

Disc Golf Guardian “DGG”

Abstract

The Disc Golf Guardian (or DGG) is a basket which aims to bring a fun and interactive experience to practicing putting. Although putting is one of the most important disc golf skills it is usually seen as the most dull skill to practice.

The DGG uses twelve accelerometers to accurately determine where the users disc hits the chains of the basket. The DGG uses the locations of where the discs hit to provide the DGG user with three fun and challenging games which provide the user a unique and productive practice session.

The DGG also uses a dot matrix as a display that users can use to navigate menus and watch their game scores change as the play. Having scores allows the users to compete and provide a more competitive practicing experience.

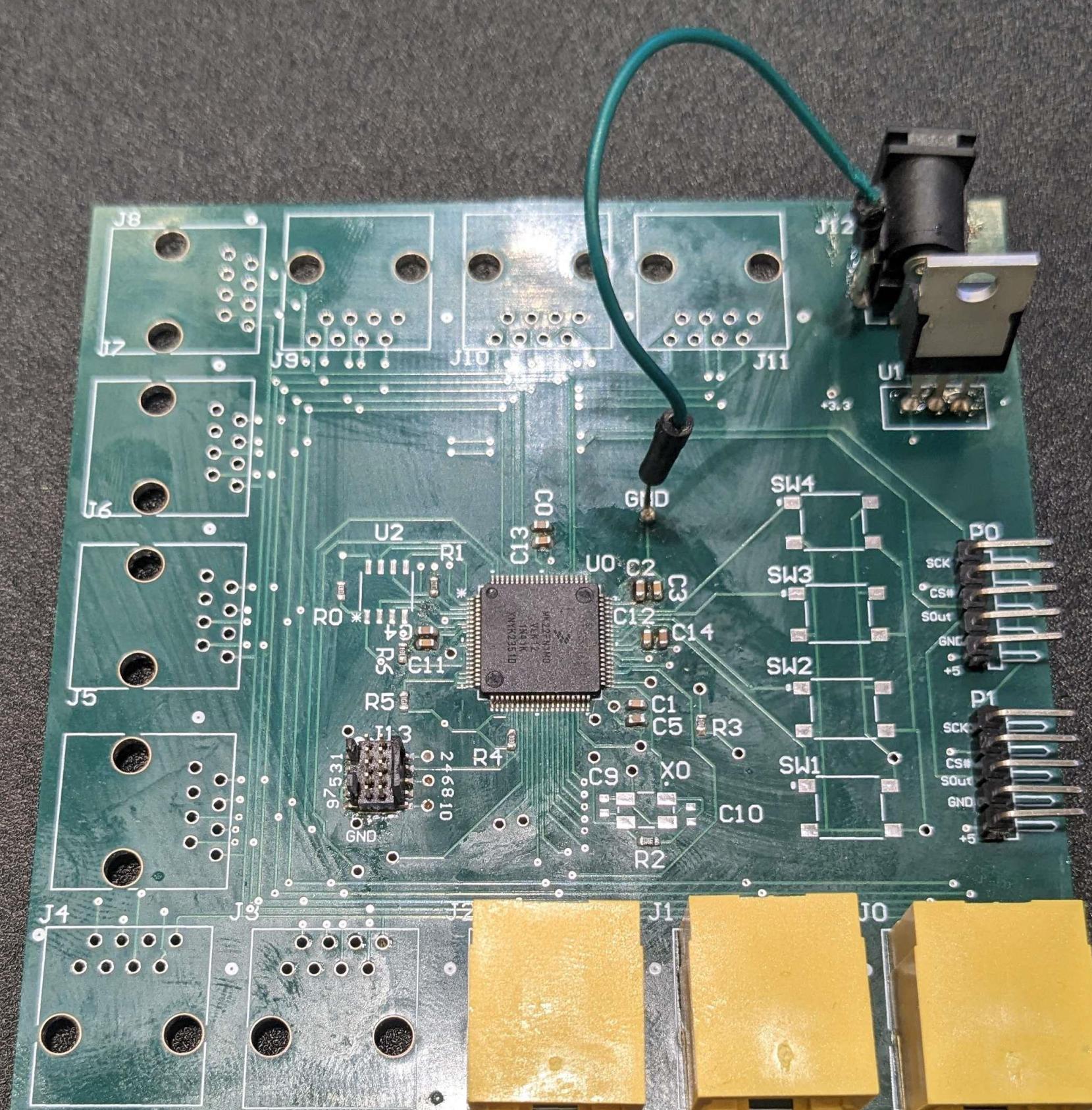
The DGG also aims to have long term storage so scores can be kept between uses. Allowing one to compete with themselves between different sessions of use.

