

Project:

INTEGRATED HOSPICE CARE SYSTEM

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01

RESEARCH/BACKGROUND

GIVEN QN

How can we design a sustainable technology solution in retail, urban farming, smart factory or healthy lifestyle?



DRIVING QN

How might we design an integrated IoT system to improve hospice care?



PROBLEM

1. The elderly are prone to falls especially in private areas like toilets where the floor is commonly wet.
2. The elderly require a comfortable and healthy environment to live in.
3. The elderly are susceptible to illnesses at old age

RESEARCH

- 80% of Elderly falls occur in the toilet
- Most Elderly are unable to discern if they are sick
- Optimum temperature for a room is 23-30 degree Celsius
- Optimum humidity level is 40-60%
- It is recommended to keep the CO₂ levels below 800PPM
- The normal heart rate for elderly is 50-80 beats/minute
- normal body temperature is between 36.1 C and 37.2 C

02

OUR SOLUTION

OUR PROJECT

This project aims to enhance hospice care by developing a system that monitors hospice environments to ensure they are comfortable and pleasant to live in. By automatically assessing factors like air quality and safety, the system will alert nurses if conditions deteriorate or accidents occur, enabling timely interventions for patient well-being.



SENSORS USED

Environment Monitoring Unit

- ENV II
- TVOC

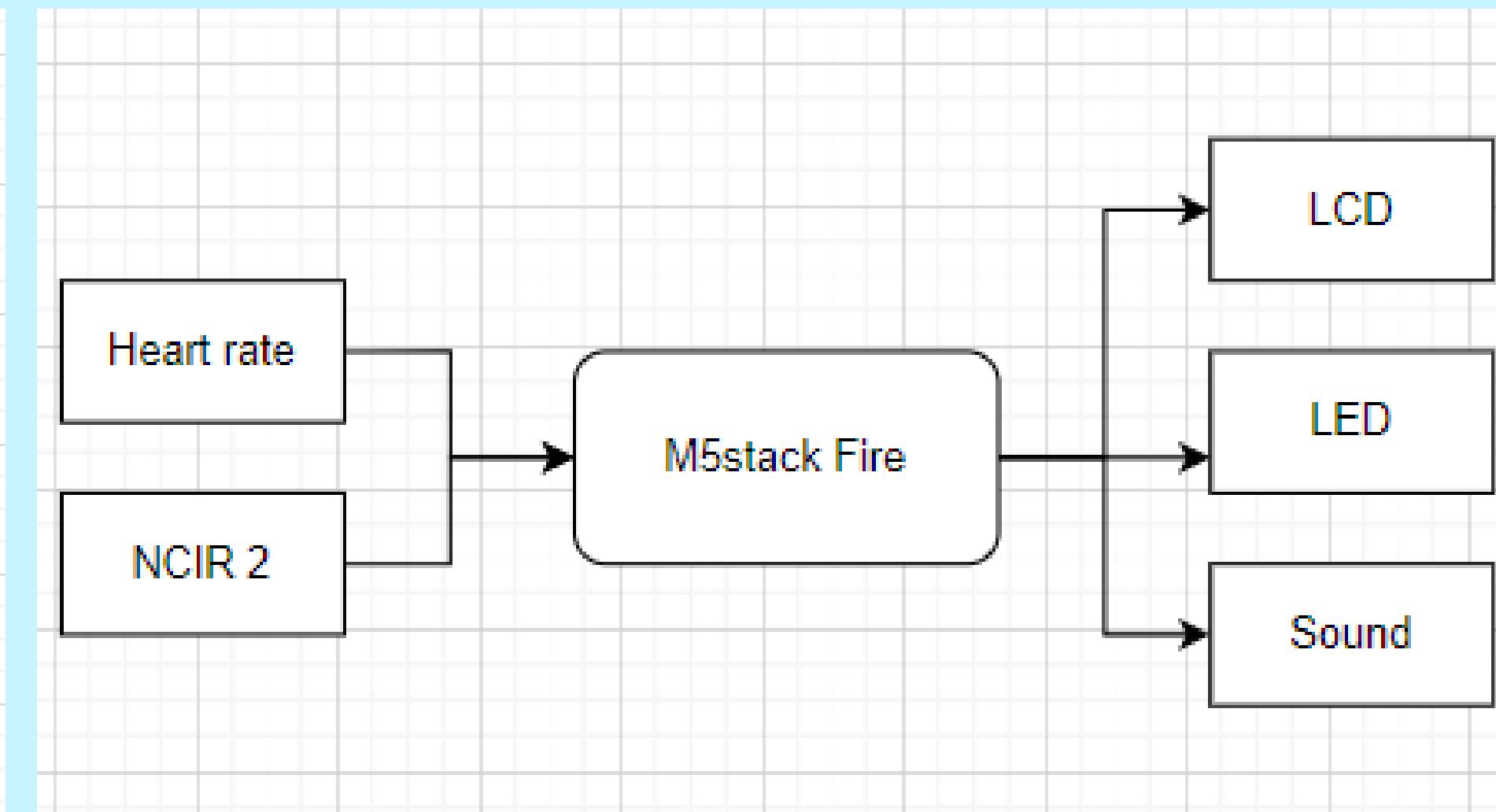
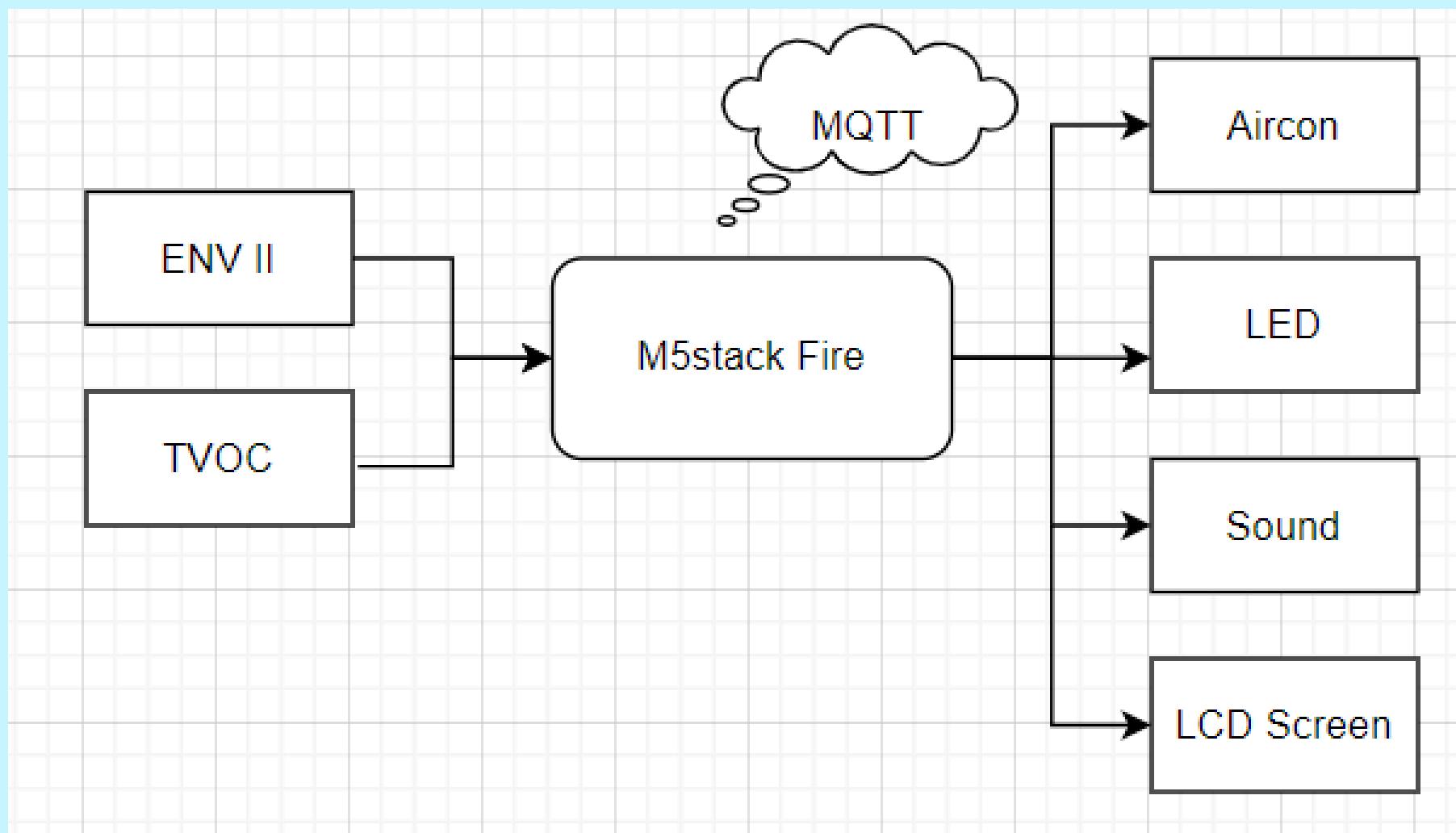
Safety Unit (Toilet)

