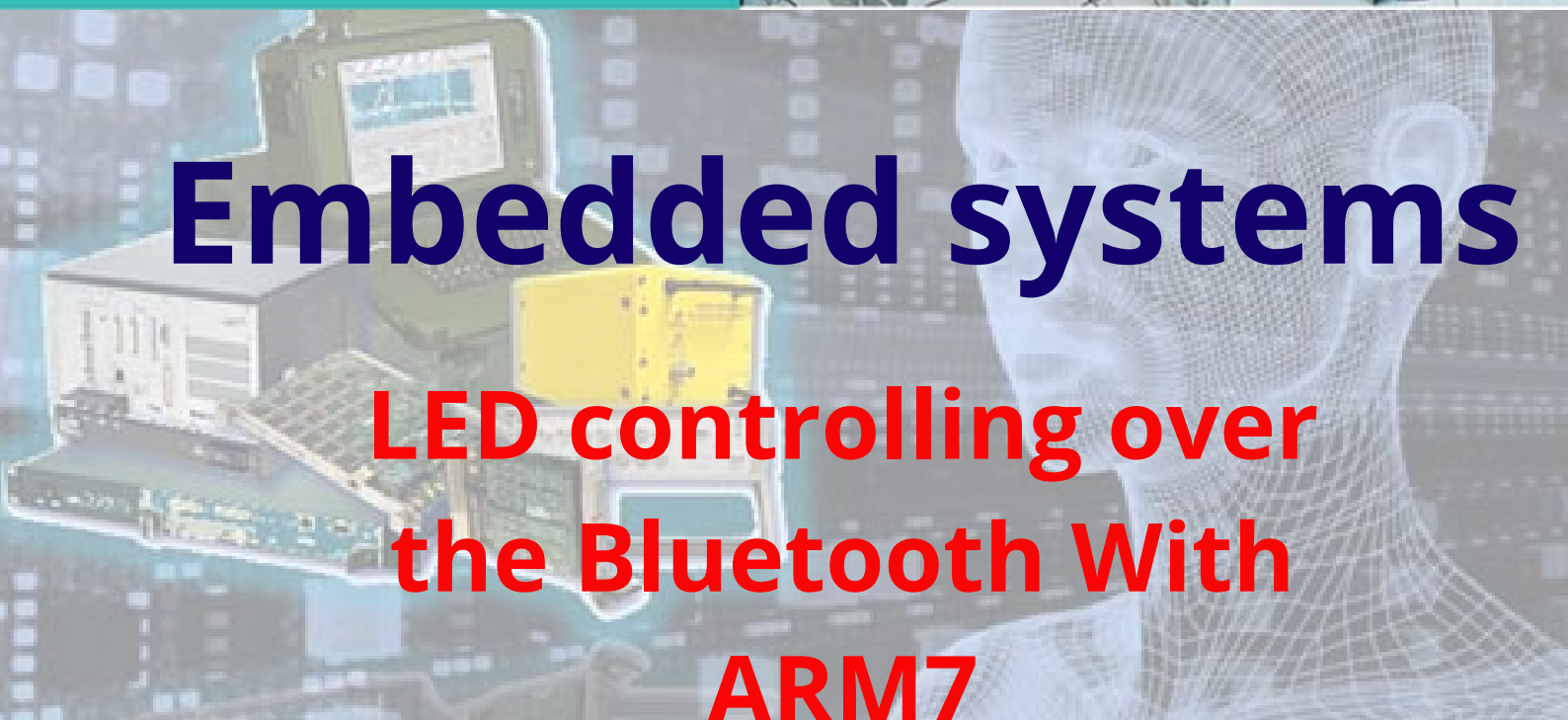




# Andhra Pradesh State Skill Development Corporation



## Embedded systems

LED controlling over  
the Bluetooth With

ARM7

## LED controlling by Bluetooth Mobile App

**AIM:** Control led by giving characters to Bluetooth Communication

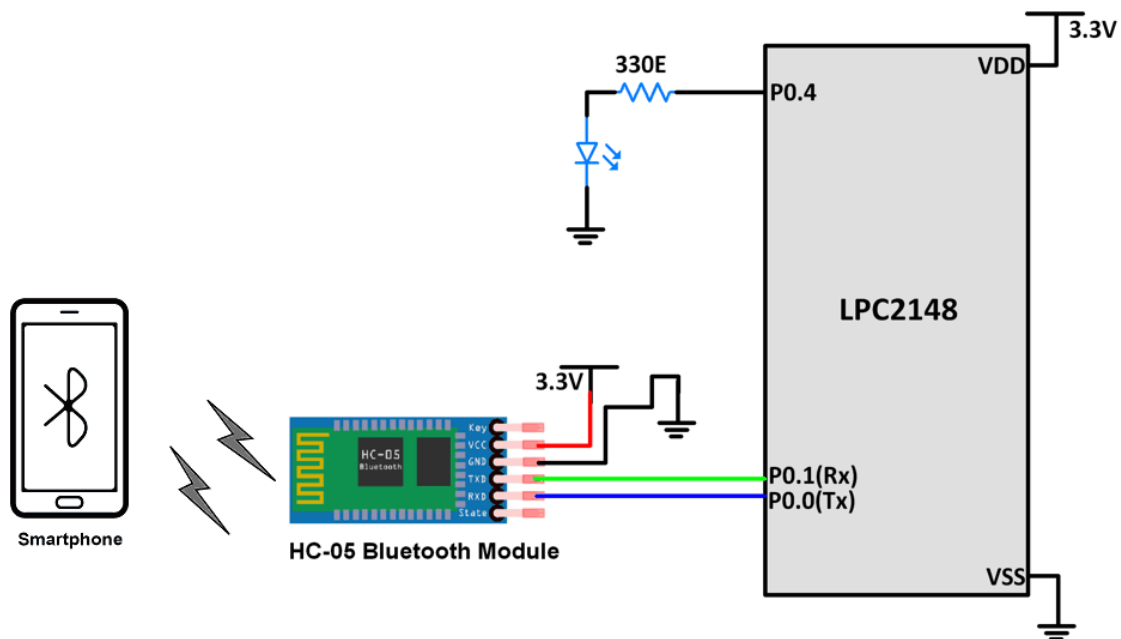
**Software Required:** Keil IDE and Bluetooth mobile App

### Components Required:

1. System -1
2. ARM7 development board -1
3. USB to RS-232 cable -1
4. 9V Adapter -1
5. LED -1
6. Resistor 330 ohms-1
7. Breadboard-1
8. Connecting Wires -Required
9. Mobile with Bluetooth app

### Theory:

HC-05 is a Bluetooth device used for wireless communication. It works on serial communication (UART). To communicate smartphone with the HC-05 Bluetooth module, a smartphone requires a Bluetooth terminal application for transmitting and receiving data. You can find Bluetooth terminal applications for android and windows in the respective app. store.



**Bluetooth Module Serial Interface**

So, when we want to communicate through a smartphone with the HC-05 Bluetooth module, connect this HC-05 module to the LPC2148 Microcontroller. Before establishing



communication between two Bluetooth devices, 1st we need to pair the HC-05 module to a smartphone for communication.

## Pair HC-05 and smartphone:

1. Search for a new Bluetooth device from your phone. You will find a Bluetooth device with the “HC-05” name.
2. Click on the connect/pair device option; the default pin for HC-05 is 1234 or 0000.

After pairing the Bluetooth device to the smartphone, open the Bluetooth terminal application, and connect to paired device HC-05.

It is simple to communicate, we just have to type in the Bluetooth terminal application of the smartphone. Characters will get sent wirelessly to Bluetooth module HC-05. HC-05 will automatically transmit it serially to the LPC2148 Microcontroller. In the same way, we can send data from the LPC2148 Microcontroller to the smartphone

In this application when **A** is sent from the smartphone, LED will turn ON. If **B** is sent, LED will turn OFF. If the received data is other than **A** or **B**, it will return a message to the smartphone that the proper option needs to be selected.

