Microprocessor

Stair Light Project Report

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1- Introduction

The purpose of this project is to create a stair light model controlled by a microprocessor. The microprocessor I used in the project is 18F45K22. This project is a project made in previous years. I developed the project, I added innovations.

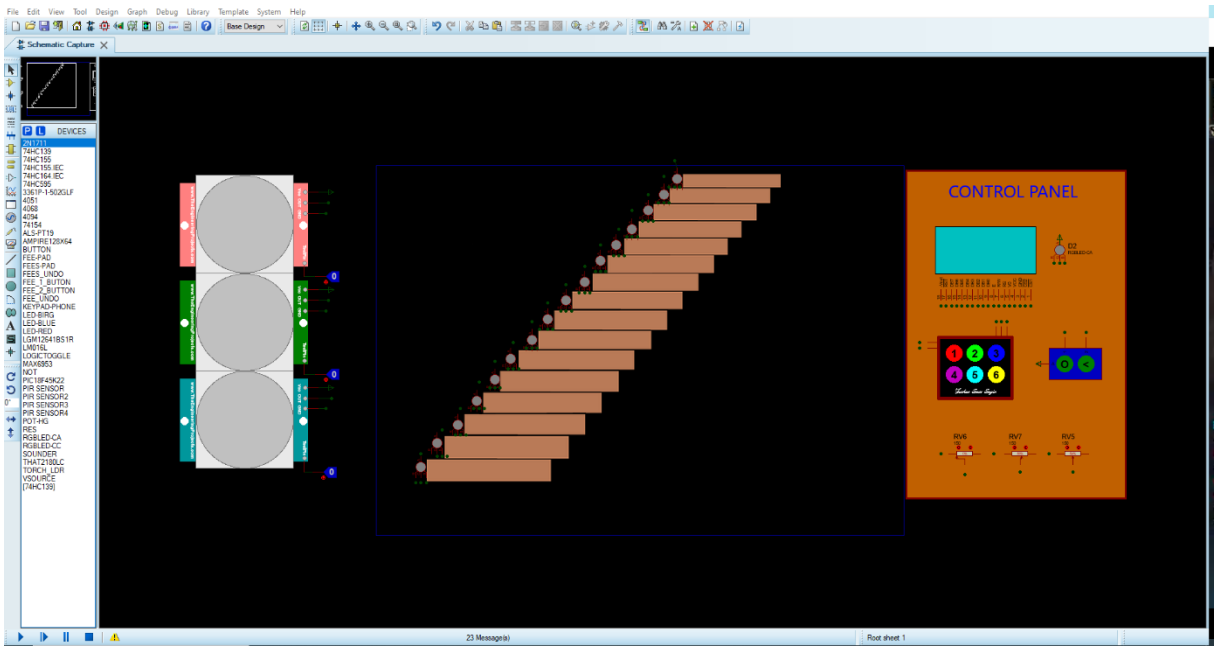
The usage area of the project is quite wide. It can be used for decoration and security in homes or shopping malls. The code of the project is written from MicroC. Proteus 8.9 was used for simulation. When running Proteus, freezes and errors may occur due to excessive CPU usage. This project was completed in 6 weeks.

2- Materials

- 18F45K22 Microprocessor
- 16 x RGB Leds
- 16 x Transistors
- 3 x Motion Sensors
- Screen (Glcd)
- Keypad (3x2)
- Keypad (2x1)
- 4 x Potentiometers
- 2 x Shift Registers
- Multiplexer
- Battery

3- Proteus Schematic

While setting up my project in proteus, I divided it into two pages. Thus, I was able to obtain a simpler and more understandable image. Switching between two pages is done with the Pgup and PgDown keys.