Results

The Disc Golf Guardian (“DGG”) had a slow start with needing to repeat most of all the progress made in winter quarter during spring quarter. This happened to do bad PCB design and un-optimal PCB testing / debugging. This set back on the hardware side also slowed down the debugging / testing for the software snowballing into a large timeline issue.

However, with these timeline issues I was still able to accomplish some of the mile stones that I set out for this project. The DGG is able to:

- Debug via J-link on my PCB
- Read and write to accelerometers
- Power via barrel plug and LDO
- Display on

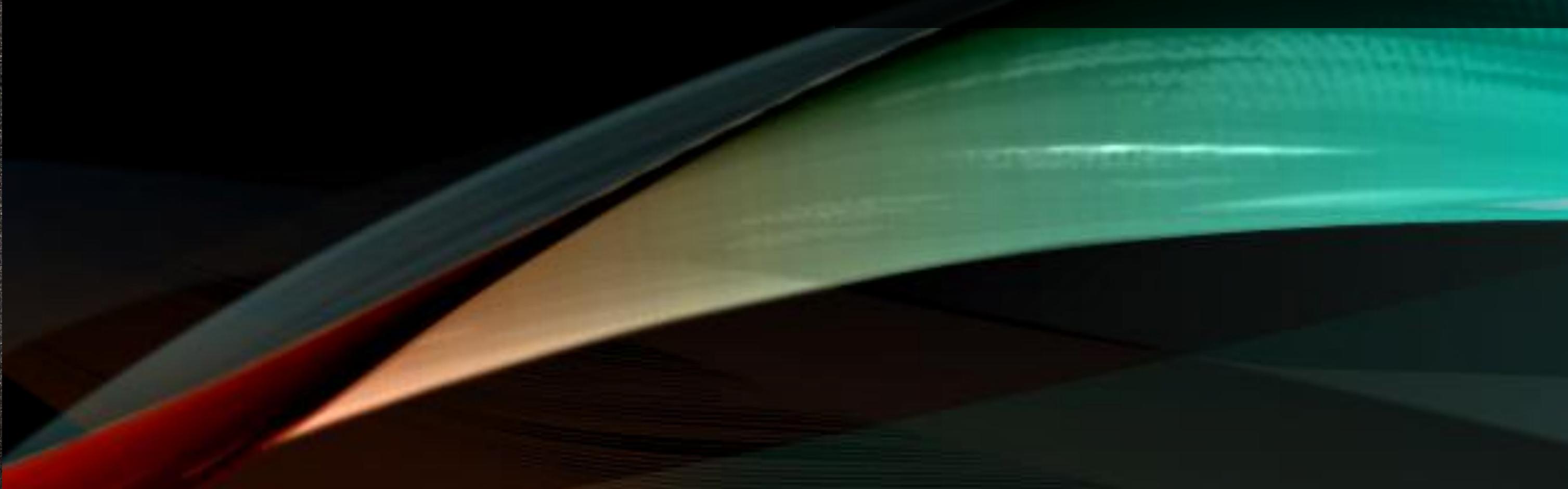


DGG MCU

This is the main board of the “DGG” project. This powers the board through a barrel plug and LDO. The board also has twelve RJ45 connectors, two five pin headers to connect to the display, Debugger, four buttons, memory, and finally the MCU.

ACC Board

This is the break off board that contains my accelerometers. It has an RJ45 port that connects to the main board along with decoupling capacitors, and the accelerometer itself. There are twelve of these spread along one side of the basket to give readings of where the discs hit on the chains.



Motivation

Through my personal experience, I know that practicing putting can be monotonous and unengaging for many in the disc golf community. When I moved to Bellingham I found a large, vibrant disc golfing community with many popular courses scattered around the city. Motivated to solve the boredom associated with putting practice, I developed the Disc Golf Guardian (DGG). The DGG not only aims to make practice more enjoyable and effective for existing players but also seeks to attract a wider audience by being accessible in places such as bars and arcades.

Hardware / Equipment

Hardware:

- MK22FN1M0VLK12
- LIS3DH
- LM1117T
- M25P16-VMN6TP
- MAX7219

- Equipment:
- Saleae
 - MCUXpresso
 - Discs
 - Basket

Conclusion

The “DGG” was a great project for me to learn more about the skills that I wanted to hone most. I furthered my abilities to create and implement PCBs, code using RTOS structure, and communicating to peripherals using SPI, a protocol that I hadn’t used before this project.

This project showed me the many things I took for granted that teachers provided for us while working through some of my EECE classes. Some of these being starting off with and altering the appropriate libraries for the MCU that you want to work on. Along with looking for hardware that fits the project and works well with your other components.

I would say the most important thing I learned from working on the “DGG” is the process of starting and working through a project in its entirety and learning how to trouble shoot and find bugs early on in projects.

