Project Assignment 1
Automatic Fan

Created by

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Presented to

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Project name: Automatic Fan

Introduction:

The motivation of our project is to facilitate people to control the fan easier because fan is a common electronic device in Thai household. Hence, we decided to create a smart fan that can be controlled by IR remote. Automatic Fan (AF) is made of many sensors (DHT11, switch,and IR receiver), and actuators (Servo, DC fan, relay,and OLED). The AF has four states which are idle state,normal state, manual control state, and automatic state. The idle mode is the first state after user turn on AF, the fan will do nothing, and wait for the next command. The normal state is the fan face will automatically move from left to right and right to left. The manual control state is the user can use IR remote to control the direction of the fan's face. The automatic mode is the fan will turn on and off automatically depending on the temperature threshold.

Controller:

1. ESP32 Microcontroller

Sensors:

1. DHT11
2. Switch button
3. IR receiver

Actuator:

1. Servo
2. DC fan
3. Relay
4. OLED

Objectives:

1. To control the fan's face direction by IR remote
2. To create an automatic fan that can be turned on depending on temperature
3. To show temperature value, humidity value, fan status, and mode on the OLED of the fan

Scenarios:

1. In case that the weather is extremely hot, So that many people will turn on the fan by going to the fan and turn it on. However, the AF can be turned on (normal state) via IR remote so the user can turn on the fan when they are on the sofa
2. When the fan is activated, and users want the face of the fan to focus on them only, they can change the fan mode to manual control state via IR remote. And then they can change the direction of the fan's face to any direction via IR remote too
3. In case that users want to save the cost electronic so they can change the state of the fan to be automatic mode, so the fan will be turned on and off depending on temperature.