- Earth
- RFID
- Gesture

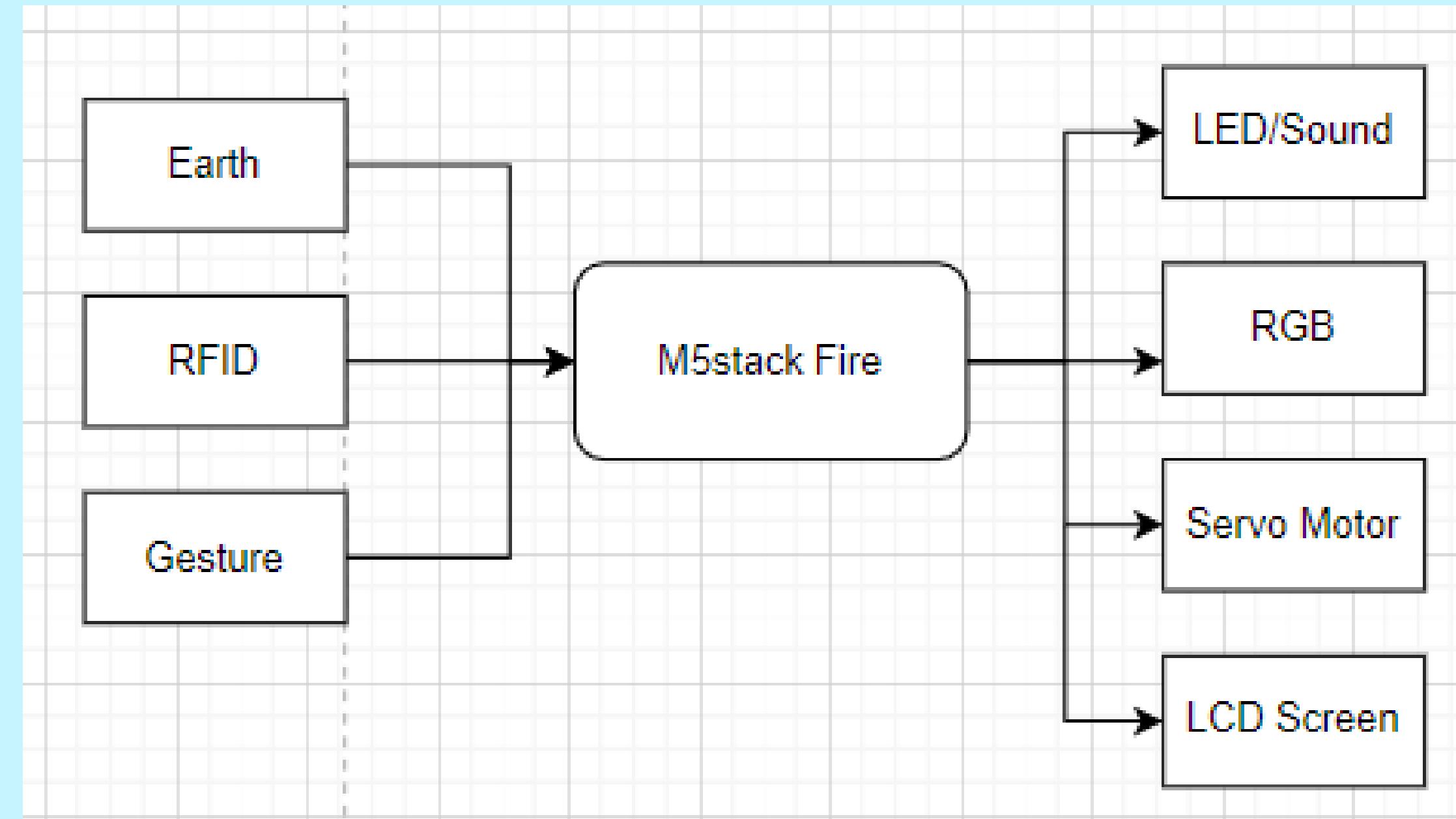
Health Monitoring Unit

- Pulse Oximeter
- NCIR 2

BLOCK DIAGRAMS



BLOCK DIAGRAMS



DESIGN IMPLEMENTATION

Environment Monitoring Unit

- Sensors are used to measure room temperature, air quality and humidity.
- Data is used to adjust room environment control devices to suit patients needs.

