

**MODULE: 6NTCM009W Internet of Things (IoT)**  
**PROVISIONAL COURSEWORK ASSIGNMENT – SPRING 2025**  
**PRACTICAL LAB: An IoT prototype**

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**Submission deadline: Monday 24 March before 13:00pm**

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Deliverable: A report which includes software development, testing and findings as presented below.

Before you submit, please make sure to include the following information on the front page:

**Module code: 6NTCM009W Internet of Things (IoT)**

**Assessment Title: Coursework – An IoT prototype**

**Student name and ID:**

The report should be up to 5 double sided pages excluding the printout of the source code you provide as an Appendix.

- Submit your work through Blackboard -> 'Assessment' tab -> 'Practical Coursework' of the module Blackboard site by the deadline.
  - Upload only **ONE** file containing your answers, either as a Microsoft Word file or a pdf.
  - You have two chances to submit your work and you cannot amend or delete your work from Blackboard after the final submission.
  - After submission of the report, **you must attend** an oral examination (VIVA) to discuss the design, functionality and testing of the prototype. Viva dates will take place during your allocated seminars in week 11 and/or week 12.
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This course work covers Learning Outcomes LO3, LO4 and LO5

LO3. Assess and evaluate IoT system requirements for a given set of specifications.

LO4. Perform modelling and design of IoT systems and networks.

LO5. Use interpersonal, communication skills; communicate orally, in writing, and presenting

The purpose of this course work is to allow you to acquire and practice different, technical, and professional skills related to IoT system development. It aims to give you the opportunity to develop, test and assess the performance of an IoT prototype.

**What you will need to complete this coursework**

The Raspberry Pi Pico W kit as used in the seminars with the BME280 external sensor connected to it.

Google account to access Google sheets.

A power bank.

The work breaks down in the following three parts as shown below.

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**A. DEVELOPMENT part:**

- 1) Write a Python script for the Raspberry Pi Pico W, to demonstrate collecting data from the BOSCH BME280 temperature, humidity, and pressure sensor, on the command Shell. Get a snapshot of the script output and include it in the report.
- 2) Modify the Python script to act as web server holding the sensor readings, using either your home Wi-Fi router or your mobile as a hotspot, (save the script under a new name). Create a web page to serve for the sensor readings. Get a snapshot of the script output and a snapshot of the sensor readings on the web page and include it in the report.

- 3) Modify the Python script to act as a serverless cloud-based application (save the script under a new name). For this create an Apps Script for Google sheets to act as a data logger of the BME280 sensor measurements together with a timestamp and a counter for the data entries. Get a snapshot of the script output and a snapshot of the BME280 sensor readings as listed on the Google sheet and include it in the report.

Create a graph of all the data values: temperature, pressure and humidity vs time, for data visualisation. The graph should use the appropriate scale, include sufficient data readings and have a corresponding title and legend. Include the graph in your report.

#### **B. TESTING part:**

1. Deploy the Raspberry Pico W and take a picture of the setup and include it in the report. Briefly explain how you tested the prototype: methodology used and test cases.
  2. Collect sufficient data that cover indoor/outdoor, daylight/night scenarios and any other scenario you think may be useful. On the Google sheet, create one graph for temperature readings only and explain how data visualisation helps with analysing the data and include it in the report. You must explain what each graph displays and under what testing conditions.
  3. If the connection is lost during the process of gathering data, what would you do? Demonstrate the required script modifications to deal with such problem and/or explain your approach.
  4. If this prototype was to be expanded to operate as an IoT air pollution monitoring system, briefly discuss three improvements/enhancements that would be necessary.
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#### **C. Report**

The report should be up to 5 double sided pages excluding the printout of the source code you provide as an Appendix. The report shall address all tasks above and would include any required snapshots, results, figures/graphs, explanations where necessary. The appendix shall include a listing of the scripts used with comments.

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### MARKING SCHEME

<b>Coursework report - weight 50%</b>	<b>Max Mark</b>
<b>Part A Development</b>	
A1 – code and evidence of its compilation on the command Shell	10
A2 – code and evidence of data collected on the serving web page	15
A3 – code and evidence of data logged with timestamp on Google sheet and graph	15
<b>Part B Testing and performance</b>	
B1 - deployment	5
B2 – data graphs during testing	15
B3 – connection loss	15
B4 – air pollution monitoring	10
<b>Report style and quality</b> (language, structure, figures). All scripts should be included in the Appendix	15
<b>TOTAL</b>	<b>100</b>

<b>Coursework VIVA – weight 50%</b>	<b>Max Mark</b>
The viva is an oral examination where you will be asked questions about the work you have presented in the report. In the Viva you will have a chance to show ownership of the work in the report and your understanding of the concepts involved.	
Understanding and explanation of the prototype development	20
Understanding and explanation of the testing approach	20
Explanation of results/graphs	20
Problem solving skills	20
Understanding the concepts	20
<b>TOTAL</b>	<b>100</b>