=time*200/20000;
}
```

Chapter 4

Results

4.1 Components:

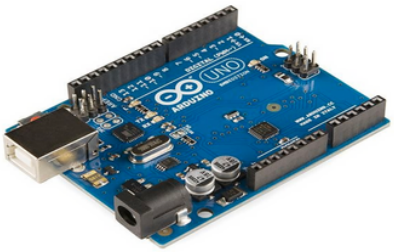

Figure 4.1 – Arduino UNO

The popular Arduino Uno microcontroller board is utilised in many IoT and electronics projects. It is based on the ATmega328P microcontroller and offers a flexible foundation for creating various electronic system prototypes. The Arduino Uno serves as the primary control component in the automated water dispenser project, managing the system's overall behaviour, interacting with sensors, and operating the solenoid valve.

Figure 4.2 – Ultrasonic water level sensor

An ultrasonic water level sensor emits ultrasonic sound waves and measures the time it takes for the waves to bounce back in order to determine the distance between the sensor and the water's surface.

Figure 4.3 – Jumper Wires

Jumper wires, also known as jumper cables or DuPont wires, are electrical wires with connectors at each end that are used to establish connections between electronic components on a breadboard or a circuit board. They provide a conveinent and flexible way to creat temporary or permanent eletrical connection in a project.

Figure 4.4 – Flow sensor

flow sensor is a hardware component used to measure the flow rate of a fluid, such as water, within a system. It provides information about the volume or rate of fluid passing through it. The automated water dispenser project uses a flow sensor to ensure precise measurement of the volume of water flowing through the device.

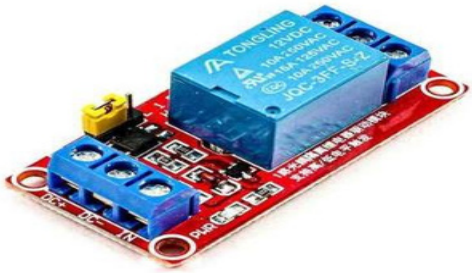

Figure 4.5 – Relay Module Photo by ElectroPeak

A relay is an electromagnetic switch that is commonly used to control high-power or high-voltage circuits using a low-power signal. It consists of a coil, an armature, and one or more sets of contacts

Figure 4.6 – Adapter

It is used to powerup the entire arduino UNO board and the circuit from the DC Source

4.2 Results

Figure 4.7 – LCD Display

The LCD is used to display the amount of water dispensed (in mL) and show the cost for that amount of water dispensed simultaneously.

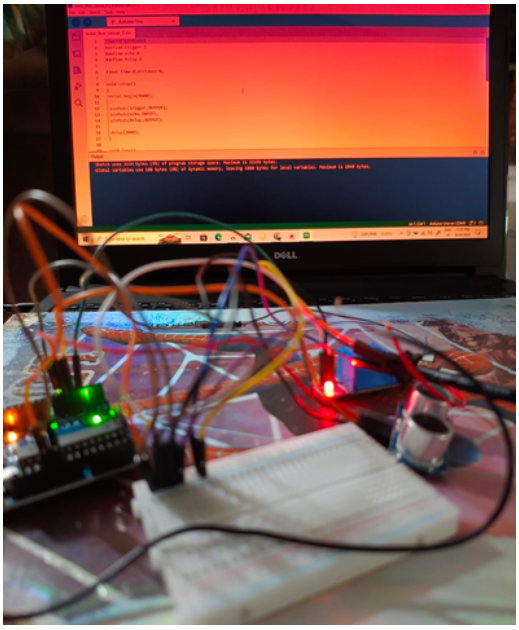

Figure 4.8 – Working Setup

The working setup diagram for Automated Water Dispenser using IOT and sensor technologies consists of Arduino UNO board, Ultrasonic Water Lever Sensors(HC-Sr04), Ultrasonic Distance Sensors(HC-SR04), Water Flow Sensors, Relay Switch, DC Air pump, BreadBoard and an LCD and a Power Supply Adapter(5V, 1A). These components are connected to both arduino and breadboards to enable proper functionality of the model and control water pump so that right amount of water gets dispensed.