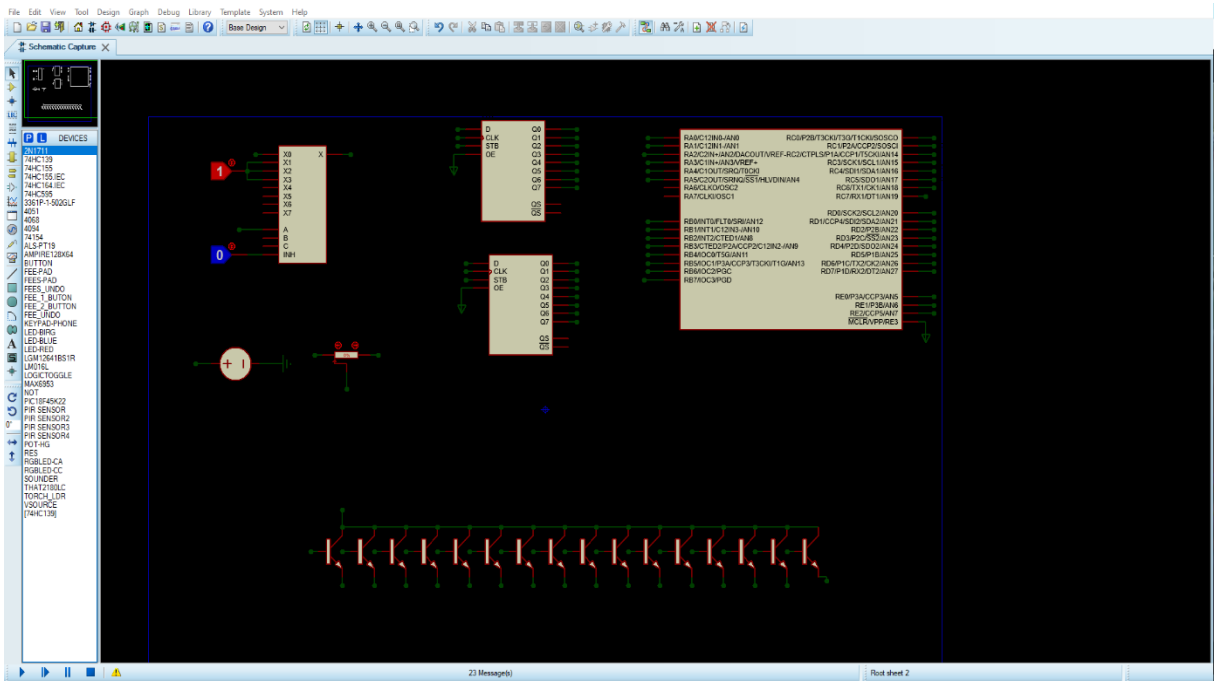


On the first page are the materials we need to check and see. In the image above, the elements on the left are the motion sensor. In the middle is an image representing the ladder I drew myself. And I added the leds to each digit. What you see on the right is the control panel. There are glcd screen and keypads and potentiometers here.

The 6-key keypad on the control panel allows us to do our operations in the menu. In the keypad with 2 keys, the "O" key is the reset key. If you press this key, the code will return to the beginning. The "<" key is the key to return to the menu. Thanks to this button, we can return to the menu and continue our operations without resetting our code.

3.1- Interrupt

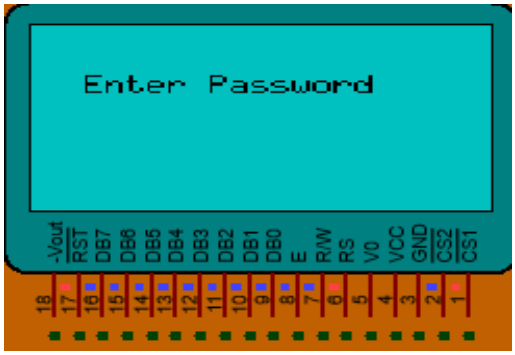
In this project, the interrupt function is used for the reset process. If the "O" key is pressed, the code exits the main function and enters the interrupt. There is a reset code in the interrupt. Therefore, if interrupt is reached, the code is reset and returns to the beginning.

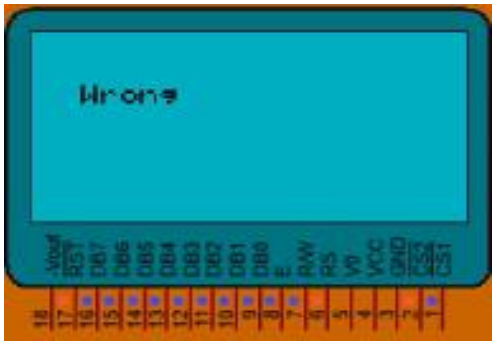


On the second page, there are equipment that we will not operate on after running the program. Here are the microprocessor, shift registers, transistors and the necessary materials for the processor to work.

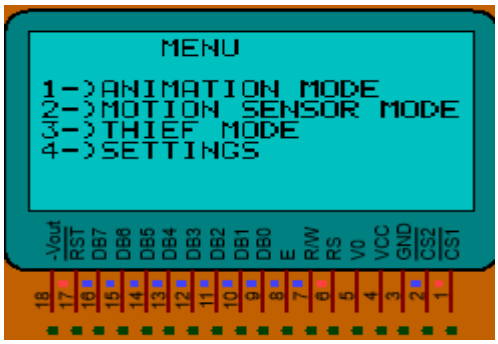
First of all, one of the biggest problems in the project is the port shortage in the microprocessor. Normally 16 ports are needed for 16 leds. We use shift register to reduce this. Transistors, on the other hand, ensure that the current coming to the LEDs is controlled.

