**Describe the current interface (5 pts):**

Computer Numerical Control machines are very important to modern manufacturing. CNC machines are currently used by engineers and students alike for automated control of machines. CNC machines are controlled by GBRL controller software. There are multiple GBRL controller software's currently being used such as Universal Gcode Sender, LinuxCNC, ioSender and CNC js. These software's provides useful user interface features such as a 3D Gcode Visualizer with color coded line segments, a real time feedback of the position of CNC machine’s position, machine control buttons, job tracking and job complete dialog notifications.

Although these controller software provide value to CNC users, there is a lot of negative feedbacks and room for user interface improvement. A common complaint about the UI is that there is a lot of buttons and drop-down options. This can be very overwhelming for a beginner who might not understand what every button is doing or might not need every button/option right away. It also means that the screen is cluttered and finding the commonly used buttons become very difficult. Infact, in a user study that we conducted, 33.3 % of participant stated that it was difficult to use the features on the interfaces. Additionally, there is a lack of emergency buttons to stop the program. This can lead to delay in stopping a CNC machine which could result in monetary loss and physical damage to equipment.

**Describe existing solutions (5 points)**

There are currently several efforts within the CNC community to build better interfaces that

**Describe HCI guideline, principles, or theory you plan on applying to address the issue (5 points)**

For this project, we will work on improving an existing GBRL software by applying a number of HCI principles and theories. We will apply usability guidelines such as Schneiderman's eight golden rules, Nielsen’s heuristics and Gestalt's principles. Firstly, using Schneiderman’s golden rules, we will improve the system by enabling the use of shortcuts for regular actions that should be performed quickly. This is something that current interfaces lack. In our interface, we will add keyboard shortcuts for emergency scenarios where the user has to make quick decisions such as stopping the CNC tool. Additionally, using Nielsen’s principle of minimalistic design, our interface will focus on highlighting core features that are commonly used by CNC users. Using information, we received from our user study we will work on improving the GBRL software by making common features easy to access and making less commonly used buttons/features as add-ons.

**Page 2** – Current Interface (20 points) We can pick 1 or 2 from existing with help from interviews. (and our initial presentation). (Kenneth)

* Describe the current interface (5 points)
* Describe problems with the current interface (5 points)
* Describe existing solutions (5 points)
* Describe HCI guideline, principle, or theory you plan on applying to address the issue (5 points)

1. Study the current problem

2. Identify existing solutions

3. Why do existing solutions not address the problem?

4. What HCI concept are you applying to address the issue?

I suggest you take a look at [this GCode Sender](https://github.com/terjeio/Grbl-GCode-Sender/releases) for some ideas. I think it is the best out there and has done much to make the experience much more approachable. It works with and Grbl but shines with [grblHAL](https://github.com/terjeio/grblHAL).

ioSender (<https://github.com/terjeio/Grbl-GCode-Sender/releases>) has a very rich interface yet is sometimes confusing

Take a look at CNCjs. It's almost perfect.

<https://winder.github.io/ugs_website/>