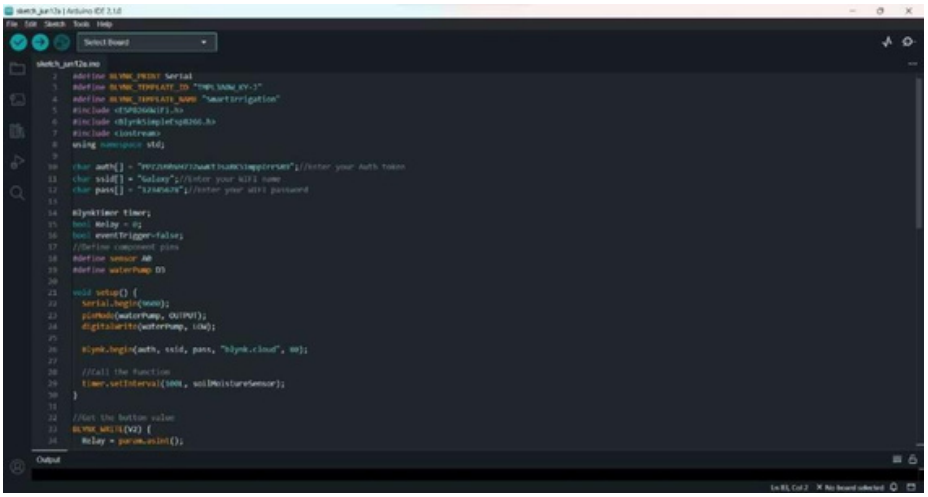

Figure 4.9 – Arduino IDE Code

The provided code snippet is for Automated Water Dispenser System using Arduino IDE. This code snippet includes all the libraries necessary for the project components to work accordingly. Some of the libraries included for this project to work are : [#include<Wire.h>, #include<LiquidCrystal.h>, #include "LCD_Functions.h".

References

[1] https://youtu.be/wEbGhYjn4QI?si=QPqjsqdQgsTQBtzU
[2] https://www.youtube.com/watch?v=-uoTlJc5hGI&t=101s
[3] https://www.youtube.com/watch?v=xXItEusqqEg
[4] https://www.youtube.com/watch?v=0qwrnUeSpYQ
[5] https://www.youtube.com/watch?v=IKa_ROXohKM
[6] https://www.youtube.com/watch?v=uJ9r2lP-ARA&t=100s
[7]https://miliohm.com/how-to-use-a-water-flow-meter-sensor-make-water-meter/
[8]https://how2electronics.com/arduino-water-flow-sensor-measure-flow-rate-volume/
[9] https://circuitdigest.com/microcontroller-projects/arduino-based-water-flow-sensor
[10] https://youtu.be/zJ-LqeX_fLU?si=Nhz8spY0YS5_vV8K

Chapter 5

Conclusion

5.1 Conclusion

Designing and implementing a system that combines IoT and AI technologies to precisely measure the dimensions of a container put on the dispenser and distribute the necessary amount of water in accordance is the proposed solution for the automated water dispenser project.

5.2 Future Enhancements

. **Enhanced User Interface :**

- Consider integrating a user-friendly interface such as a touchscreen or mobile app for better user interaction.
- Implement a graphical user interface (GUI) to display water level, cost, and other data visually.

Water Quality Monitoring :

- Integrate water quality sensors to ensure the dispensed water meets certain quality standards.
- Provide alerts or recommendations for filter replacements.

Energy Efficiency :

- Implement power-saving features to reduce energy consumption when the system is not in use.
- Explore renewable energy sources for powering the system.

Data Analytics :

- Utilize data analytics to generate insights into water usage patterns.
- Provide users with usage reports and suggestions for water conservation.

Sustainability Features :

- Incorporate features that encourage sustainability, such as promoting the use of. reusable containers
- Provide statistics on plastic bottle savings for eco-conscious users.