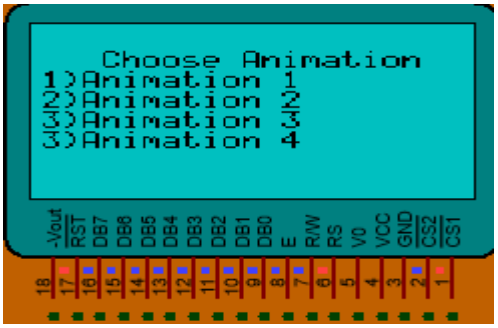
4- Usage Of The Project



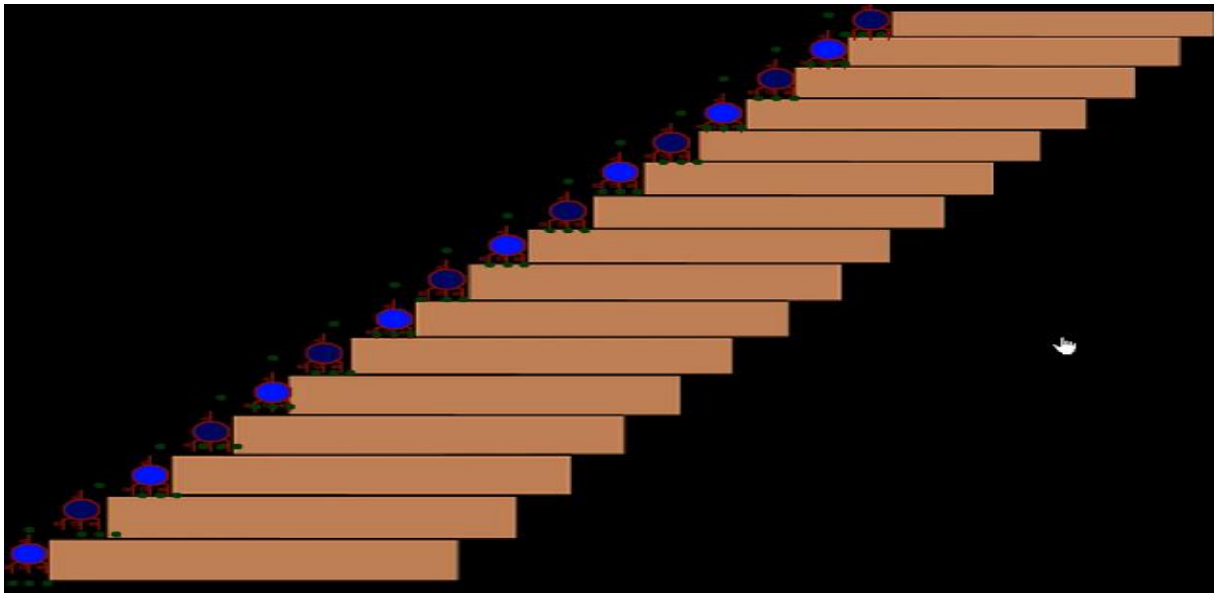


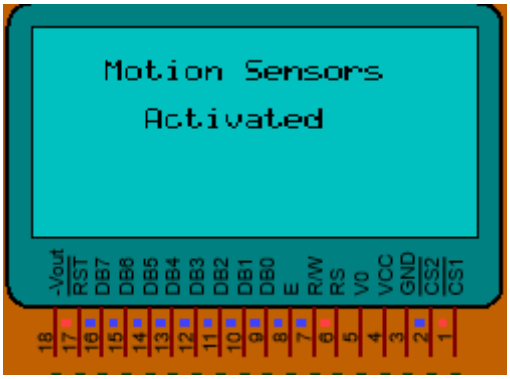
As soon as you run the project, it first asks for a password. It keeps prompting you for the password until you enter the correct password. The password I set is "16". If you key this number, you can switch to the menu.



