WORKSHEET 2

Student Name: Sumit Kumar **UID: 22BCS10048**

Section/Group: KRG_IOT-1-A **Semester: 6th Semester**

Branch: BE-CSE **Date of Performance: 23/01/2025**

Subject Name: Foundation of Cloud IoT Edge ML Lab **Subject Code: 22CSP-367**

Aim: Simulate a cloud scenario using Matlab and run an algorithm for temperature variations.

Objective: To simulate a cloud computing scenario using MATLAB and implement an algorithm to monitor and analyze temperature variations.

Software Used:

- Online MATLAB
- ThinkSpeak

Procedure:

Creating Account on MATLAB:

- Open the web browser and create a account on the online MATLAB.
- Open MATLAB and start a new script.
- Write the code
- Select the code and press Enter to run the code.
- The code will simulate temperature readings (based on a sine wave variation) and send the data to ThingSpeak every 10 seconds Sending data on ThingSpeak:
- Go to ThingSpeak and create an account.
- Create a new channel for storing the temperature data
- After creating the channel, go to the Channel Settings page
- Get the Channel ID,Write API Key from the channel settings DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
- Now Analyze and Visualize Data on ThingSpeak

Code:

1. **MATLAB code:**

```
% ThingSpeak Configuration
channelID = 2807877; % Replace with your ThingSpeak Channel ID
writeAPIKey = 'B6HD5FG7NL1544LT'; % Replace with your ThingSpeak Write API Key
% Parameters
```

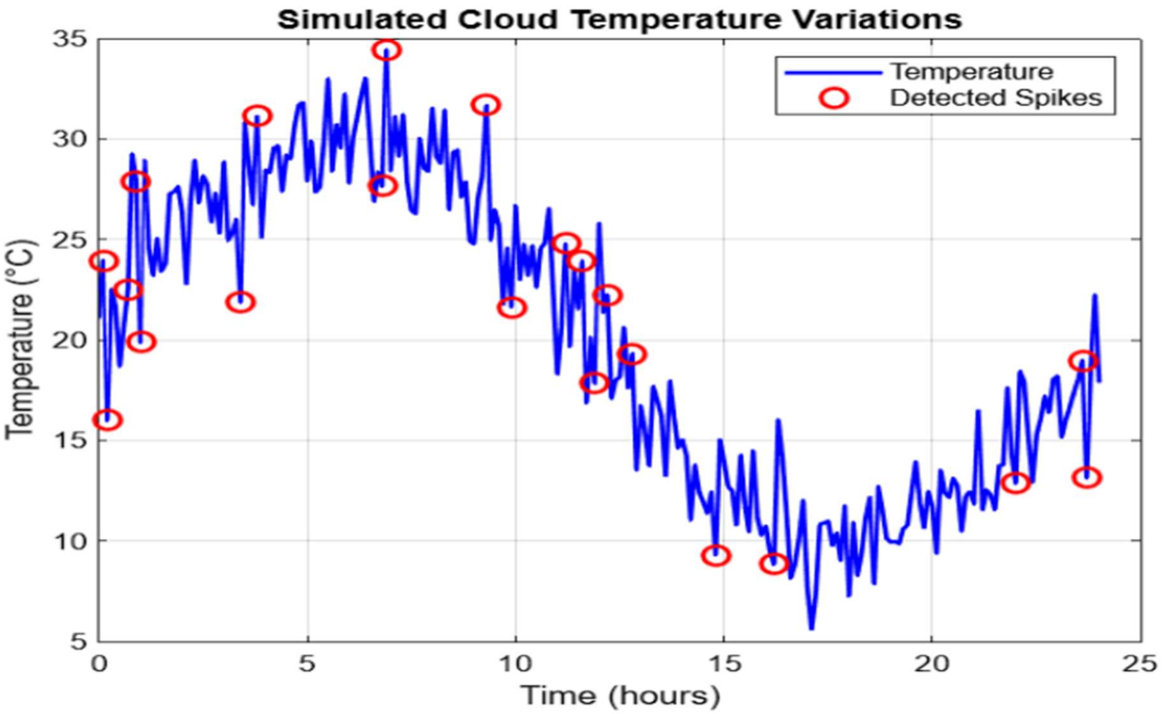
```
baseTemp = 20; % Base temperature in degrees Celsius
amplitude = 10; % Temperature fluctuation amplitude
noiseFactor = 2; % Random noise amplitude
% Simulating temperature variations
temperature = baseTemp + amplitude * sin((pi/12) * time) + noiseFactor *
randn(size(time));
% Plotting the temperature variations figure;
plot(time, temperature, 'b', 'LineWidth', 1.5);
xlabel('Time (hours)');
ylabel('Temperature (°C)');
title('Simulated Cloud Temperature Variations');
grid on;
% Running an algorithm to detect significant changes (spike detection)
threshold = 5; % Change threshold for spikes
tempDiff = diff(temperature); % Calculate differences
spikeIndices = find(abs(tempDiff) > threshold);
% Mark spikes on the plot
hold on;
plot(time(spikeIndices), temperature(spikeIndices), 'ro', 'MarkerSize', 8, 'LineWidth',
1.5);
legend('Temperature', 'Detected Spikes');
% Output spike times and values
disp('Detected spikes at the following times (hours) and temperatures (°C):');
disp([time(spikeIndices)', temperature(spikeIndices)']);
% Sending data to ThingSpeak
for i = 1:length(time)
 % Write the temperature to ThingSpeak
 response = thingSpeakWrite(channelID, temperature(i), 'WriteKey', writeAPIKey);

 % Display the data being sent
 fprintf('Time: %.1f hours, Temperature: %.2f°C\n', time(i), temperature(i));
% Optional: Add a delay to respect ThingSpeak rate limits (1 update per 15 seconds)
 pause(15);
end
disp('All data has been sent to ThingSpeak.')
```

2. **MATLAB code for sending data:**

```
matlab.addons.install('ThingSpeak Support for MATLAB')
% ThingSpeak Parameters
channelID = <2807877>; % Replace with your channel ID
writeAPIKey = '< B6HD5FG7NL1544LT >';
% Replace with your Write API Key
% Time in hours baseTemp = 20;
% Base temperature amplitude = 10;
% Temperature fluctuation amplitude noiseFactor = 2;
% Random noise amplitude temperature = baseTemp + amplitude * sin((pi/12) * time) +
noiseFactor
* randn(size(time));
% Send data to ThingSpeak in a loop for i
= 1:length(time) % Create data structure
data = temperature(i);
 % Write data to ThingSpeak channel response = thingSpeakWrite(channelID, data,
'WriteKey', writeAPIKey);
 % Pause to simulate real-time data (every 5 seconds)
pause(5); end
disp('Data successfully sent to ThingSpeak.');
```

Output:



Learning Outcome:

- Gain a basic understanding of how cloud cover and other environmental factors influence temperature.
- Improve your MATLAB programming skills by implementing algorithms for simulating real-world phenomena.
- Understand how to represent spatial data (like temperature) on a grid