19 February 2025

EMBEDDED SOFTWARE FOR THE IOT PROJECT

DISTRIBUTORE SWAG

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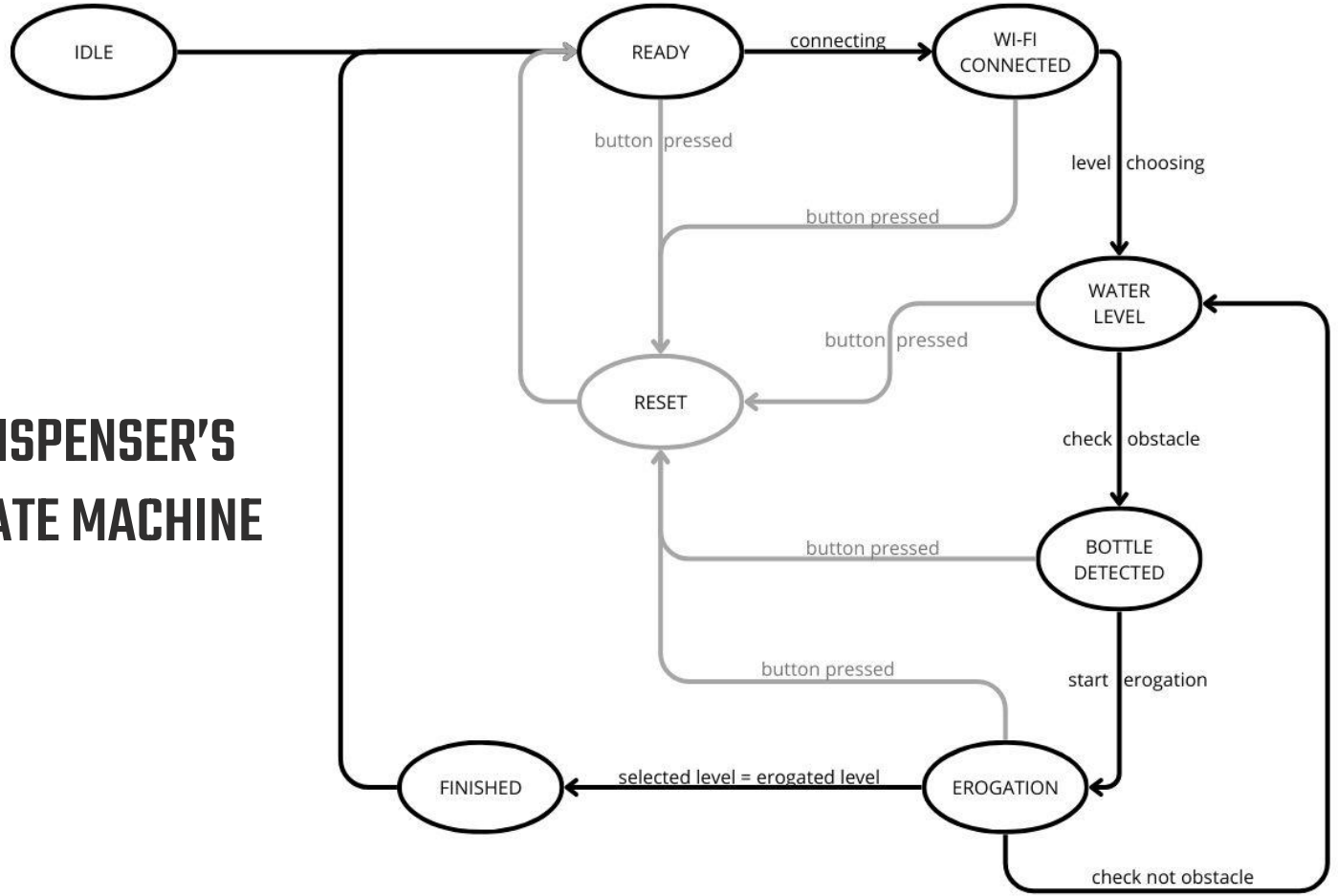
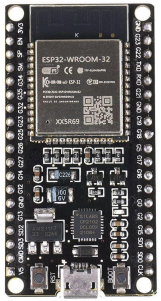
WATER DISPENSER'S FINAL STATE MACHINE



HARDWARE USED



Input

- ESP32 WIFI Module
- Ultrasonic Sensor
- Button

Processing

- ESP32

Output

- Servo Motor
- Led RGB
- Display
- Buzzer

TEAM MEMBER CONTRIBUTIONS

We divided the project into **4 steps**

SCAN ME

STEP 1

The system is powered on and the ESP32 is set as an AP. Wi-fi is now ready.

STATUS_LED: BLUE

STEP 2

The user connects to the wi-fi via their phone and scans the QR code to access the local dispenser page.

STATUS_LED: PURPLE

Then they select the amount of water to dispense:
0.2L, 0.33L, 0.5L, 1L

STATUS_LED: YELLOW

TEAM MEMBER CONTRIBUTIONS

STEP 3

The proximity sensor verifies if the bottle is correctly positioned.
If the bottle is in place dispensing begins
STATUS_LED: GREEN

If the bottle is removed during dispensing the system remembers the dispensing level and resumes once the bottle is back in place
STATUS_LED: YELLOW

STEP 4

Scenario 1:
Water has been dispensed correctly.
The buzzer will sound and the system returns to step 1

Scenario 2:
The user presses the STOP button and the system stops immediately.
System returns to step 1
STATUS_LED: RED

REPRESENTATIVE C CODE

01 JAGO

```
//Set up the ESP as an Access Point
WiFi.mode(WIFI_AP);
WiFi.softAP(ssid, password, random(1, 12), 0, 1);
Serial.print("AP IP address: ");
Serial.println(WiFi.softAPIP());
```

02 GIULIO

```
// in case of request of root page
server.on("/", HTTP_GET, [](AsyncWebServerRequest *request)
        {
    request->send_P(200, "text/html", index_html);
    isChoiceMade=false;
    Serial.println("Client Connected"); });
```

03 GIULIA

```
void activateWaterRelease()
{
    Serial.print("Chosen size:  ");
    Serial.println(chosenSize);
    if (getElapsedTime() == 0) { startTimer();
    } else if (!timerRunning) {  restartTimer();
    }
    switch (chosenSize)
```

04 ELENA

```
//interrupt service routine function
void IRAM_ATTR isr()
{ buttonTime = millis();
  if (buttonTime - lastButtonTime > 250)
  {  emergencyTriggered = true;
     lastButtonTime = buttonTime;
  } }
```

TESTING: problems and solutions

- **Display** : when the display had to change the lettering, sometimes some letters from the previous phrase remained mixed up with the new one
  → adding as many blank spaces as many characters the display could show.

- **AP**: to be able to pass all the parameters in the Access Point we had to use the HTTP GET method

- **ServoMotor** : the servo motor can rotate from 0 to 180, but when reading the rotating value there was a “9086” that we couldn’t understand
  → adding an if statement to translate the 9086 to 0 (tap closed)

- **Interrupt** : when we tried to call instructions that required time the interrupts cannot perform
  → only modify a boolean variable in the interrupt and then call another function for other changes

- **Dispenser tap** : our tap is a bit difficult to open with a 5V servo motor
  → use a more powerful servo or connect a water pump

FUTURE POSSIBLE IMPROVEMENTS:

- Add more beverages
- Add temperature options
- Show in the display the live percentage of water erogated
- Notify users of leaks or maintenance needs, for example when dispenser need to be refilled

THANKS FOR YOUR ATTENTION

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