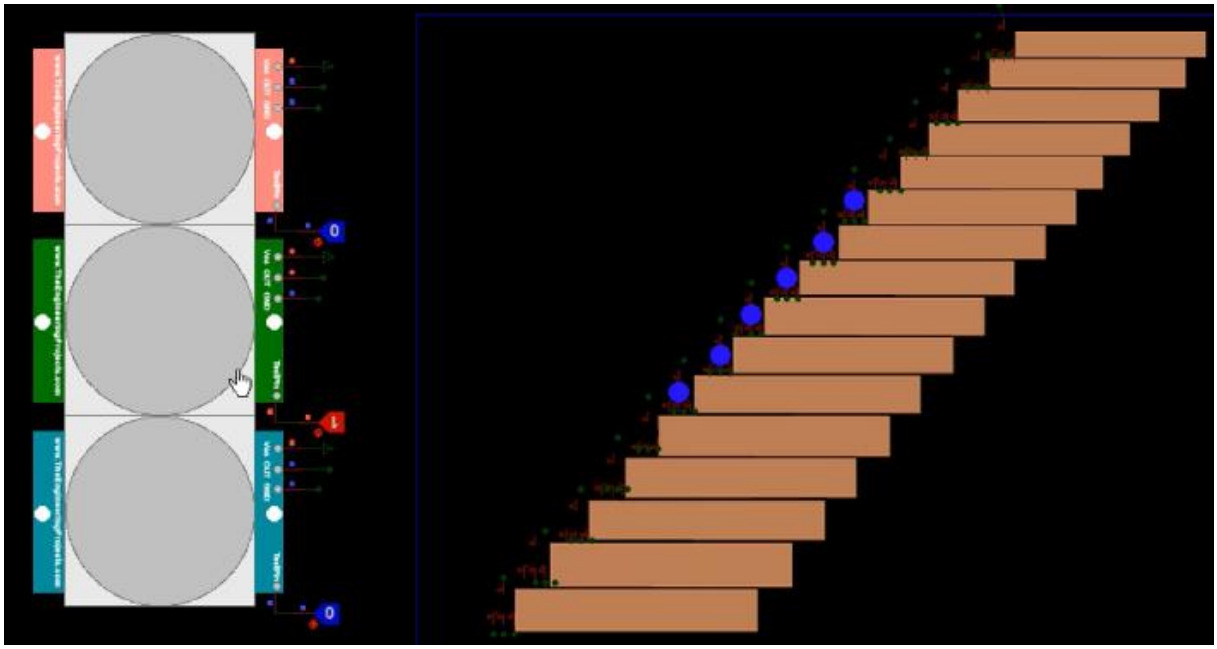


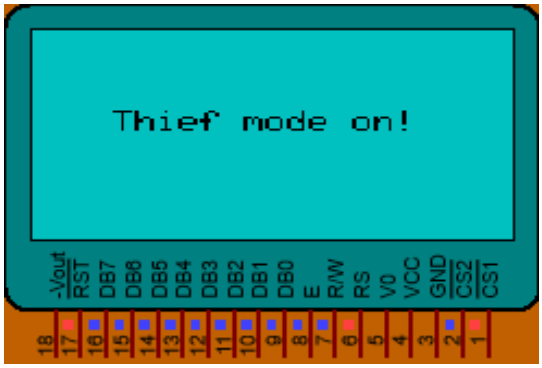
We have 4 options on the menu. The first option is Animation mode. If you enter here, you will see 4 animations. Understanding the logic of shift registers is essential when creating these animations.

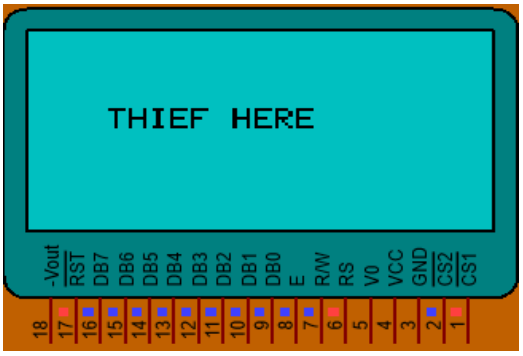




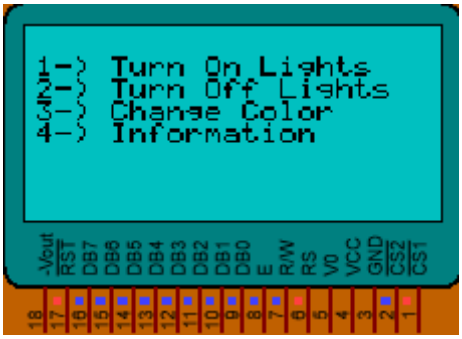
The second option in the menu is motion sensor mode. When this mode is activated, the sensors detect motion when we make 1 toggles connected to the sensors on the left of the screen. Each sensor lights up a few leds. When the toggle is zero again, the leds turn off. It may take some time for the LEDs to go out. This is due to Proteus. After the LEDs turn off, other sensors can be activated.



