



YILDIZ TECHNICAL UNIVERSITY
MECHATRONICS ENGINEERING DEPARTMENT
MKT3811 – Microprocessors and Programming
TERM PROJECT
SMART HOME SYSTEM

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1. Code

The coding part of our smart home system project consists of two stages. In the first stage, the code we wrote on the CCS C compiler is as follows.

```
#include <16F887.h>

#fuses HS, NOWDT, NOPROTECT, NOLVP

#use delay(clock=4000000)

// Define LED pins
#define LED1 PIN_B7
#define LED2 PIN_B5
#define LED3 PIN_B3
#define LED4 PIN_B1
#define LED5 PIN_B0

// Define Bluetooth module pins
#define BT_RX PIN_C7
#define BT_TX PIN_C6

// UART configuration
#use rs232(baud=9600, xmit=BT_TX, rcv=BT_RX, stream=BT_SERIAL)

// Variables to store the previous state of LEDs
int led1State = 0;
int led2State = 0;
int led3State = 0;
int led4State = 0;
int led5State = 0;
```



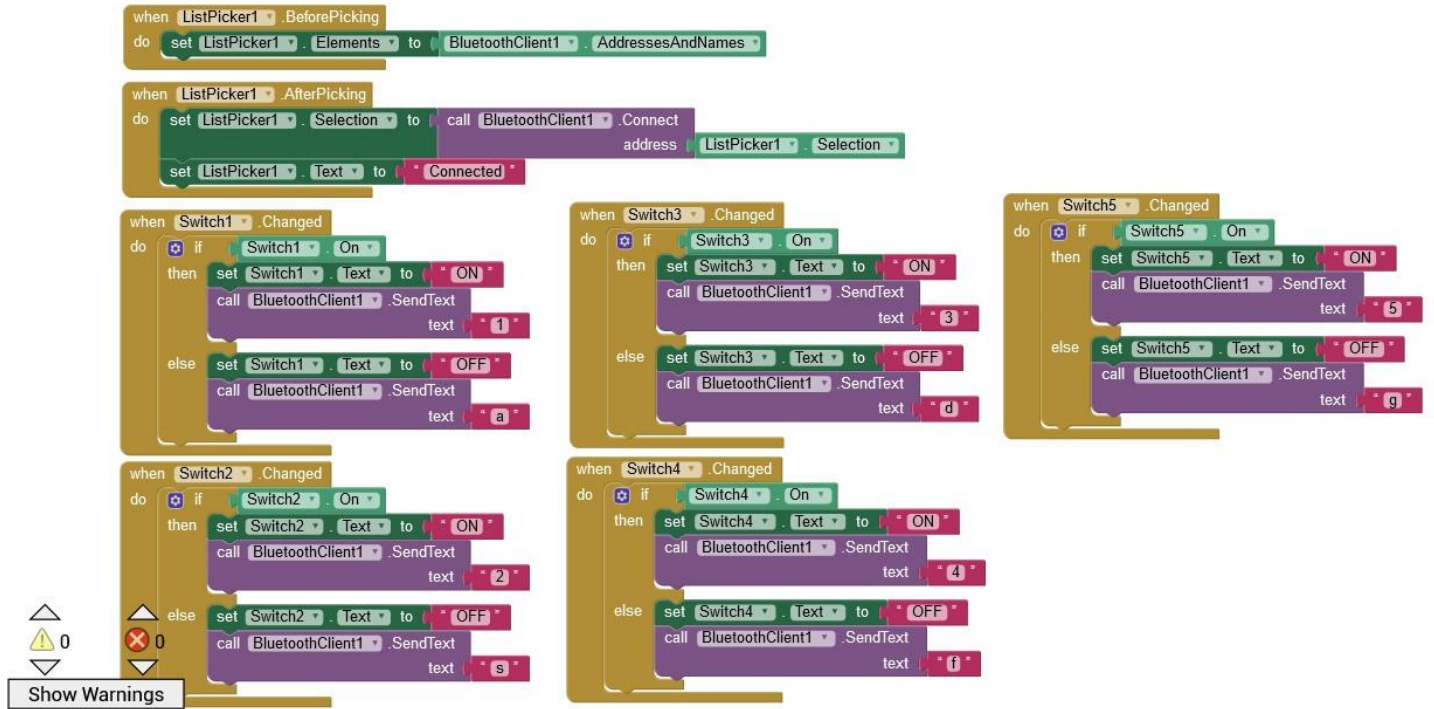
```
void main() {  
    // Initialize port directions  
    set_tris_c(0b11000000); // Configure RC6 and RC7 as inputs for Bluetooth module  
  
    // Initialize LEDs  
    output_low(LED1);  
    output_low(LED2);  
    output_low(LED3);  
    output_low(LED4);  
    output_low(LED5);  
  
    // Main loop  
    while (true) {  
        // Check if data is available on the Bluetooth module  
        if (kbhit(BT_SERIAL)) {  
            char receivedData = getc(BT_SERIAL);  
  
            // Control LEDs based on received data  
            if (receivedData == '1') {  
                led1State = 1;  
                output_high(LED1);  
            } else if (receivedData == 'a') {  
                led1State = 0;  
                output_low(LED1);  
            } else if (receivedData == '2') {  
                led2State = 1;  
                output_high(LED2);  
            } else if (receivedData == 's') {  
                led2State = 0;  
            }  
        }  
    }  
}
```



```
        output_low(LED2);
    } else if (receivedData == '3') {
        led3State = 1;
        output_high(LED3);
    } else if (receivedData == 'd') {
        led3State = 0;
        output_low(LED3);
    } else if (receivedData == '4') {
        led4State = 1;
        output_high(LED4);
    } else if (receivedData == 'f') {
        led4State = 0;
        output_low(LED4);
    } else if (receivedData == '5') {
        led5State = 1;
        output_high(LED5);
    } else if (receivedData == 'g') {
        led5State = 0;
        output_low(LED5);
    }
}
}
```

