import time

import random

import paho.mqtt.client as mqtt

# MQTT Configuration

BROKER = "broker.hivemq.com"

TOPIC = "ev/bms/data"

CLIENT\_ID = "EV\_BMS\_Client"

# Battery Parameters

BATTERY\_CAPACITY = 100 # Ah

VOLTAGE\_RANGE = (3.0, 4.2) # Per cell (Li-ion)

CURRENT\_RANGE = (0, 100) # A

TEMPERATURE\_RANGE = (20, 60) # Celsius

# MQTT Client Setup

client = mqtt.Client(CLIENT\_ID)

client.connect(BROKER, 1883, 60)

def get\_battery\_parameters():

"""Simulates battery parameters"""

voltage = round(random.uniform(\*VOLTAGE\_RANGE) \* 10, 2) # 10 cells in series

current = round(random.uniform(\*CURRENT\_RANGE), 2)

temperature = round(random.uniform(\*TEMPERATURE\_RANGE), 2)

soc = round((voltage - 30) / (42 - 30) \* 100, 2) # Simple estimation

return voltage, current, temperature, soc

def monitor\_battery():

while True:

voltage, current, temperature, soc = get\_battery\_parameters()

data = {

"voltage": voltage,

"current": current,

"temperature": temperature,

"soc": soc

}

print(f"Voltage: {voltage}V, Current: {current}A, Temperature: {temperature}°C, SoC: {soc}%")

client.publish(TOPIC, str(data))

# Safety Checks

if voltage < 30 or voltage > 42:

print("⚠️ Voltage Out of Range!⚠️")

if current > 90:

print("⚠️ High Current Warning!⚠️")

if temperature > 55:

print("⚠️ Overheating Detected!⚠️")

time.sleep(5) # Adjust monitoring frequency

if \_\_name\_\_ == "\_\_main\_\_":

monitor\_battery()