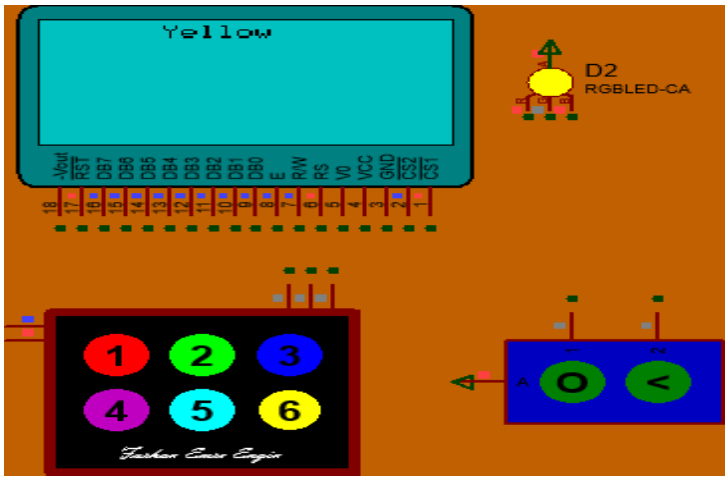


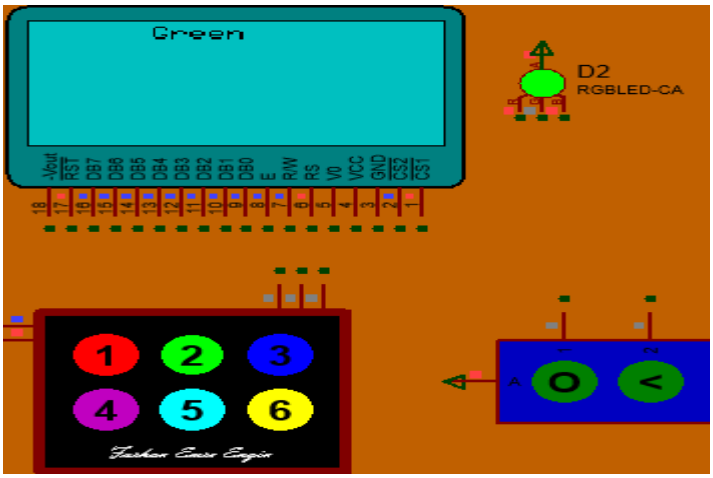


The third option in the menu is Thief mode. When this mode is activated, if the first or third sensors detect motion, the leds will start to light up to give an alarm. It also appears on the screen where the thief is detected. In this mode, the return to menu button does not work. The program can be used only if the code is reset and the password is re-entered.

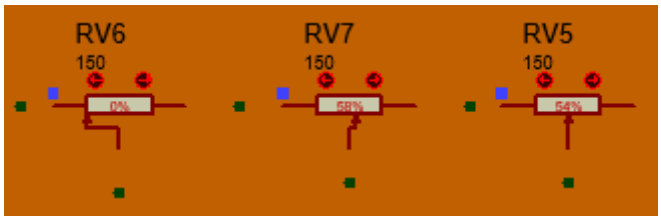


And the fourth option in the menu is the Settings section. When entered here, the above screen appears. The first two options allow the lights to turn on and off completely without animation. The third option here actually doesn't quite work. There is a led on the right side of the control panel. You can see that each key on the keypad has a different color. The reason for this was that it actually chose the color on each key and the leds were lit in that color. You can see this change on the led on the control panel. But when I applied this to the actual leds I used, the leds did not light. So here I can only control the led on the control panel.





Therefore I use a different way to change the colors. Each of the potentiometers on the control panel represents the 3 primary colors Red Green and Blue. Many shades of color can be obtained by turning them on and off at different rates.



And when the information section is selected, the name of the school, the name of the project and information about me appear on the screen.

5- What Is New I Added To The Project ?

- ✓ Password
- ✓ Edits In The Menu
- ✓ Added New Animations
- ✓ Motion Sensor Mode
- ✓ LED On/Off Option
- ✓ Return To Menu Button
- ✓ Color Changing

6- The Same Features As Old Project

- ➢ Thief Mode
- ➢ Reset Button

7- Result

I learned a lot when I finished the project. These are the working logic of the shift registers, the use of glcd, the working logic of the keypad, such as creating a password… I wrote the password code completely myself. I did not use any ready-made code.

While designing the project in Proteus, I noticed that the program is quite difficult while running. This is because the operations done in the project are heavy for Proteus. That's why I often encountered errors while running the project.