This C code is designed for a PIC16F887 microcontroller and utilizes UART communication to control five LEDs through a Bluetooth module. The LEDs are connected to pins B7, B5, B3, B1, and B0, and the Bluetooth module is connected to pins C7 (RX) and C6 (TX). The program continuously checks for incoming data from the Bluetooth module and interprets specific characters ('1', 'a', '2', 's', '3', 'd', '4', 'f', '5', 'g') to control the state of each LED. For instance, receiving '1' turns on LED1, 'a' turns it off, '2' turns on LED2, 's' turns it off, and so forth. The LED states are tracked using variables, and the corresponding output pins are manipulated accordingly within the main loop, resulting in the dynamic control of the connected LEDs based on Bluetooth input.

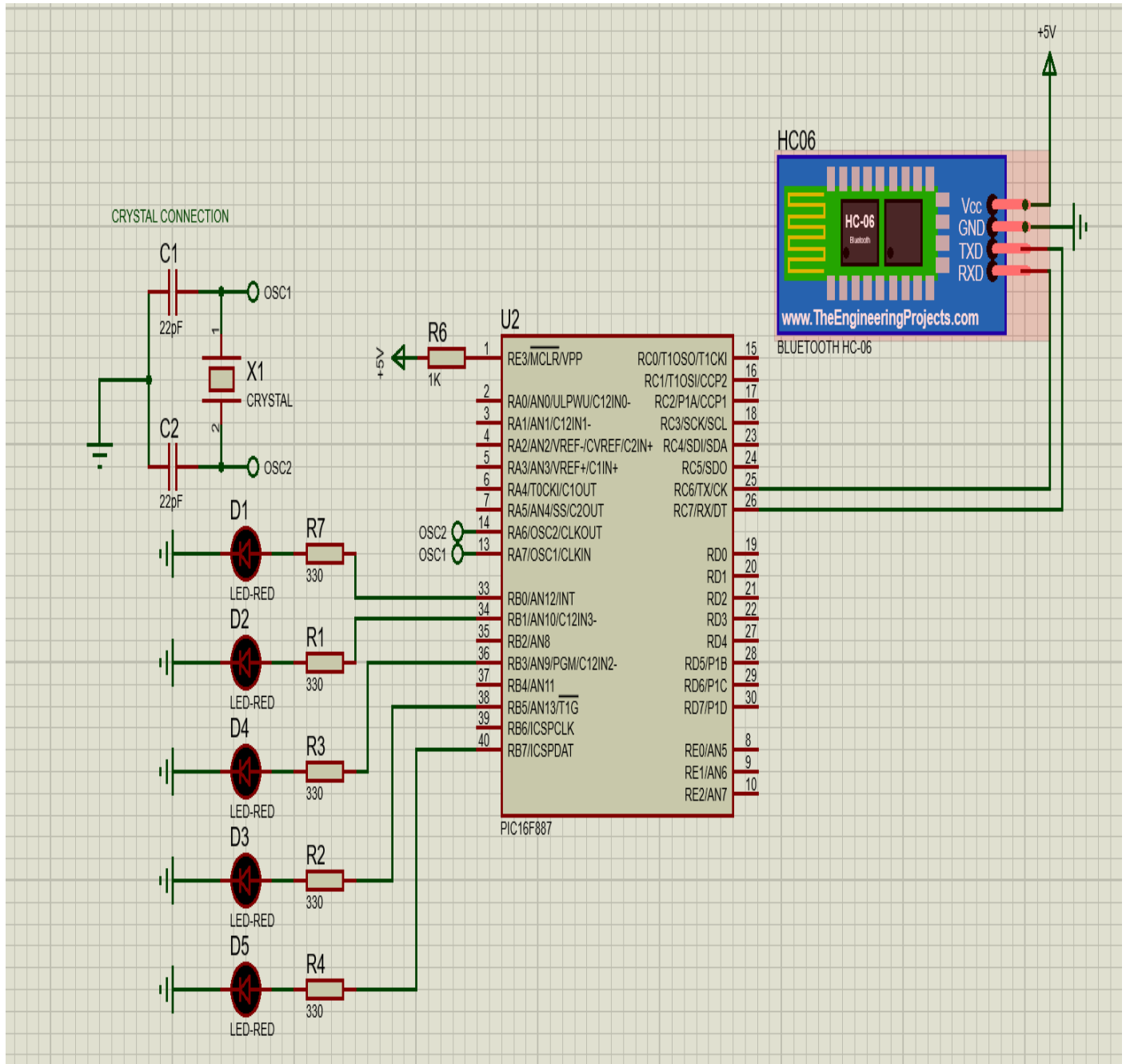
In the second stage, we created a code that sends a signal to the bluetooth module through the change in the 'switch' button via AppInventor.