Project Design: FSM diagram

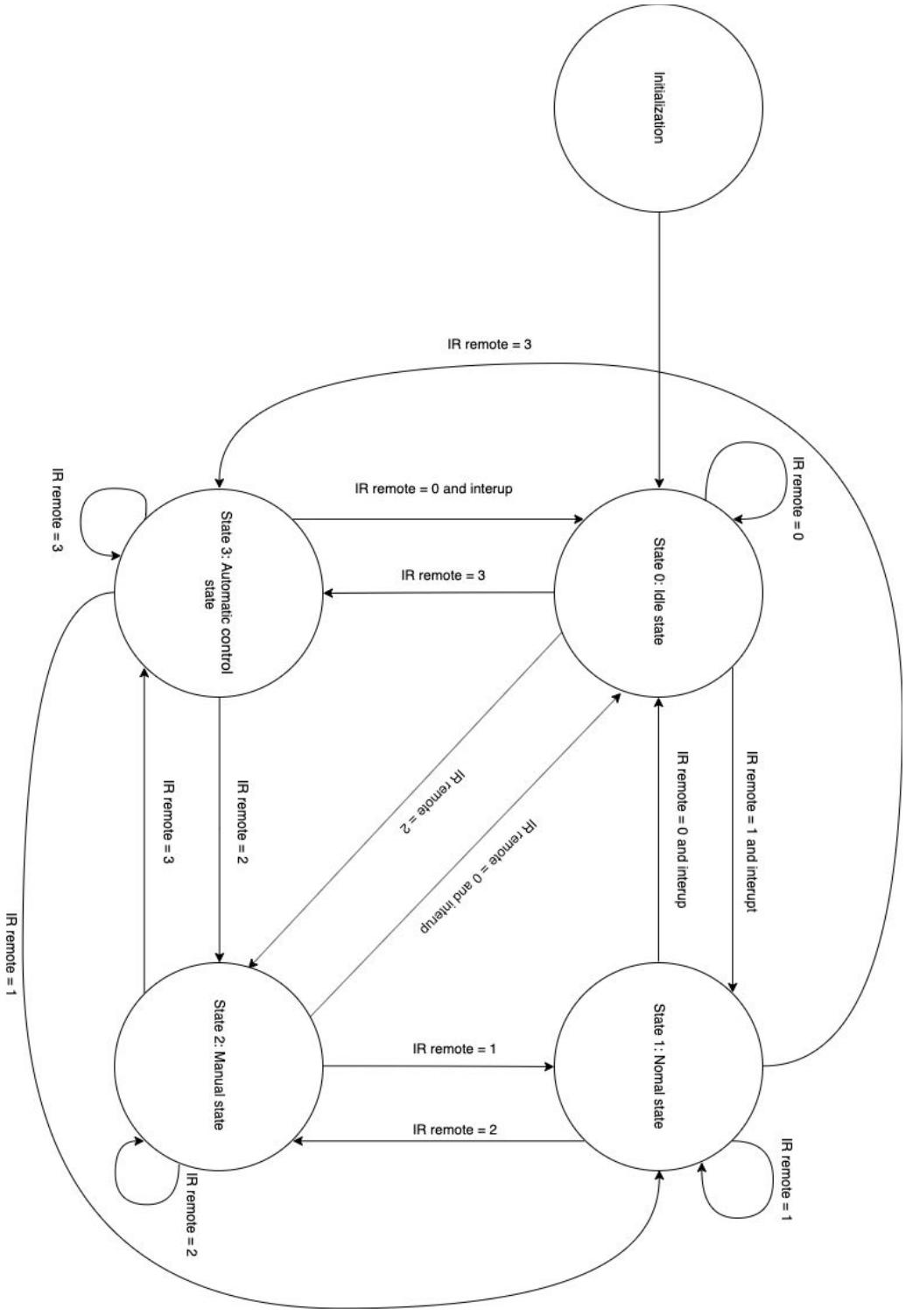

Figure 1. States of automatic fan

Circuit schematic

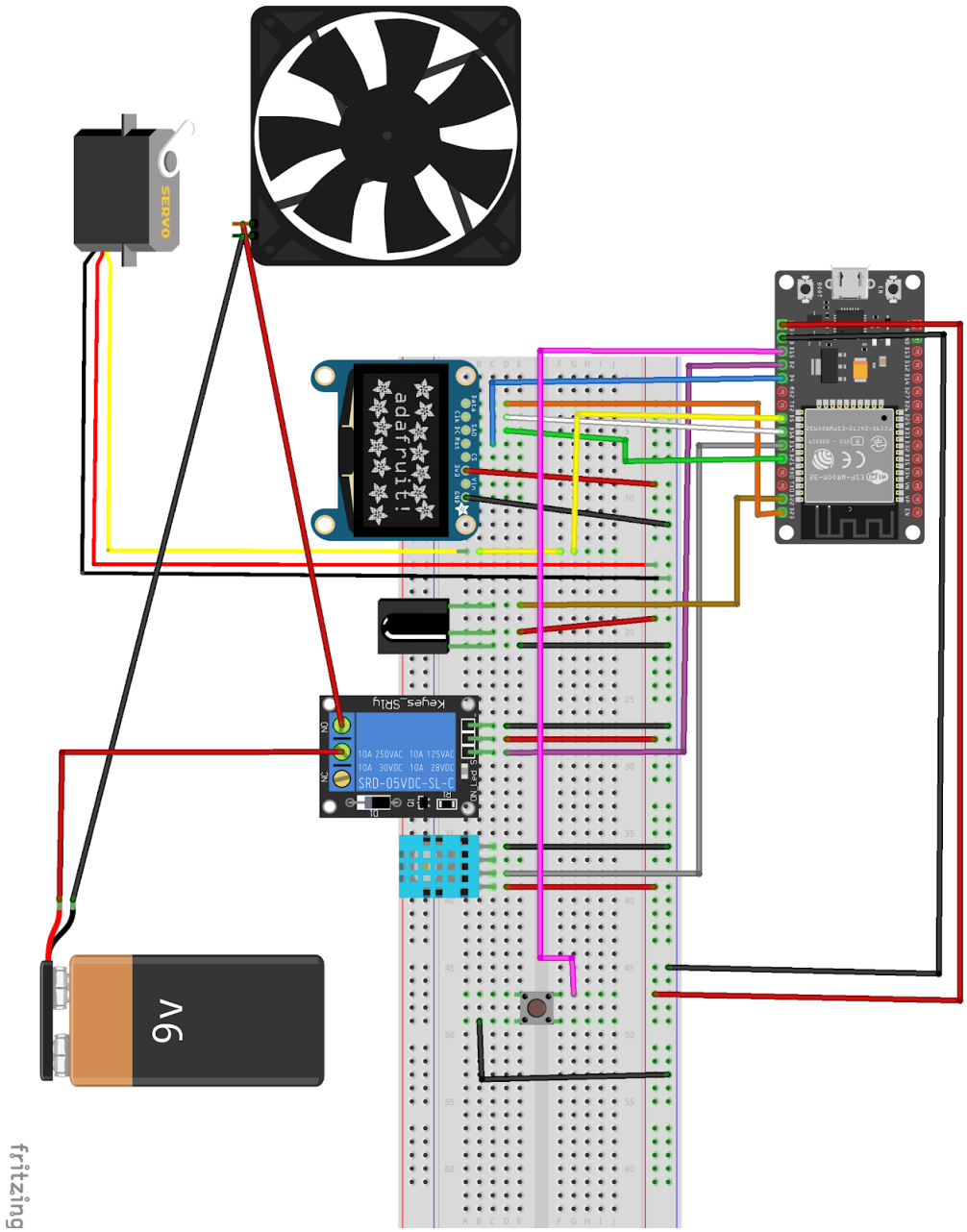

Figure 2. Bread board of automatic fan

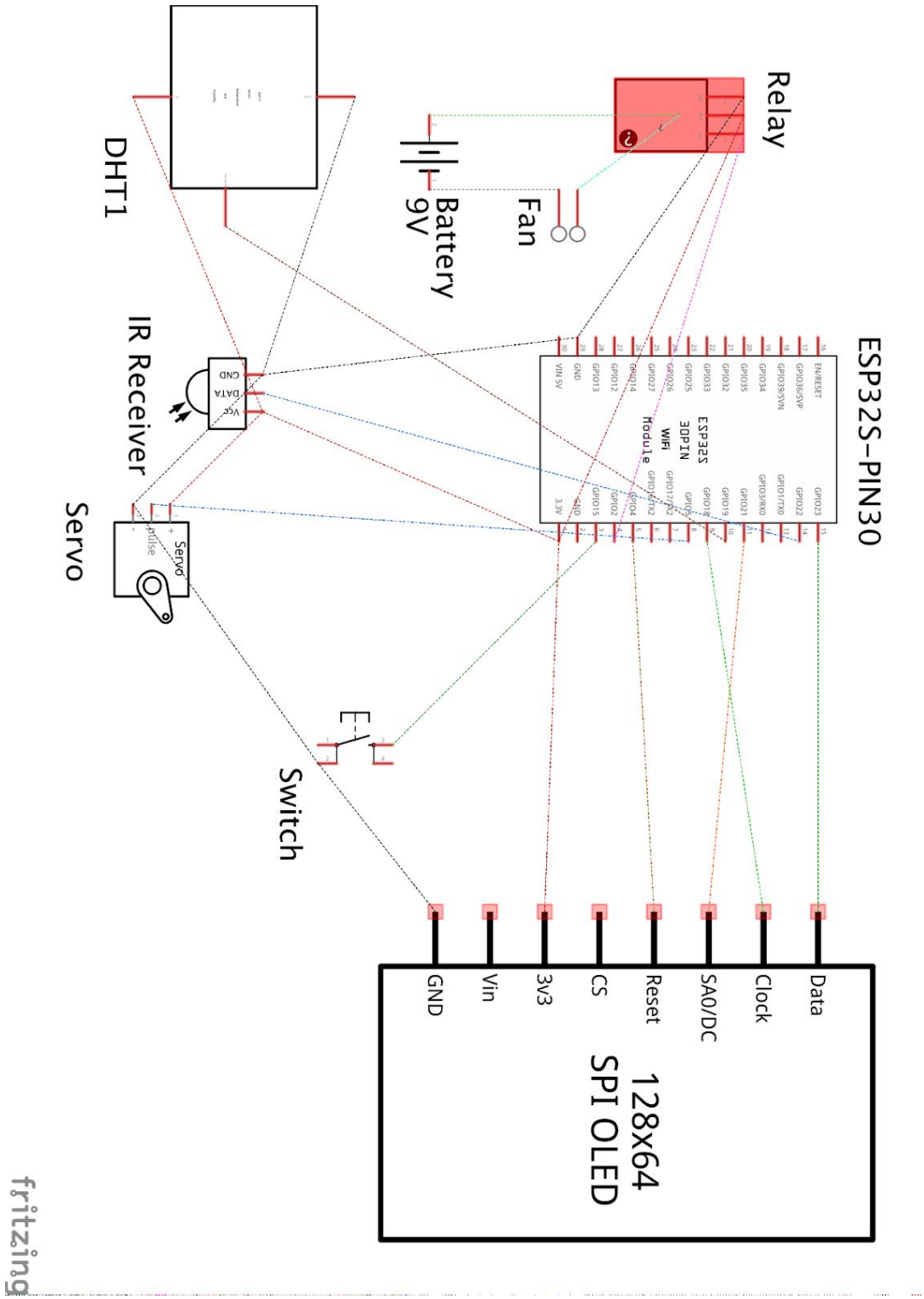