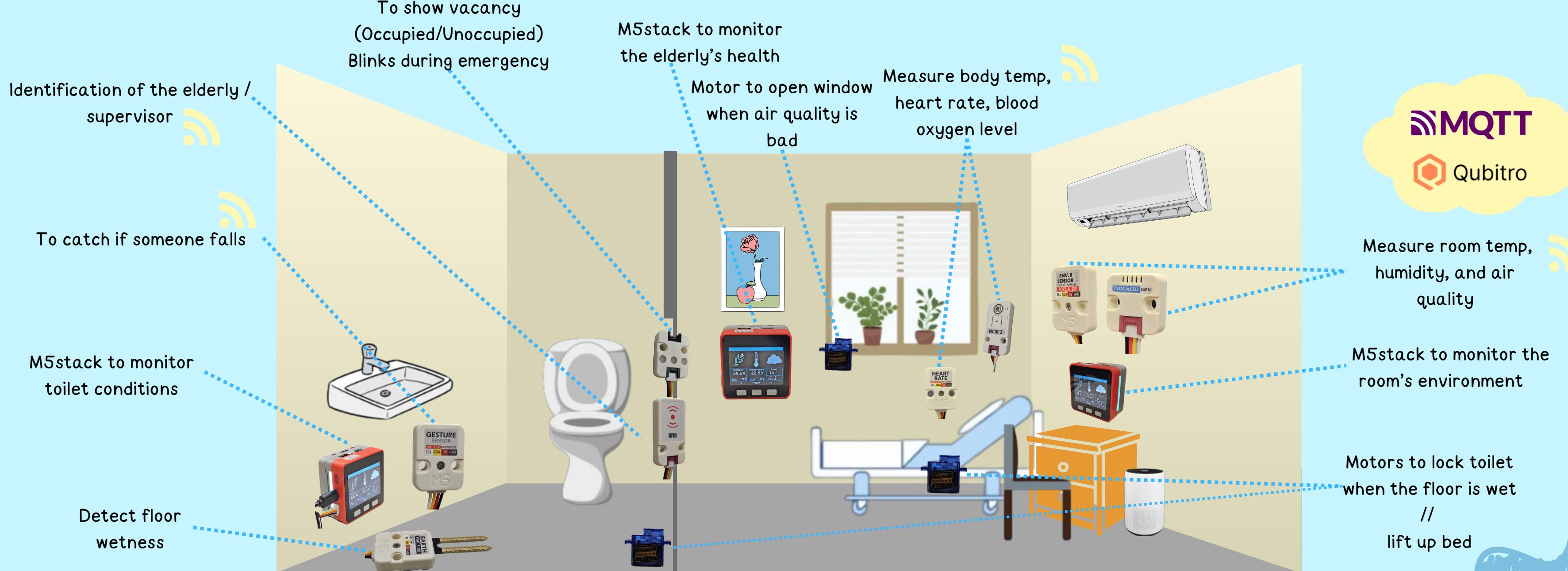
Safety Unit

- Sensors are used to sense a fall in the toilet and to know when the patient is in the toilet
- Data is used to keep staff on standby and to alert staff if patient falls down

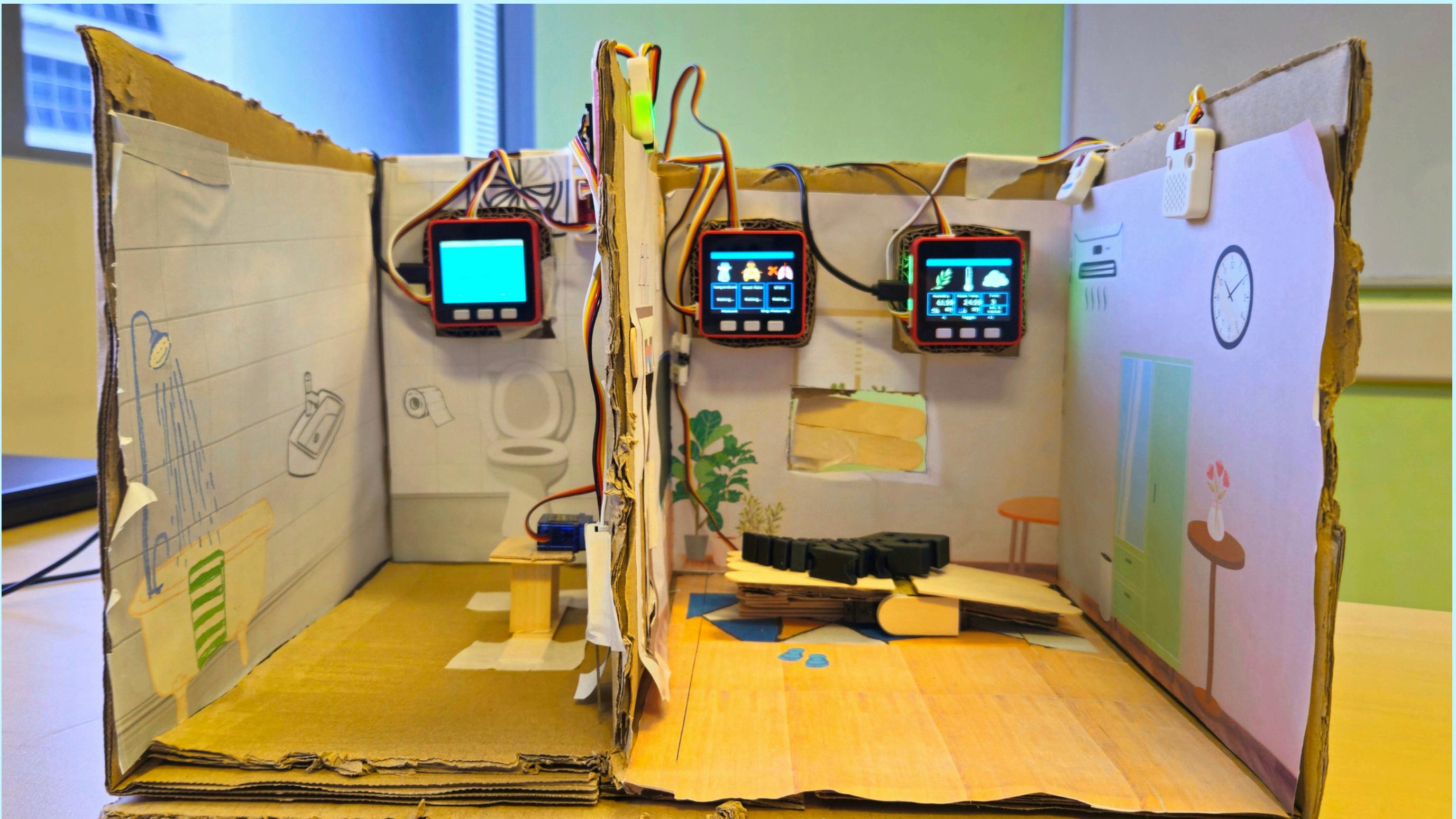
Health Monitoring Unit

- Sensors are used to measure patients body temperature, heart rate and blood oxygen levels.
- Data is used to closely monitor patients health and ensure they are not sick or experiencing any health issues that are out of the ordinary.

