

TED UNIVERSITY

2023 Fall

CMPE 453 Embedded Systems

LAB REPORT # 7

Lab Name: ARM7: GPIO and Led Blinking

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Section: 2

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I. Tasks

During the completion of this lab, several tasks were undertaken to achieve the goal of displaying binary numbers (100-255) in a circular manner on eight LEDs connected to the LPC2148/LPC2138 microcontroller. The primary tasks can be outlined as follows:

1. Proteus Simulation Setup

- a. Created a new project in Proteus for simulating the microcontroller and LED circuit.
- b. Added the LPC2148/LPC2138 microcontroller to the Proteus project.
- c. Connected eight LEDs to the microcontroller's GPIO pins P0.9–P0.16.

2. Programming the Microcontroller

- a. Opened Keil μ vision and created a new project for the LPC2148/LPC2138 microcontroller.
- b. Developed a C program to display binary numbers in a circular manner on the connected LEDs.
- c. Utilized GPIO commands in the C code to control the state of each LED.

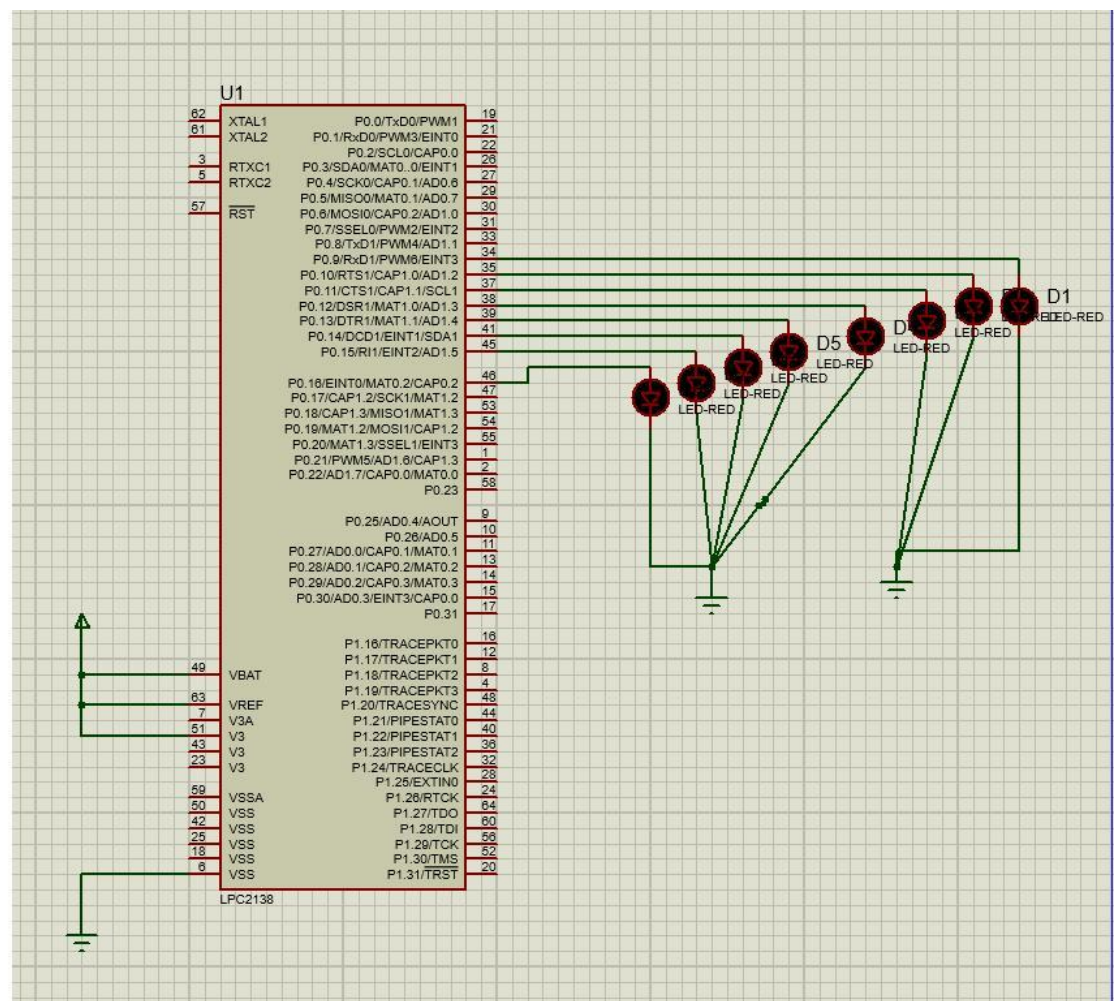
3. Microcontroller Programming

- a. Loaded the generated hex file into the LPC2148/LPC2138 microcontroller using Keil μ vision.
- b. Ran the simulation in Proteus to observe the LED blinking pattern based on the programmed microcontroller.

II. Hardware Implementation

The LPC2148/LPC2138 microcontroller was chosen for this experiment. The GPIO pins of this microcontroller were utilized to control the state of eight LEDs for the desired LED blinking pattern. Eight LEDs were connected to the microcontroller's GPIO pins P0.9–P0.16.

In Proteus, a new project was created, and the LPC2148/LPC2138 microcontroller was added. Eight LEDs were connected to the designated GPIO pins, replicating the real-world circuit setup. This allowed for the simulation of the programmed microcontroller's behavior.



III. Code

- The main loop continuously cycles through binary numbers from 100 to 255, displaying them on the LEDs in a circular manner.
- The GPIO commands were used to control the state of each LED. The following code snippet configures the GPIO pins as output ports for LEDs:

```
IOODIR |= (1<<9) | (1<<10) | (1<<11) | (1<<12) | (1<<13) | (1<<14) | (1<<15) | (1<<16);
```

- A nested loop iterates through the binary numbers from 100 to 255, displaying each number on the LEDs in a circular manner.

```
for(unsigned int i = 100; i<256;i++)  
{  
    IOSET0 |= i;  
    delay();  
    IOCLR0 |= ~(i);  
}
```

- A simple delay function (delay()) was implemented to introduce a delay between the display of two consecutive binary numbers.

IV. Critical Analysis / Conclusion

In conclusion, the lab was a success in implementing a microcontroller-based LED blinking circuit. The chosen LPC2148/LPC2138 microcontroller, coupled with the Keil μ vision IDE and Proteus simulation, provided a sturdy environment for development and testing.