Figure 3. Schematic of automatic fan

Project result:(Upon FSM or Flow Chart for every condition)

Initialization

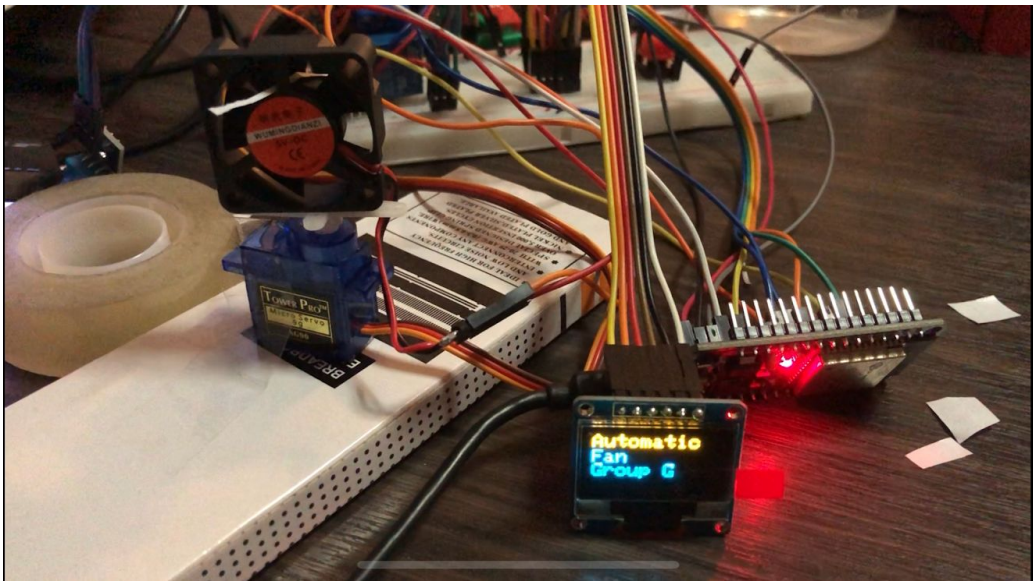

Figure 4. The initialization of automatic fan

After the ESP 32 get electricity via micro usb port, the AF will move to the initialization step. In this step, the OLED will show a picture, project name, and group name. It will move to the next state when the OLED show fan status, temperature, humidity, and mode.

State0: Idle state (zero button on the IR remote and Interruption from any state)