DESIGN IMPLEMENTATION



DESIGN IMPLEMENTATION



DESIGN IMPLEMENTATION

Safety Unit (Toilet)

Pin Id	Sensor Port
Servo	Port B
Gesture Sensor	Port A via PA Hub 2
RFID Sensor	Port A via PA Hub 5
Earth Sensor	PA hub via PB Hub 0
RGB Unit	PA hub via PB Hub 1

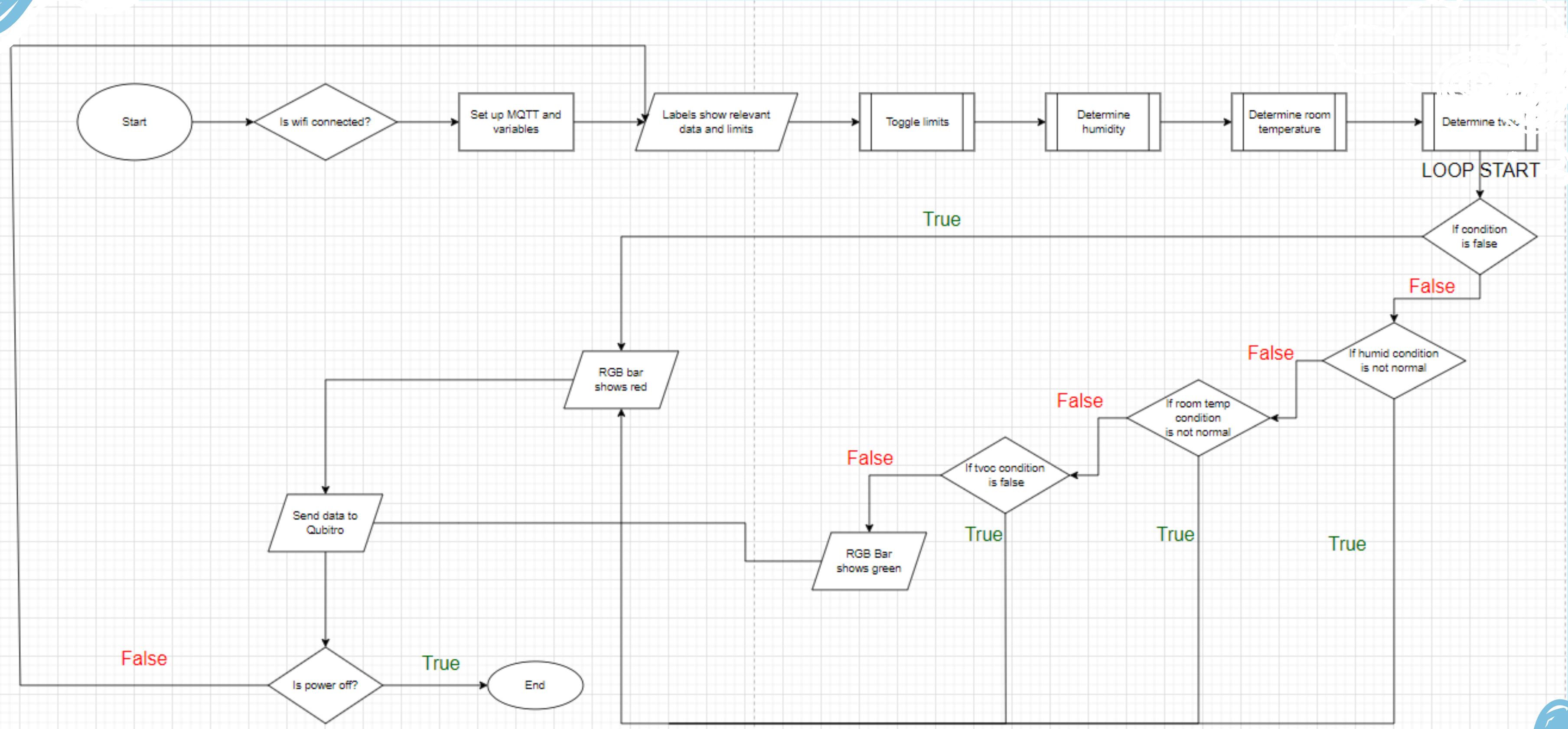
Health Monitoring Unit

Pin Id	Sensor Port
Heart Oximeter	Port A (via Groove Hub)
NCIR 2	Port A (via Groove Hub)
Angle Unit	Port B (Via Groove Hub)
Servo Motor	Port B (via Groove Hub)

