**Proposal and Product Vision for Senior Design Project Spring 2022**

**Title** - EGR101-E Bot simulator

**EGR101 Background –** In the past years EGR101 shifted to having four major projects : line-following of a straight line, line-following in a deceptive environment, navigation using environment sensors (distance sensing), and a mission deployment. The mission deployment was a reconnaissance exercise using the boe-bot either controlled or autonomously. The environment was a two-dimensional LED matrix with controllable RGB LEDs, along with three-dimensional walls. The goal was to identify as many colors, each with respected point values (only four colors), while navigating the walls within a two minute time frame.

Students also construct and test basic circuits and get a taste of software development with Arduino scripting.

**Problem statement** – Due to the Covid era problems of close quarter work is problematic and the constant preparedness for transition to remote learning limits the use of in lab resources. Lab resources being a boe-bot, additional sensors, tracks, and required tools. This all leads to requiring the students to purchase supplies, an additional burden for which under normal conditions would not be required.

**Product Description** – A local software package that students can utilize to simulate boe-bot behaviors, thus removing the need for the physical components. The simulated behaviors are, but limited to, basic electronic circuit development and testing, Arduino emulation, sensor emulation, and boe-bot construction and testing. The student’s software package should provide error reports, along with a packaged project report that can be submitted for review by the instructor. The software should be able to take in pre-config files from the instructor, this would allow for examples and demonstration to be shared between student and instructor. Currently there is no belief that it is required to have an instructor and student version of the software.

The software should be GUI driven as it is to emulate hardware components. With that being said, student errors should be allowed during simulation of circuit development in the manner of “frying” components when connecting polarized components incorrectly.

Along with circuit and Arduino code simulation, the software should allow for complete boe-bot testing. Examples being line-following, distance sensing, and “wirelessly” controlled behavior.