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Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Electronics Engineering (SENSE)

B. Tech – Electronics & Communication Engineering

BECE403E – EMBEDDED SYSTEMS DESIGN

LAB RECORD

(lab slot L27+L28)

Submitted By

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Submitted To

Dr. S.Muthulakshmi

DATE: 21/02/2025

Slot: L27+L28

Date: 21/2/2025

LAB – 08: HC-05 Bluetooth Module Interfacing

AIM:

To understand the working of Nucleo64-STM32L152RE Board and to perform the following tasks:

Lab Task-1: Print name and registration number in smartphone serial console

Lab Task-2: Home automation with LED and buzzer

Lab Task-3: Temperature monitoring system

Software Required: ARM Keil Studio (Mbed Online Compiler)

Hardware Required: Micro USB cable, NUCLEO64-STM32L152 Board, LEDs, Jumper Wires (M-F and MM), Breadboard, HC-05 bluetooth module, LM35 senso.

Procedure:

1. Go to ARM Keil Studio (<https://studio.keil.arm.com>) and log in
2. Select File → New → Mbed Project
3. Click the Example project drop-down list and select “mbed2-example-blinky”
4. In Project name field, provide the name of the new project and click Add project
5. Double click on the “main.cpp” file from the newly created project folder
6. Modify the code in the editor window as per the logic of your application
7. Check for any errors in the program under the “Problems” tab of the panels window
8. If no errors, connect the Nucleo Board to the computer using Micro USB Cable
9. Click Play icon (Run project) to upload and start the code execution on the board.

PROGRAMS:

Lab Task 1: Print name and registration number in smartphone serial console

```
#include "mbed.h"
Serial pc(USBTX, USBRX);
Serial bt(PC_10, PC_11);
int main() {
    pc.baud(9600);
    bt.baud(9600);

    pc.printf("Hello!\n\r");
    char c;    while(1)
    {
        if(pc.readable()){
            c = pc.getc();
            pc.printf("%c", c);
            bt.printf("%c", c);
        }
        else if(bt.readable()){
            c = bt.getc();
            pc.printf("%c", c);
            bt.printf("%c", c);
        }
    }
}
```

Output:

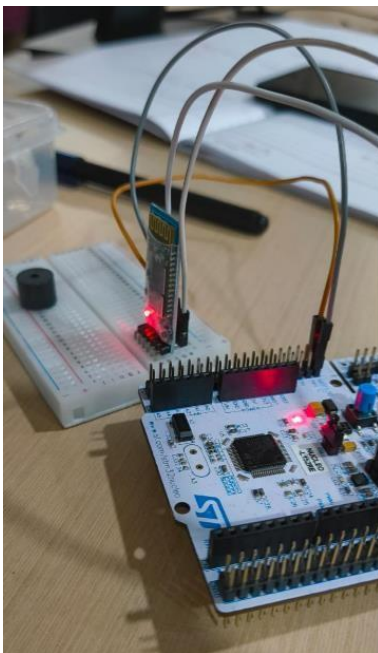


Fig.1.1: Setup of Nucleo board with HC-05

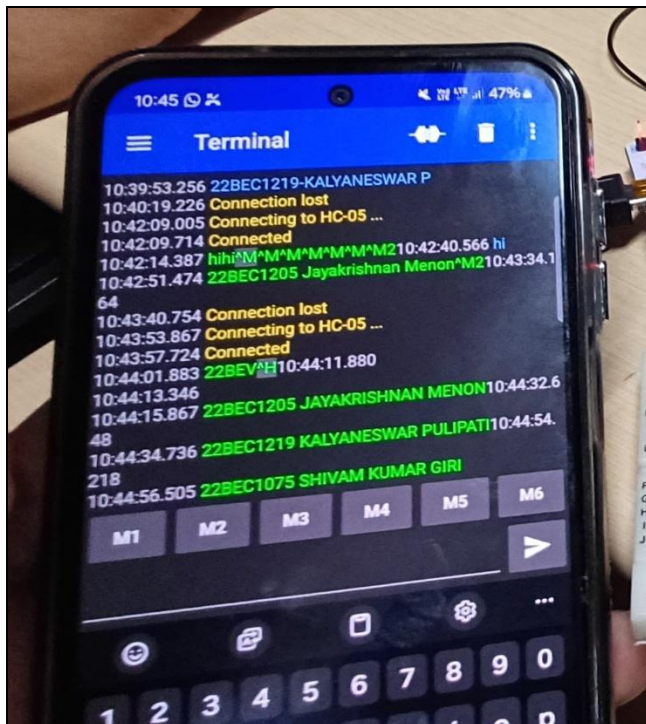


Fig.1.2: Print name and registration number in smartphone serial console

Lab Task 2: Home automation with LED and buzzer

```
#include "mbed.h"

Serial bt(PC_10, PC_11);

DigitalOut led(LED1);
DigitalOut buz(PC_8);

int main() {
    bt.baud(9600);
    bt.printf("Hello, world!");
    while(1) {
        if(bt.readable()){
            char c = bt.getc();
            switch(c){
                case '1':
                    led = 1;
                    bt.printf("LED is ON");
                    break;
                case '2':
                    led = 0;
                    bt.printf("LED is OFF");
                    break;
                case '3':
                    buz = 1;
                    bt.printf("Buzzer is ON");
                    break;
                case '4':
                    buz = 0;
                    bt.printf("Buzzer is OFF");
                    break;
            }
        }
    }
}
```

Output:

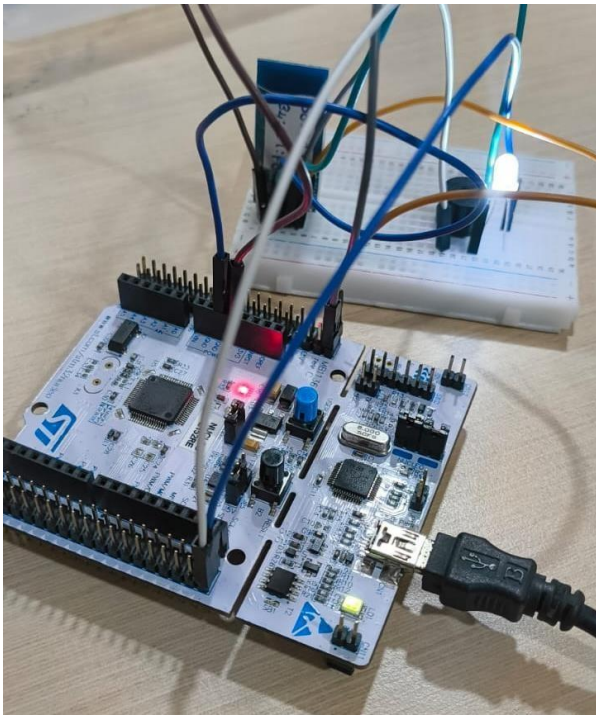


Fig.2.1: Home automation with LED and buzzer

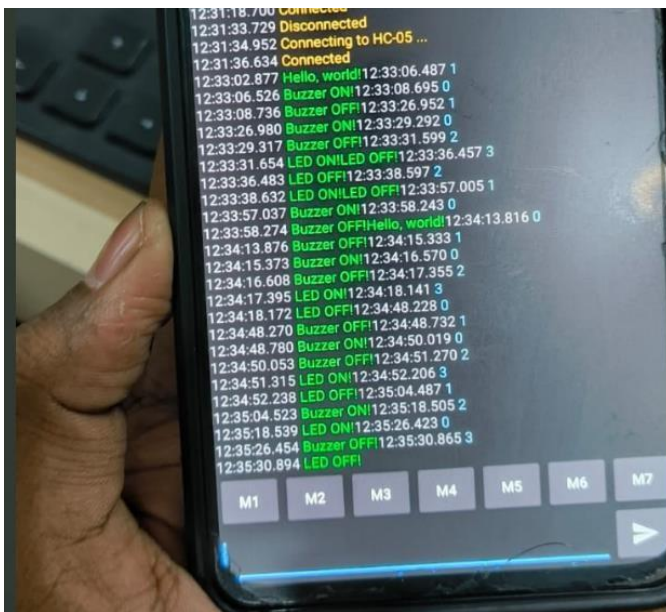


Fig.2.2: Bluetooth console in smartphone

Lab Task 3: Temperature monitoring system

```
#include "mbed.h"

Serial bt(PC_10, PC_11);

AnalogIn temp(PC_5);
DigitalOut buz(PC_8);

int main() {
    bt.baud(9600);
    bt.printf("Temprature sensing");

    while(1) {
        float read = temp * 500;
        bt.printf("Temperature is %.4f\n\r", read);

        if(read > 35.0) buz = 1;
    else buz = 0;

        wait(1);
    }
}
```

Output:

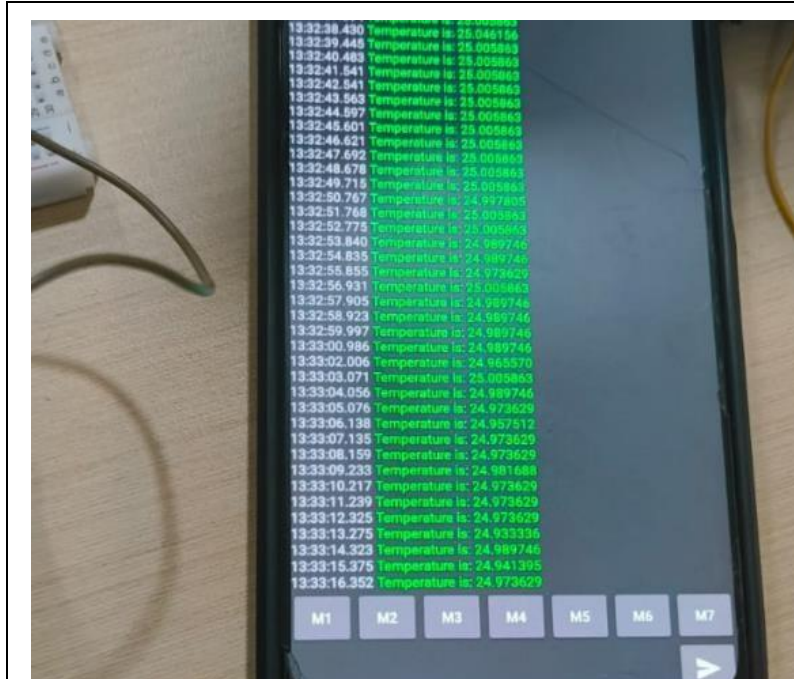


Fig.3.1: Temperature monitoring system

OUTPUT VERIFICATION:

P R T W T M		M T W T F S S	
Exp No: 8	Date: 21/2/25	Page No.: Date:	
Jeyakrishnan Menon 22BEC1205		YOUVA	
<u>Lab 8</u> HC05 Module Interfacing			
<u>Task 1</u> : — o/p ref 8/21/2 1205 —			
<u>Task 2</u> : < 12 21/2 (1205)			
<u>Task 3</u> :			
o/p ref 8/21/2 1205			

RESULT:

This experiment showcases Bluetooth-based communication for remote control and monitoring. It enables bidirectional data transfer, toggles an LED and buzzer via commands, and implements temperature sensing with an alert system. This demonstrates fundamental embedded system interactions using serial communication and sensor-based automation.

UART was used to interface the HC05 with the nucleo board.