The mobile interface of the application we created is as shown below.

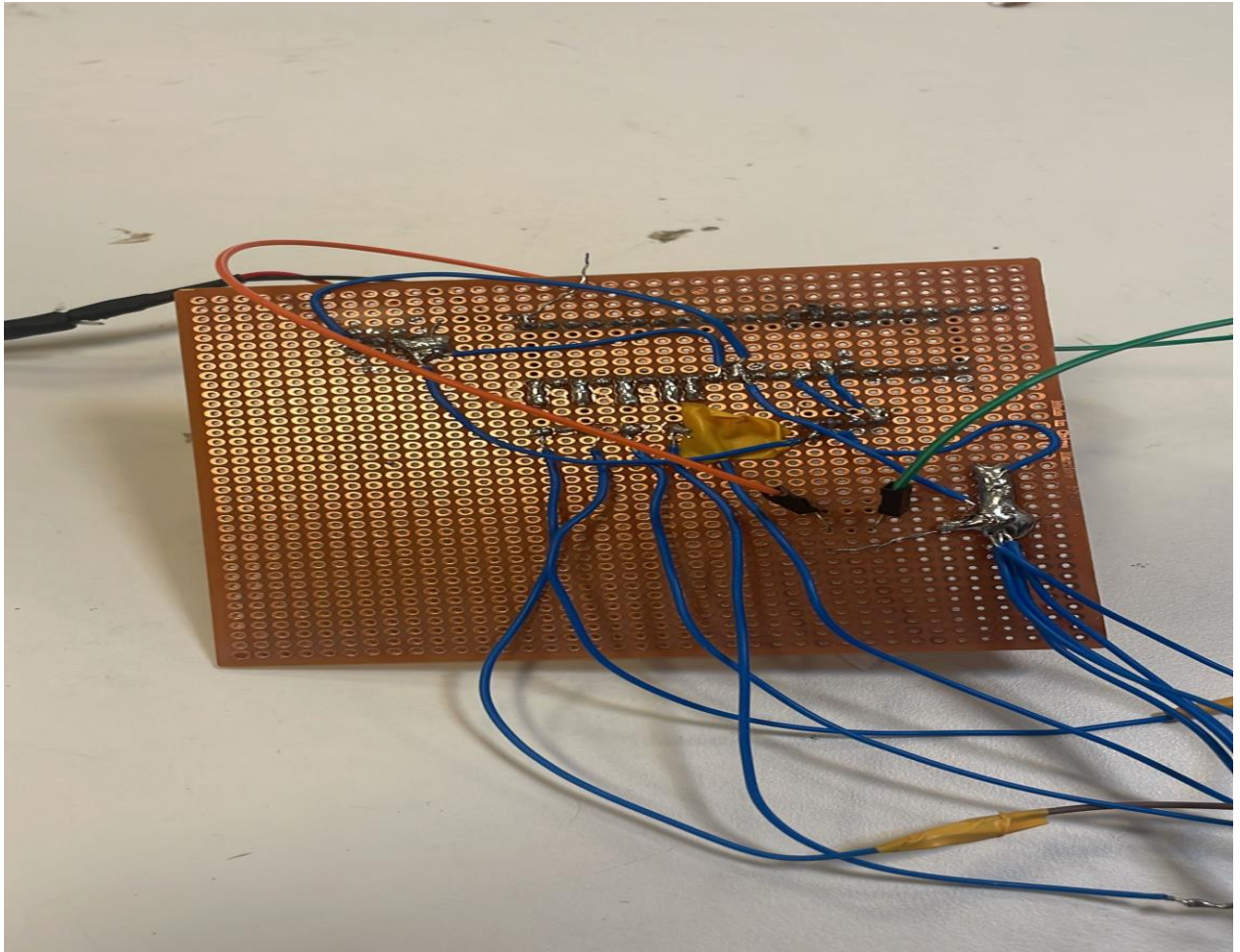
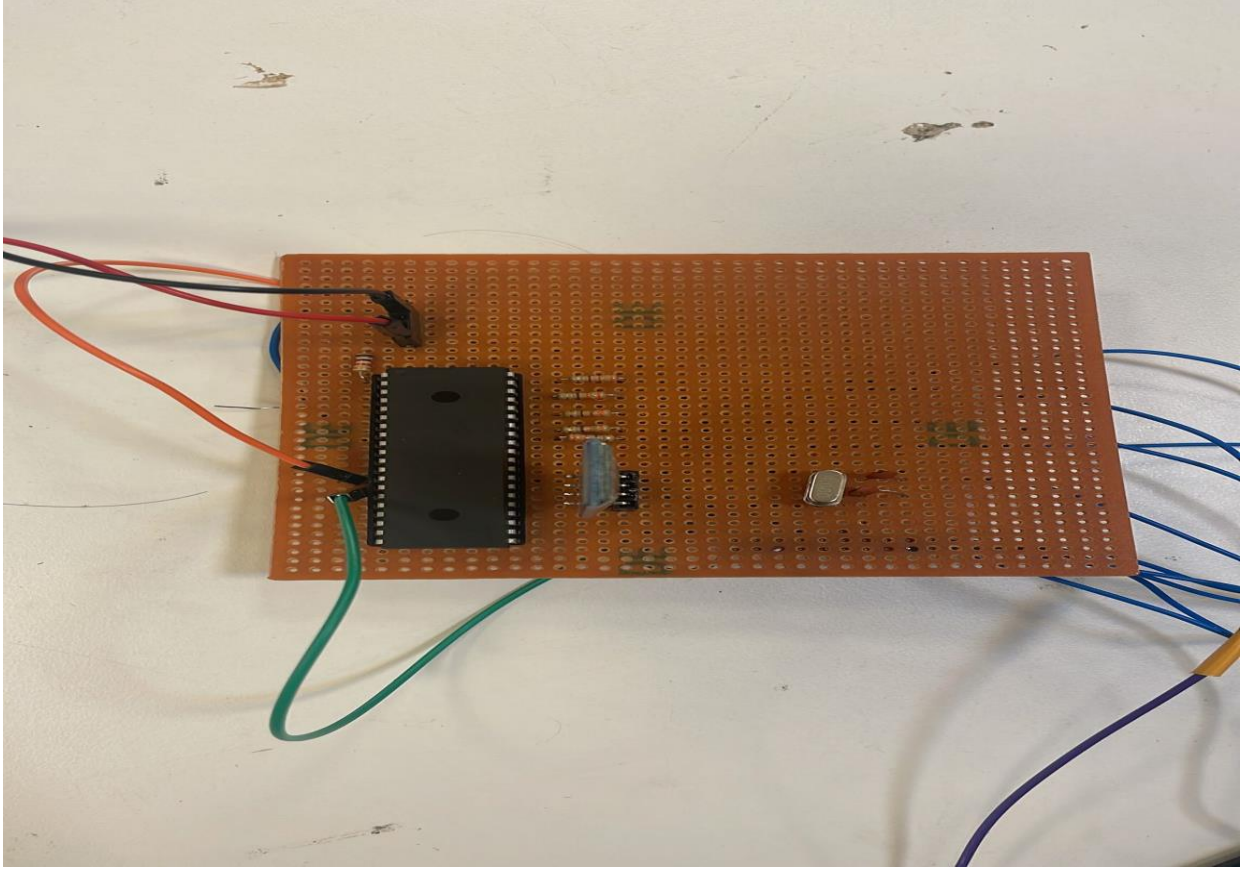