## Procedure:-

1. Open Keil  $\mu$ Vision from the icon created on your desktop.
2. Create a new project on Kiel with the appropriate name and destination.
3. Take a new text file and write the code in a text editor.
4. Save the text file with “.c “extension.
5. add “.c ” file to source group and check errors and warnings.
6. change the target options and create a hex file.
7. Now open flash magic to burn hex file into the development board.
8. Connect the hardware circuit and Connect your development Board to the USB port of your computer.
9. In the flash-magic window select the target device, serial port, board rate, and hex file.
10. Click on the start button to burn the hex file to the development board.
11. after uploading press the reset button and check the output.

## Code:-

```
#include<lpc21xx.h>

//User function declaration
void uart0_init(void);
void uart_tx(unsigned char);
void uart_enter(void);
```



```
char uart_rx(void);
void uart_string(unsigned char [])

//pin declaration
#define led 0x00000004

// main function
int main(){

    unsigned char a;
    IODIR0|=led;
    uart0_init();
    while(1){

        a=uart_rx();
        if(a>0){
            uart_tx(a);
            if(a=='a') {
                IOSET0|=led;
                uart_string("led is on");
            }
            else {
                IOCLR0|=led;
                uart_string("led off");
            }
        }
        uart_enter();
    }
}

// user function definition
void uart0_init(void){
    PINSEL0|=0x00000005;
    U0LCR=0x83;
    U0DLM=0x00;
    U0DLL=0x61;
    U0LCR=0x03;
}

void uart_tx(unsigned char ch){
    U0THR=ch;
    while(((U0LSR) & (0x20)) ==0);

}

void uart_enter(void){
    uart_tx(13);
    uart_tx(10);
}
```



```
char uart_rx(void){  
    while(((U0LSR) & (0x01)) == 0);  
    return (U0RBR);  
}  
  
void uart_string(unsigned char ch[]){  
    unsigned int x=0;  
    for(x=0;ch[x]!='\0';x++)  
        uart_tx(ch[x]);  
}
```

**Result:** -When a character is given to the Bluetooth terminal then the led will turn ON and for another character led will turn OFF.