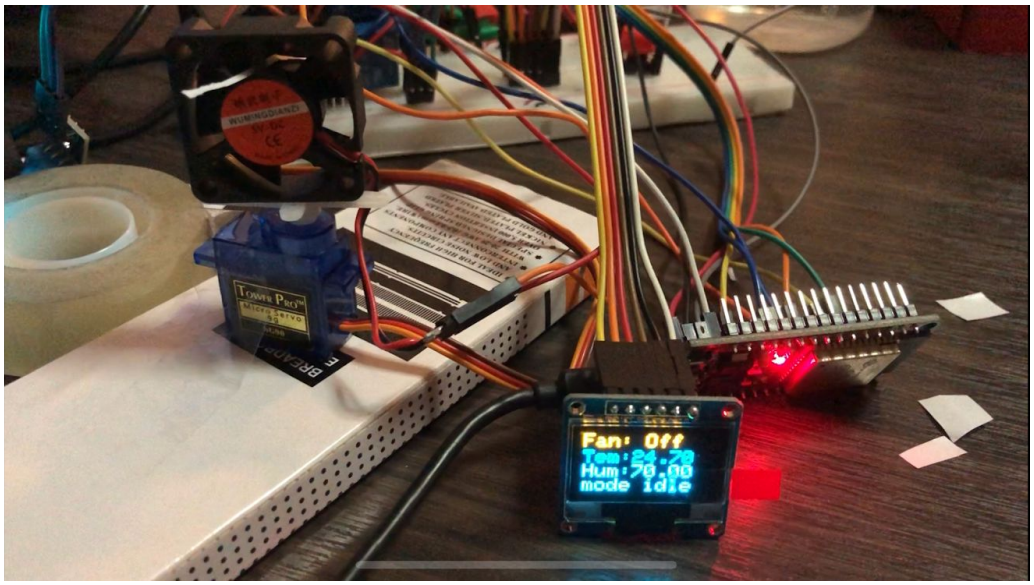

Figure 5. The idle state of automatic fan

In this state, the fan system is not working in this state. It waits for the next state via IR remote and interrupt. The IR remote can change the state to be idle state (itself), normal state (one button), manual control state (two button), and automatic control state (three button). For the interrupt, it can be change to be normal state only.

State1: Normal state (one button on the IR remote and interruption from idle state)

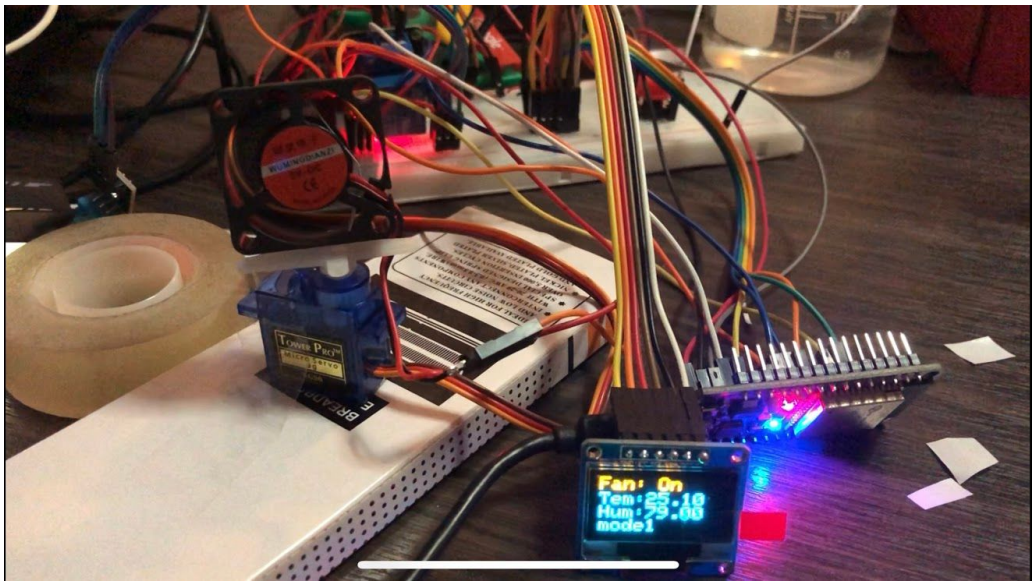

Figure 6. The normal state of automatic fan

In this state, the fan and servo motor are active so the fan will move its face from left to right and light to left repeatedly until it changes to a new state.

