**WORKSHEET 2**

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

**Edge ML Lab**

**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.')

1. **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,

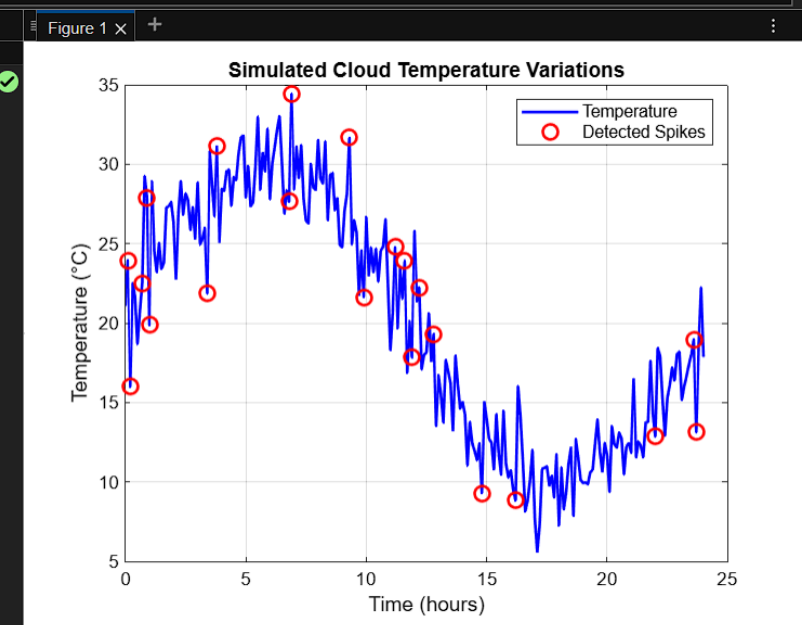
'WriteKey', writeAPIKey);

% 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