

Light Navigator

*A simple Arduino project using a 5-position
switch sensor and an 8x8 LED display.*

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Table of Contents

Introduction	2
The Microcontroller Platform	3
The Test Device	4
Development tools	5
The Experiment	6
Conclusions	7
Contributions	8
Project code	9
Sources	9

Introduction

(Author: Marisa Smith)

Using an 8x8 LED display (MAX 7219) and a 5-position switch sensor (basically a simple joystick) controlled by an Arduino, we plan to create a simple game. Ultimately, we would like to use the joystick to direct the player character, or pip, represented by a blinking LED around a maze displayed on the 8x8 board. The pip will be able to move in 4 directions. There are a few steps along the way:

1. get the 8x8 display working [done]
2. create a level [done]
3. be able to move the pip in the level [done]
4. use input from joystick [done]
5. failure states [done]
6. win screen
7. more levels

Depending on how well this project is scoped and how hard each step is, we might have to scale back.

The Microcontroller Platform

(Author: Ryan Hardy)

Explain the Arduino here

[Describe the microcontroller board you are using. This description should indicate where such boards can be obtained, and lay out the basic architecture of the board. You can paste screen captures of diagrams from any documentation you find online. You should describe the basic capabilities of the actual processor on the board. Show a block diagram of the device indicating any special features you find that are interesting and useful in conducting your experiment.]

The Test Device

(Author: Nicholas Warren)

MAX7219 Red Dot Matrix Module

27801 5-Position Switch

[wiring diagram]

[Each project uses some kind of device that ends up being controlled by the microcontroller. Describe that device and give an overview of what it might be used for. Basically, describe what is involved in interacting with the device. Again, use screen captures of diagrams from documentation is you can.]

Development tools

(Author: Nicholas Warren)

Explain the Arduino IDE and LED library here

[Detail the tools you needed to obtain to work with the microcontroller and the device. You also need to identify any additional software you needed to interact with your test device.]

The Experiment

(Author: Marisa Smith)

We were required to use at least one sensor in this project, but it seemed more fun and interesting to have two affect each other. So, our original idea was to use the 8x8 display and joystick combined. The obvious choice for these components was a simple game; we envisioned a lit dot moving around on the display, controlled by the user.

As we continued discussing, we thought the next step could be to make a maze for the player to navigate around to an "exit," which would be the win condition. We also discussed that touching a wall would reset the position of the dot, to add some challenge and a failure condition.

To set up the 8x8 LED display, we used these connections (Arduino - Display):

- 12 - DIN
- 10 - CS
- 11 - CLK
- 5V - DCC
- GND - GND

The 5-position switch sensor was set up as follows (Arduino - Switch):

- 9 - UP
- 8 - LT
- 7 - RT
- 6 - DN
- 3.3V - VCC
- GND - GND

Conclusions

(Author: Marisa Smith)

One of the challenges of this project was debugging. Because the code ran on an Arduino, there was no “easy” way to check what was in a variable through a print statement. The 8x8 board was easier to get working because a lot of people have played with something similar and written about it, and we could instantly see if the part was wired to the Arduino properly, because all of its lights lit up.

For the switch, in the beginning, we didn’t know if the switch was broken or just wired incorrectly. It was also a less popular choice for projects so there was no template we could look at as a guide that was known to work.

Other ideas that have stemmed from this project include:

- an Arduino board that fetches a weather report (somehow?) and displays a corresponding graphic on the 8x8 display
- adding teleports to the game
- finding a board that has multicolored LEDs and using the different colors to represent different things in the game
- maps that change over time
- adding sound with a third device

[What did you learn about hardware control from this project? Did you get any ideas for other projects you might try in the future?]

Contributions

Joystick Controls - Ryan & Nicholas

Project Manager - Marisa

Level Designer - Marisa

Documentation Formatting - Marisa

Game Code - Marisa & Nicholas

Wiring - Nicholas

Requirements - Roie Black

Project code

[Include a listing of the code you used for this project.]

Sources

<https://www.parallax.com/sites/default/files/downloads/27801-5-Position-Switch-v1.1.pdf>

<http://www.instructables.com/id/LED-Matrix-with-Arduino/>