State2: Manual control state (two button on IR remote)

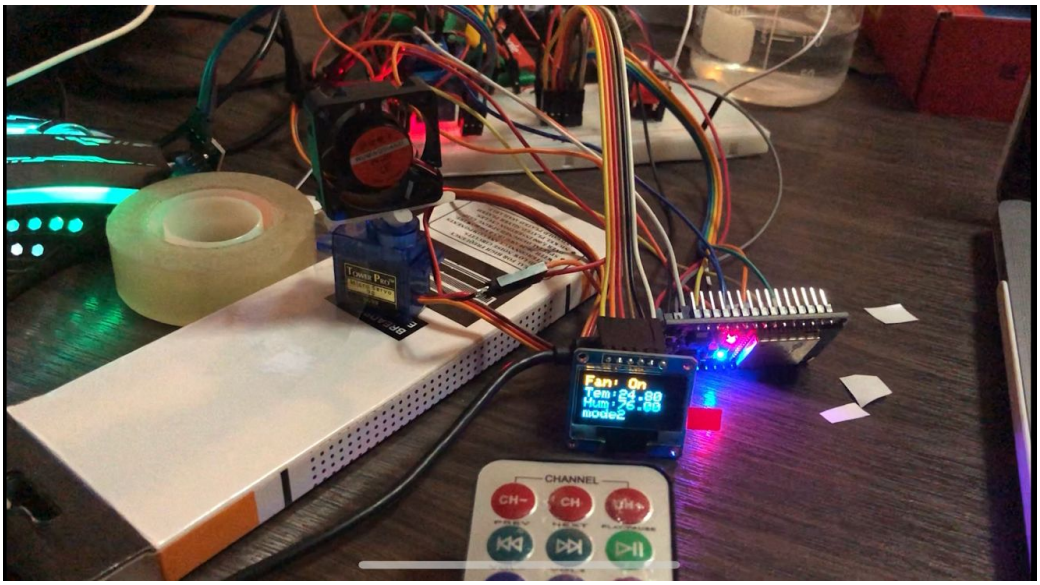

Figure 7. The manual control state of automatic fan

In this state, the user can control the face of the face via the left and right on the IR remote. If the fan move to the left most angle it will stop which is the same as the right most angle.

State3: Automatic control state (three button on IR remote)

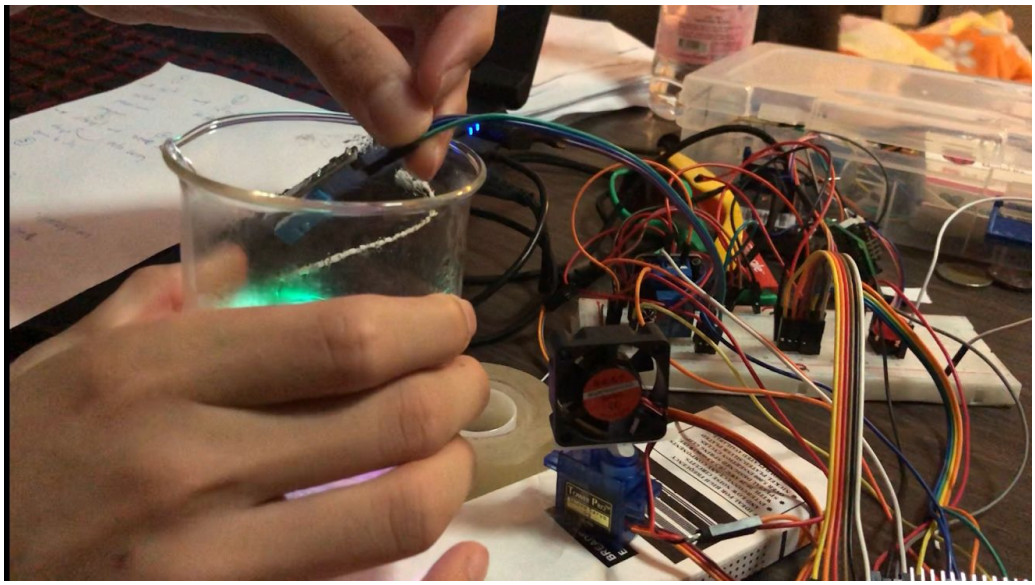

Figure 8. Increasing temperature with boiled water when The fan in automatic control state