2. Circuit



In the circuit you see above, HC-06 is used as a Bluetooth module. When making Bluetooth connections, the RX TX ends are reversed on the pic16f887 so that RX to TX and TX to RX. The connections of the LEDs are made as B0, B1, B3, B5, B7 as in the code. The oscillator circuit is connected to 14 and 13 of the pic16f887 as it should be, and the circuit operates at 4Mhz. In addition, the power is made from the 1st leg of the pic 16f887 to be 5V by adding a 1K resistor.

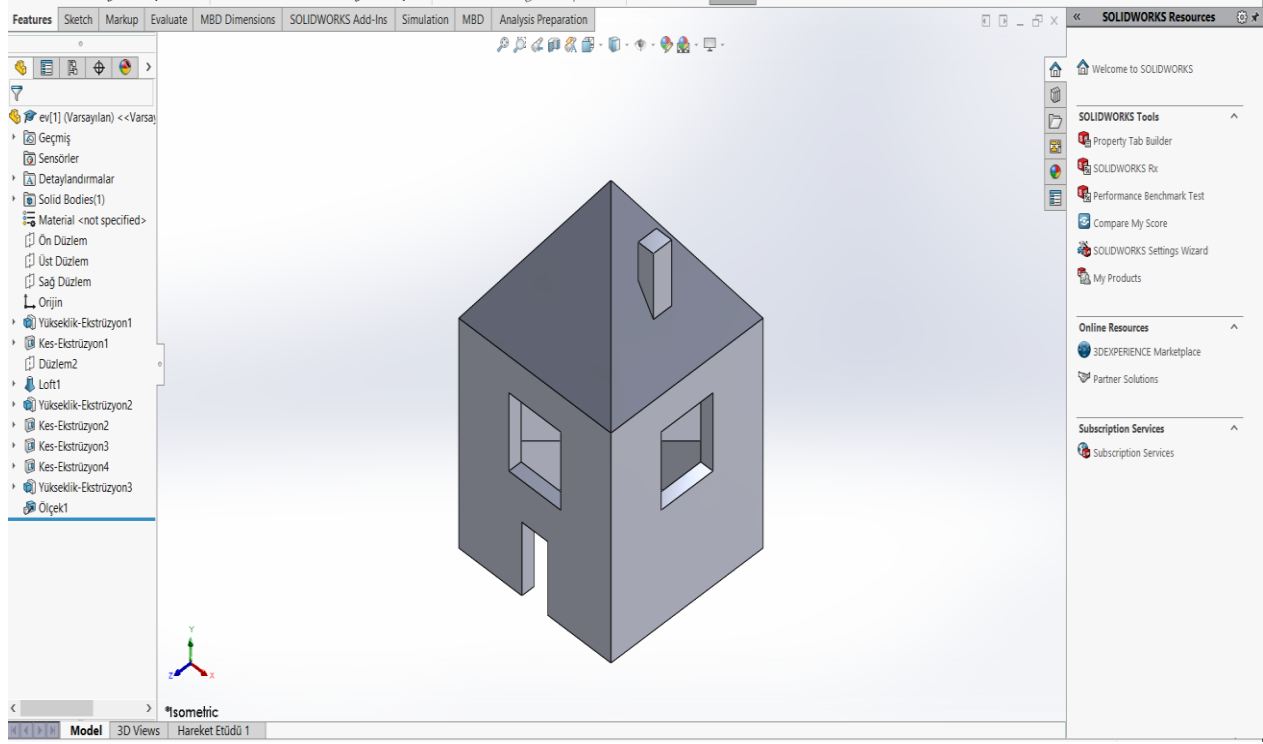
The implemented version of the circuit is as follows.





3. Home

The cad drawing of the house was made on SolidWorks as follows:





The house made of cardboard is as follows.