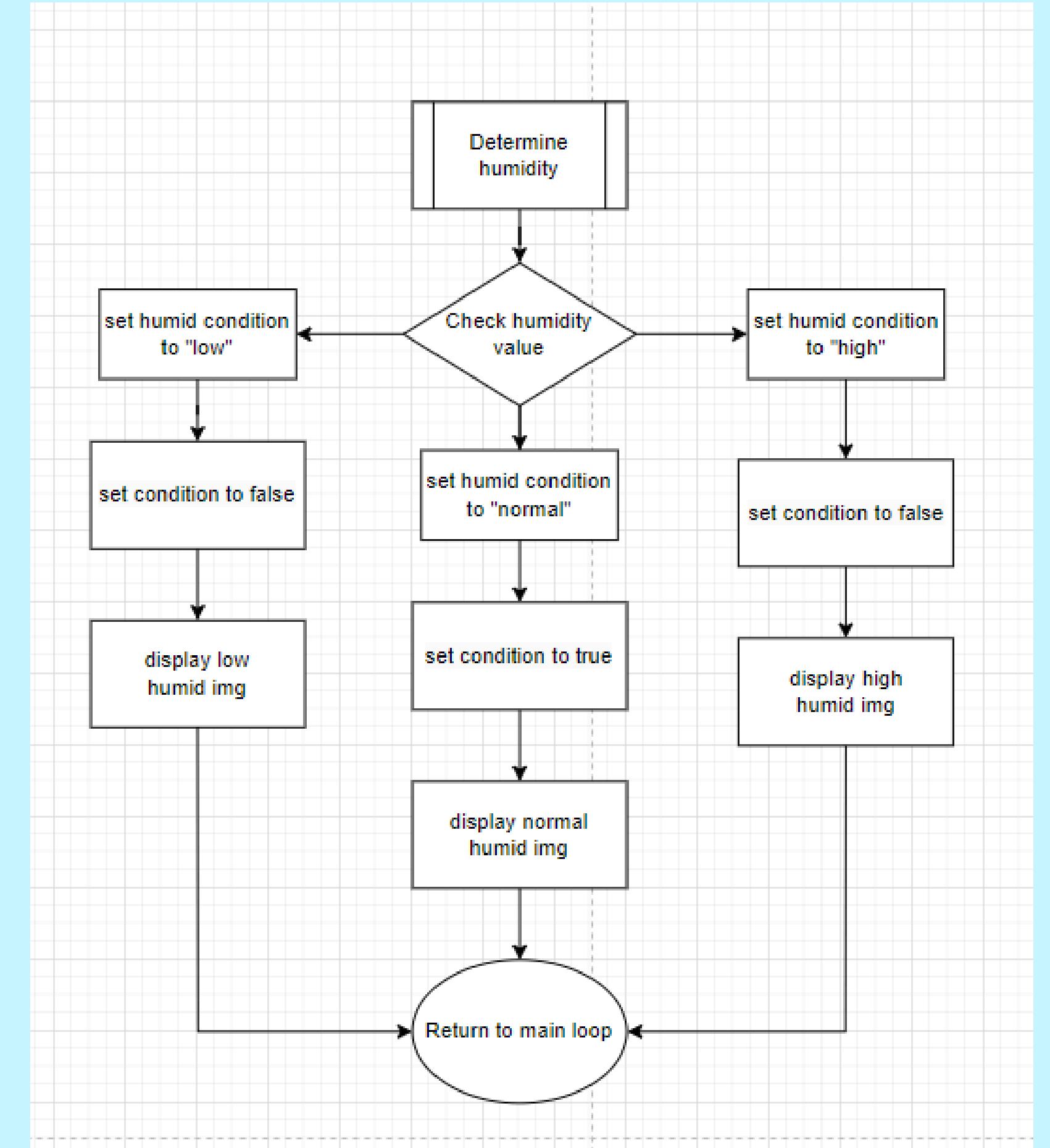
Environment Monitoring Unit

Pin Id	Sensor Port
TVOC	PA Hub
ENV II	PA Hub
Servo Motor	Port B