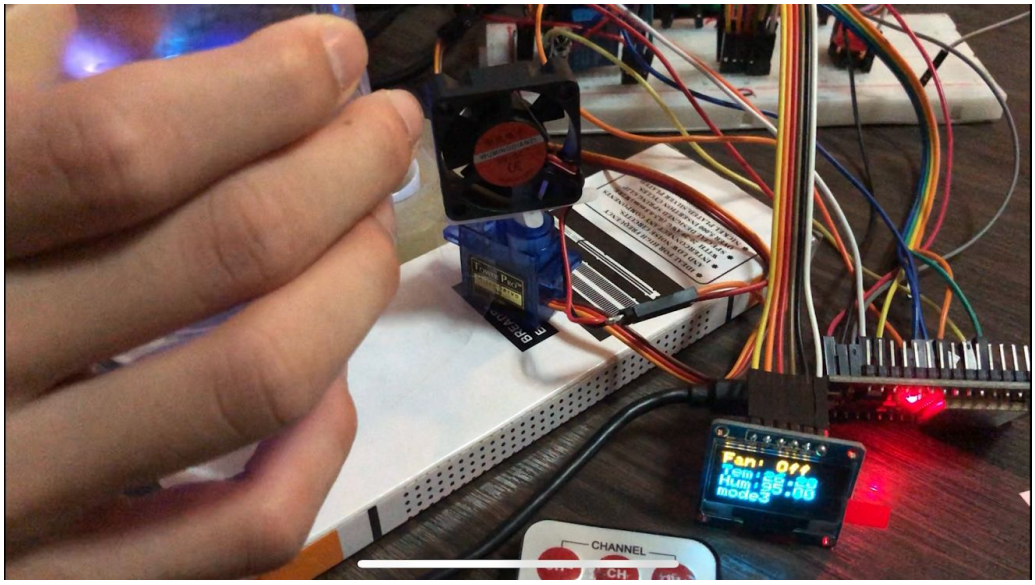

Figure 9. The temperature is lower than 30 degree celsius so the Fan is off

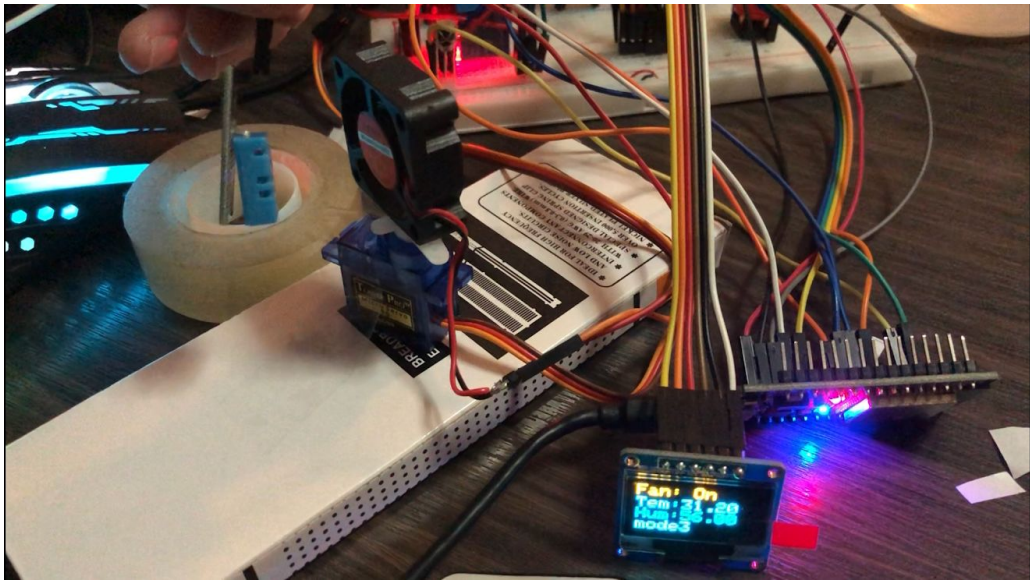

Figure 10. The fan is on when the temperature is above 30 degree celsius

In this state, the fan will automatically turned on and off depending on temperature. The fan will be turned on of the temperature over 30 degree Celsius and turned off when the temperature below 28 degree celsius.

Note: The OLED will show fan status, temperature, humidity, and mode on every state.

VDO link:
https://drive.google.com/open?id=1LrakDqCZyphNGyXzcgXD_JXpG-iFV2lO