Republic of the Philippines
Polytechnic University of the Philippines
College of Engineering
Computer Engineering Department

CMPE 30094
Embedded Systems
BSCOE _____

Laboratory Exercise 2: Bluetooth-Based Temperature and Humidity Monitoring

Name	Signature	Date Submitted	Group Grade	Individual Grade (Q&A)	Total
1.					
2.					
3.					
4.					
5.					
6.					

Group Grade

Criteria		**Points**					**SCORE**
Quality of the report activity	25	Very Untidy (5 points)	Untidy With erasures (10 points)	Untidy wo erasures (15 points)	Neat With erasures (20 points)	Neat no erasures (25 points)	
Correctness on the questions of the activity	25	No answer (0 point)	Incorrect (10 points)	Some are correct (15 points)	Mostly correct (20 points)	Correct (25 points)	
Promptness	25	more than 1 week late (5 points)	3 to 5 days late (10 points)	2 days late (115points)	One day late (20 points)	On time (25 points)	
TOTAL	75						-

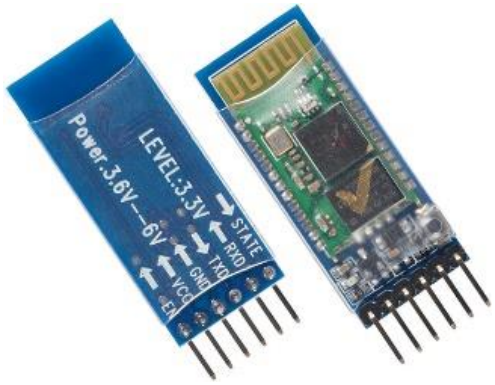
Individual Grade

Criteria		**Points**					**SCORE**
Q & A	25	No answer (0 point)	Wrong answer (10 points)	Slightly correct (15 points)	Mostly correct (20 points)	Correct answer (25 points)	

Laboratory Objectives

- Integrate a Bluetooth module and a DHT11 temperature and humidity sensor to create a wireless temperature and humidity monitoring system.
- Learn how to interface the DHT11 sensor with a microcontroller
- Establish a Bluetooth connection with a smartphone, and transmit sensor data wirelessly for real-time monitoring.

Materials Required:

Arduino UNO R3 board	- Jumper wires	Blue tooth module HC-05 
USB cable	- LEDs (optional)	
Breadboard	- Resistors (220 ohms or similar)	
Temperature and Humidity Sensor - DHT11	- Smart phone	

Activity Procedure:

a. Connect the DHT11 sensor to the microcontroller board using the following connections:

- VCC : Connect Vcc to 5V power supply of the Arduino R3
- GND : Connect the GND to ground (GND) of the Arduino R3
- DATA : Connect the DATA to the digital input pin 2 of the Arduino R3

b. Connect the Bluetooth module to the Arduino R3 board:

- VCC : Connect the Vcc to the 3.3V power supply of the Arduino R3
- GND : Connect the ground (GND) to the GND of the Arduino R3
- TX : Connect TX (receive) to the Pin 10 of the Arduino R3
- RX : Connect RX (transmit) to the Pin 11 of the Arduino R3

c. Ensure that the connections are secure and there are no loose connections or short circuits.

2. Software Setup:

a. Run the Arduino IDE

b. Select Arduino UNO R3 board (select the correct board and port).

c. Install the required libraries for the DHT11 sensor (Adafruit) and the Bluetooth module.

d. Open a new sketch in the Arduino IDE and write the code to read data from the DHT11 sensor and transmit it via the Bluetooth module. Sample code is provided below:

Source Code

```
#include<SoftwareSerial.h>

#include "DHT.h"


SoftwareSerial BLUETOOTH(10,11);    //Bluetooth Module to Pin 10 (RX),  Bluetooth
Module to Pin 11 (TX)

#define DHTPIN 2
#define DHTTYPE DHT11      // DHT 11
DHT dht(DHTPIN, DHTTYPE);

void setup()
{
BLUETOOTH.begin(9600);
dht.begin();
}

void loop()
{
  delay(2000);
  // Read humidity
  float humidity = dht.readHumidity();
  // Read temperature as Celsius (the default)
  float tempC = dht.readTemperature();
  // Read temperature as Fahrenheit (isFahrenheit = true)
  float tempF = dht.readTemperature(true);
  BLUETOOTH.print(humidity);
  BLUETOOTH.print(",");
  BLUETOOTH.print(tempC);
  BLUETOOTH.print(" Celcuis");
  BLUETOOTH.print(",");
  BLUETOOTH.print(tempF);
  BLUETOOTH.print(" Farenht");
  BLUETOOTH.print(";");
  delay(20);
}
```

e. Upload the code to the Arduino Board board.

3. Smartphone Setup:

a. Open Play Store

b. Install an Arduino Bluetooth Terminal application by Frederik Hauke on your smartphone. 

or you can install Bluetooth Serial Monitor by ArduinoGetStarted. 

b. Enable Bluetooth on your smartphone and pair it with the Bluetooth module connected to the Arduino.

4. Testing and Data Monitoring:

a. Open the Bluetooth terminal application on your smartphone and establish a connection with the Bluetooth module. Pair the connection with the HC-05 temperature sensor. Password is 1234.

b. On the app, select the Smart Phone as a Receiver.

b. Once the connection is established, the Arduino will start reading the temperature and humidity values from the DHT11 sensor and transmit them wirelessly via Bluetooth.

c. Monitor the temperature and humidity readings displayed on the smartphone screen.

You can also access the Bluetooth Terminal APK app in the google drive

https://drive.google.com/file/d/13baGsuOv-hguJSAHVF3XbfXdgK5MFS5M/view?usp=sharing