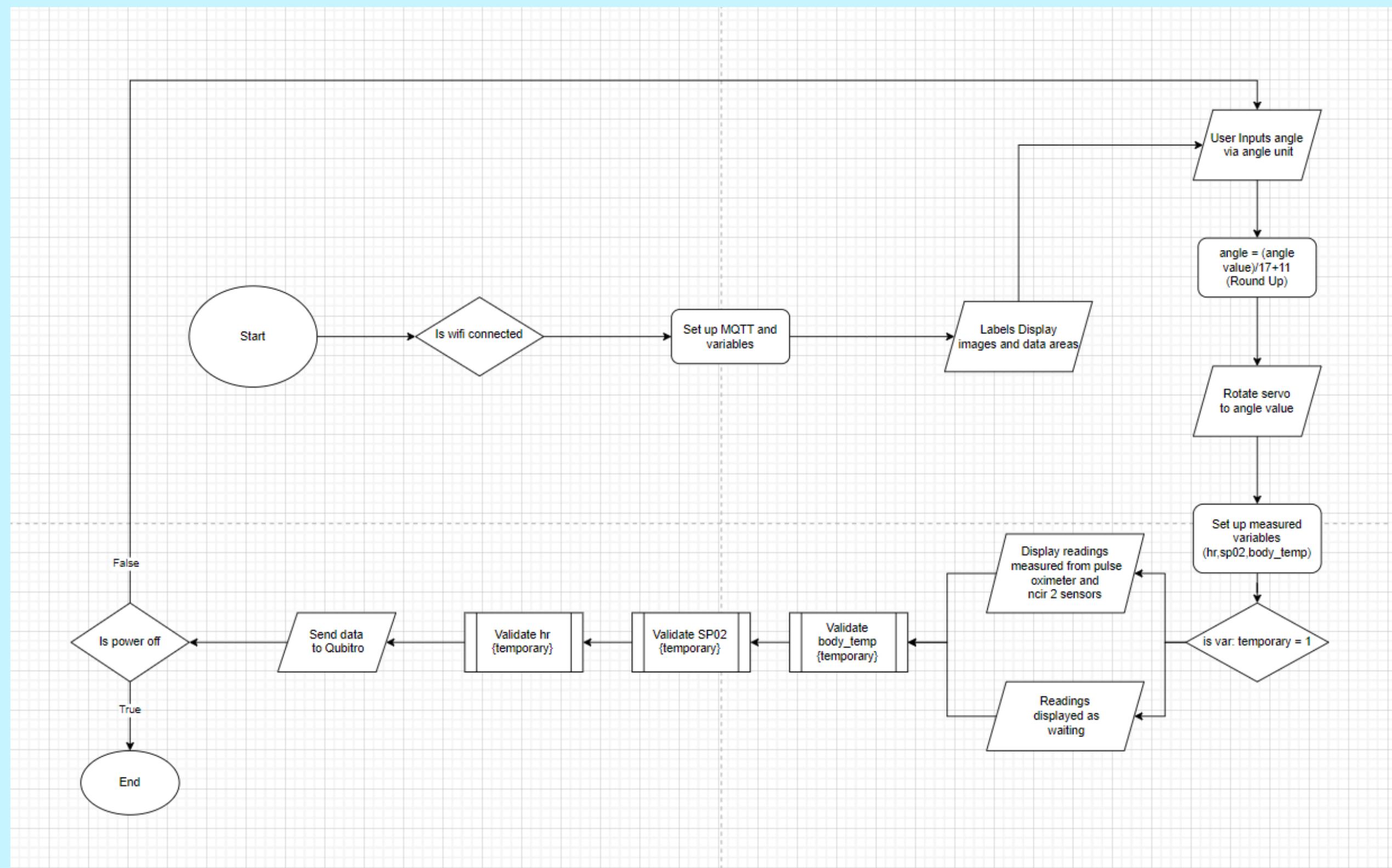
FLOWCHARTS



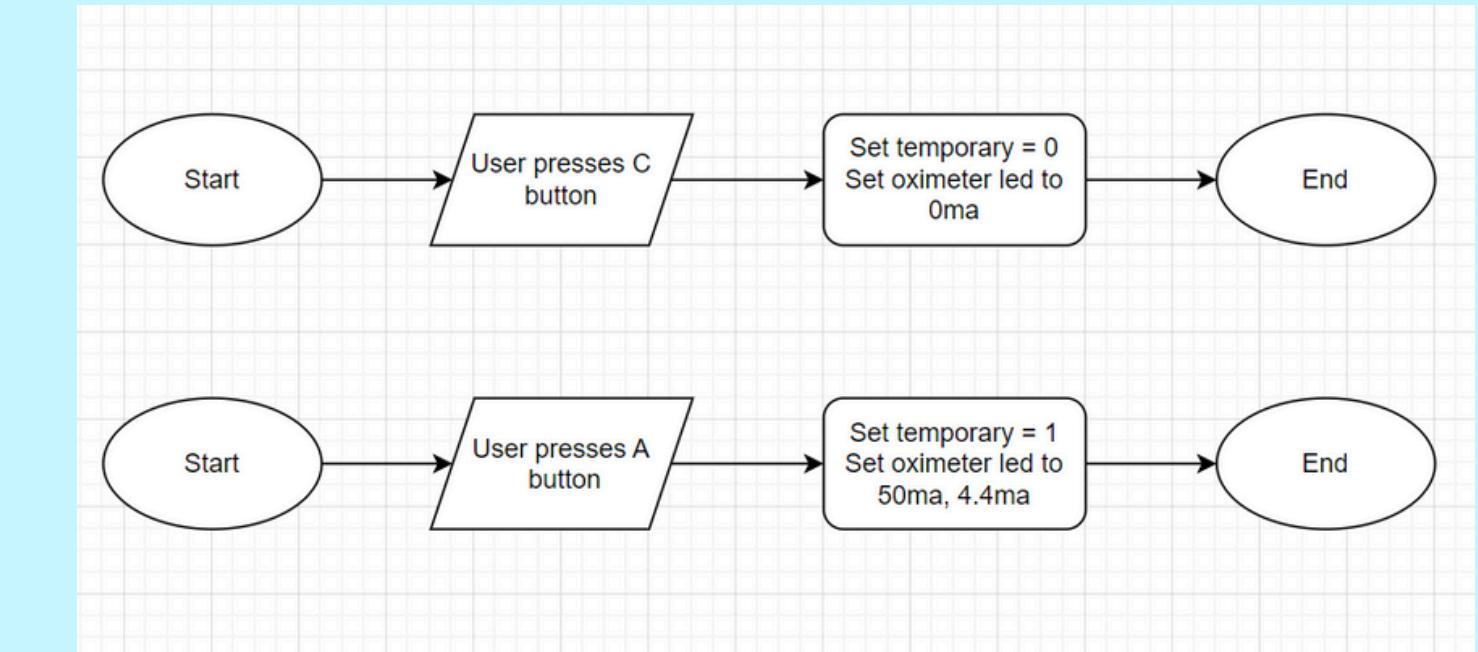
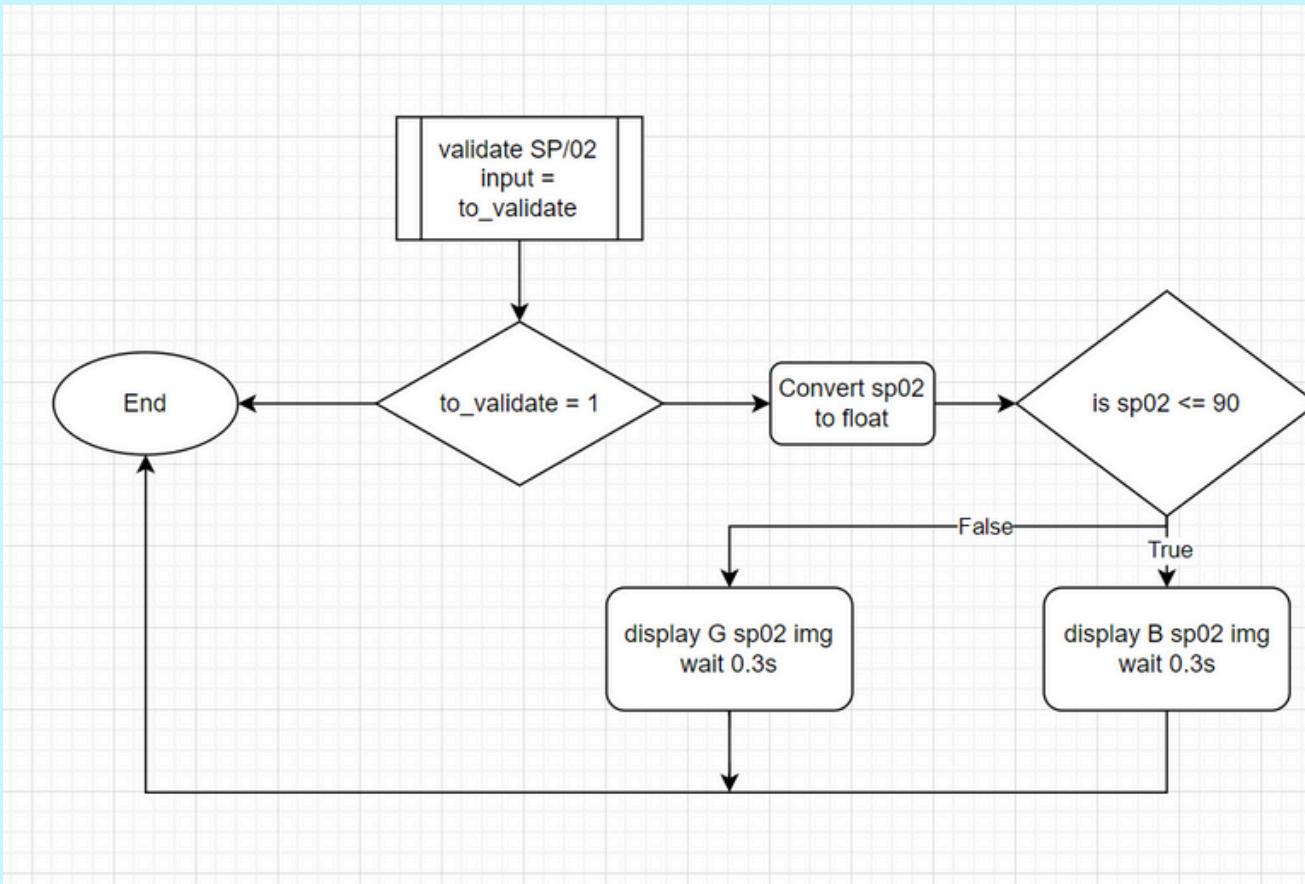
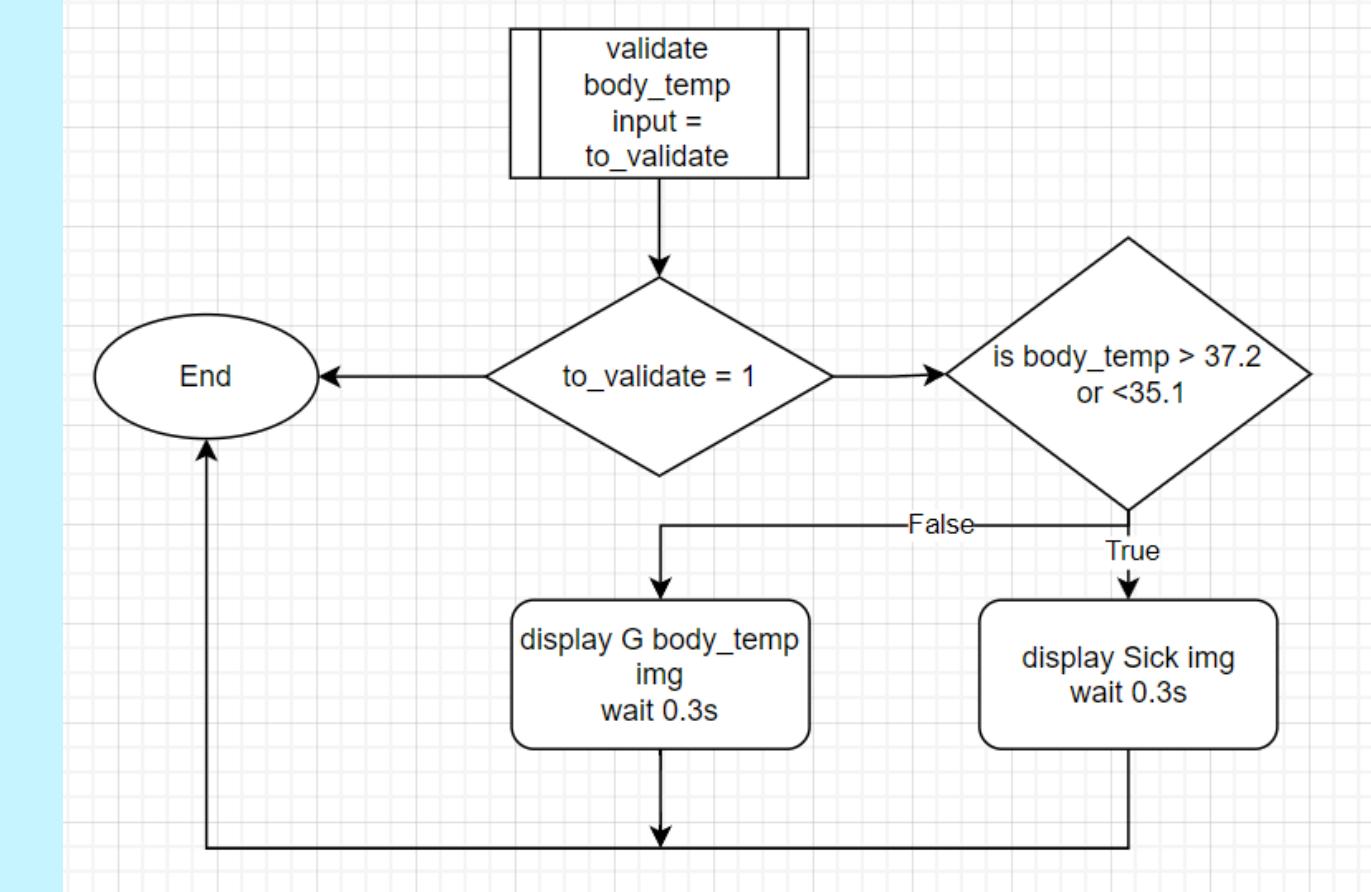
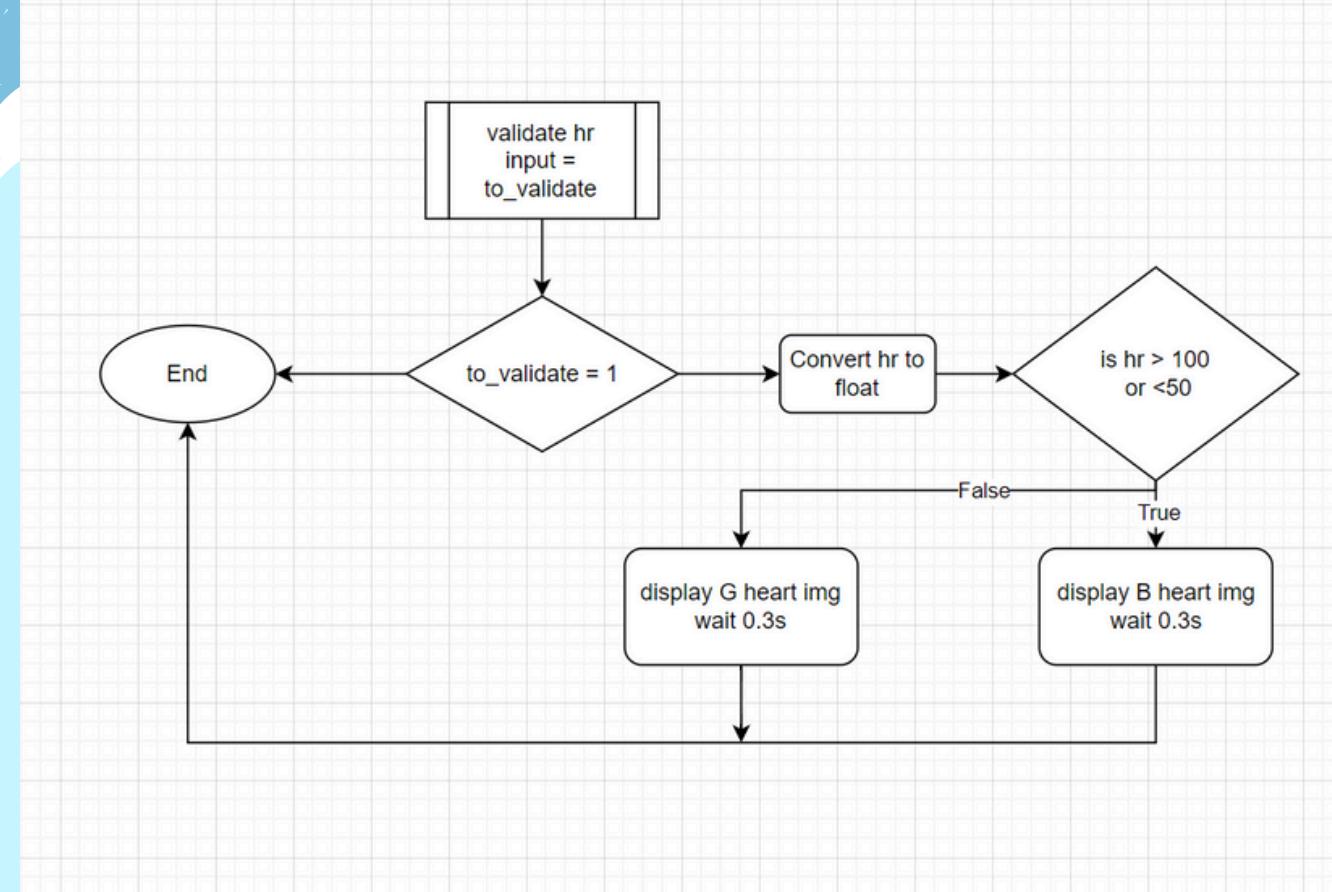
Flow Chart I.I - Environment Unit



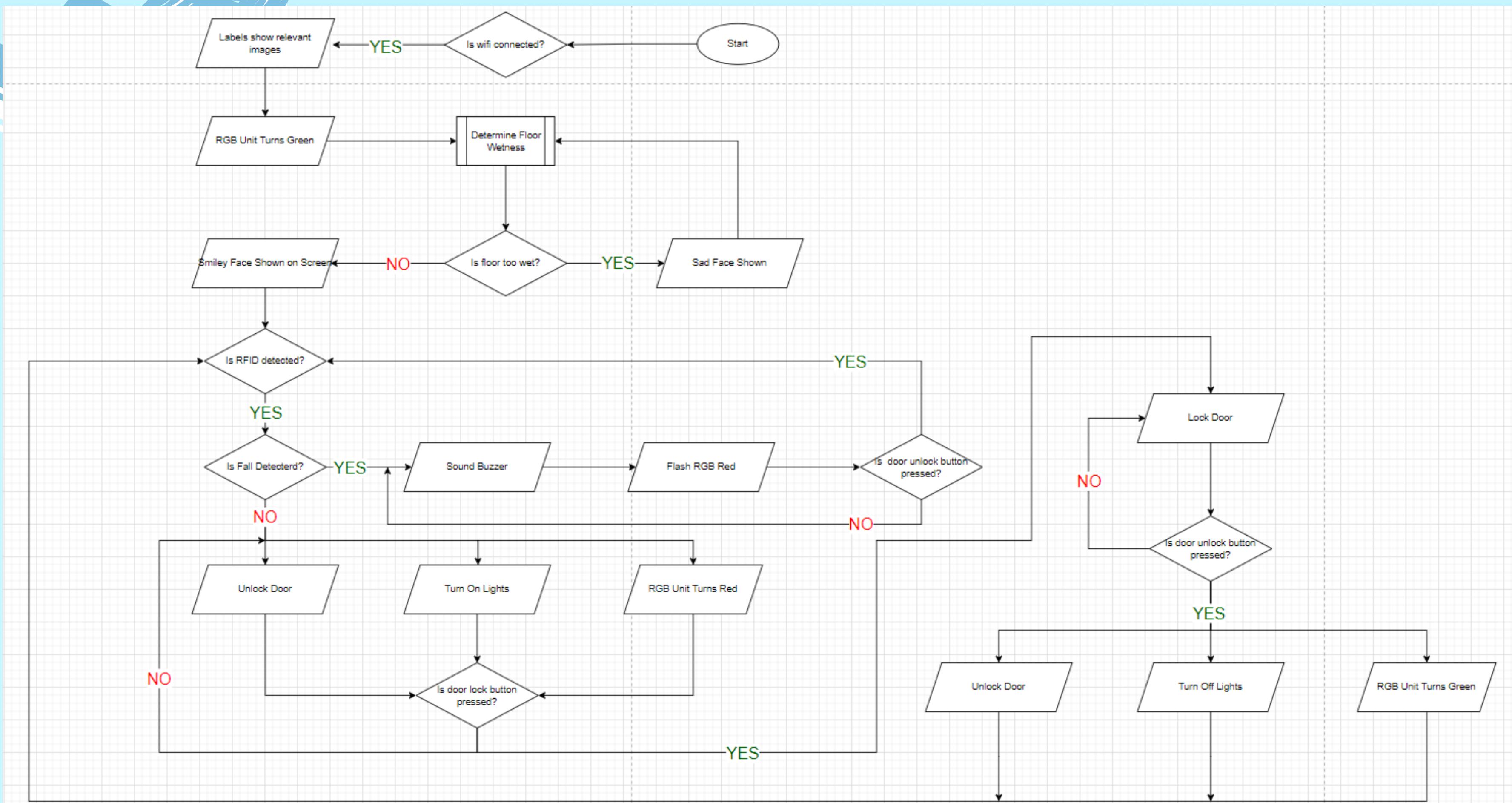
Flow Chart 1.2 - Environment Unit



Flow Chart 2 - Body Monitoring Unit



Flow Chart 2.1 - Body Monitoring Unit



Flow Chart 3 - Toilet Safety Unit

BLOCKY CODE

PARTLY

Setup

```

Connect to Wi-Fi SSID "Myrios" PASSWORD "*****"
if wifi is connected
do set client id "env_unit"
server "broker.qubitro.com"
port 1883
user "5ad1ffd6-d9a8-4e01-9a2b-de9a0f053163"
password "*****"
keepalive 300
SSL False
+ mqtt start
set min_humidity to 40
set max_humidity to 65
set min_temp to 23
set max_temp to 30
set tvoc_limit to 2
set condition to true
set tvoc_condition to true
set body_temp_condition to "normal"
set humid_condition to "normal"
set temp_condition to "normal"
set ac_status to 0
set ventilation to 0
set var1 to 0
set var2 to 0
servo_0 Set 0 (0 ~ 180) degree turn

```

Loop

```

Label label8 show Get env2_0 Humidity (%) (return float)
Label label9 show Get env2_0 Temperature (°C) (return float)
Label label10 show Get tvoc_0 TVOC
Label label15 show ac_status
Label label16 show ventilation
Label label11 show min_humidity
Label label12 show max_humidity
Label label13 show min_temp

```

```

Label label11 show min_humidity
Label label12 show max_humidity
Label label13 show min_temp
Label label14 show max_temp
toggle_limits
determine_humidity
determine_room_temp
determine_tvoc
if condition = false
do Set RGB Bar color red
else if humid_condition ≠ "normal"
do Set RGB Bar color orange
else if temp_condition ≠ "normal"
do Set RGB Bar color blue
else if tvoc_condition = false
do Set RGB Bar color red
else Set RGB Bar color green
if humid_condition = "normal" and temp_condition = "normal"
do set ac_status to 0
else set ac_status to 1
if tvoc_condition = true
do set ventilation to 0
servo_0 Set 0 (0 ~ 180) degree turn
else set ventilation to 1
servo_0 Set 90 (0 ~ 180) degree turn
publish topic "env_data" msg Create JSON (string)
key "humidity" value Get env2_0 Humidity (%) (return float)
key "room_temp" value Get env2_0 Temperature (°C) (return float)
key "tvoc" value Get tvoc_0 TVOC

```

to toggle_limits

```

if var1 is even and var2 is even
do Set label14 color white
Set label13 color blue
else if var1 is odd and var2 is even
do Set label13 color white
Set label10 color blue
else if var1 is odd and var2 is odd
do Set label10 color white
Set label15 color blue
else Set label15 color white
Set label14 color blue

```

Button B wasPressed

```

if var1 = var2 and var1 is even
do change var1 by 1
else if var1 = var2 and var1 is odd
do change var1 by 1
else change var2 by 1

```

Button A wasPressed

```

if var1 is even and var2 is even
do change min_humidity by -1
else if var1 is odd and var2 is even
do change max_humidity by -1
else if var1 is odd and var2 is odd
do change min_temp by -1
else change max_temp by -1

```

Button C wasPressed

```

if var1 is even and var2 is even
do change min_humidity by 1

```

RESOURCES



Google Drive - Source Files

GOALS

Through our versatile Integrated Hospice Care System, which can be applied in many indoor living spaces including offices, we aim to contribute to the following UN SDG Goals:

- Good Health & Well-Being (in remote Hospices)
- Resilient infrastructure (in offices) that fosters innovation
- Sustainable cities by reducing electricity and human resources



THANK YOU

by T2 G5