

**Client/Company/Organization:** \_\_\_\_\_

**Submitter Name:** Joseph Kenkel **Email:** kenkelj@iastate.edu

**Project Contact:** Nathan Neihart **Email:** neihart@iastate.edu

**Project Title:**  
Laser Arcade Machine

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**Project Abstract:**

If you have even been to Bass Pro and played at their arcade where you shoot at the targets and once you hit them, something will move in their environment. We want to create a mock version of this that can be taken anywhere. These targets can be placed anywhere in the environment and read which laser shooter shot the target. In order to track their score, we want each laser shooter to display the point received on a mobile app. Both the laser shooter and the targets will be battery powered to increase their mobility. In order to accomplish this, the targets will wirelessly communicate to a central hub. The hub will be a microcomputer that can process the inform relayed from the targets. Once it is processed it will display the information using Bluetooth. Building the app will require skills learned in CPRE 388. This app will be channel the outputs such as what game mode we are in and inputs such as what the score is, it will then display the score on the app. We have not figured out how the laser shooter will work yet but we are thinking using different wavelengths or frequencies (I know they are the same thing) to distinguish between the which one is which. Building the laser shooter and the receiver will be a hardware design requiring signal manipulation that we learned in EE224 and EE321. We are thinking about using a laser because of its focus. If we used radar, or sonar, the shot will be to unfocused to tell where it was actually aimed. We also want the light to cue in the shooter where it's shot landed. Lastly the targets will just be one big sensor waiting to read if the laser activates it. Once activated, using either a microprocessor such as a teensy or use purely hardware to send out a signal containing both the information that it has been hit and what hit it. Some of the constraints is that we have set for this project is that both the targets and the laser shooter are extremely portable. You should be able to take them wherever your heart desires and play with them. You will not be constrained by a plug in or the bulkiness of the design. Our other constrain is that you should be able to see where you hit in order to allow you to see how much you missed by and allow you to adjust your aim while playing.

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**Expected Deliverables:**

We will deliver a target that can read which laser shooter hit it, and communicate with a mobile app. We will also create a laser shooter that sends out a unique signal in order to identify itself. Next, we will create a mobile app that will interface with these toys in order to display the score. Lastly, we will have modes on this app to allow competitors to compete with each others. To start off, we are going to focus on the laser shooter and the target. This is the core of our design so we need a solid way to both send a narrow signal and read that signal once hit. Once we are able to do that, we will focus on sending that signal to a microcomputer such as a raspberry pi with python in order to keep track of the score and what game mode we are in. Lastly, we will connect the app that will add the UI. This UI will display the score, any rules for the round, and also allow you to pick the game mode. We will focus most of our schedule on creating the target's ability to communicate with with the microcomputer and tell what hit it.

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**Specialized Resources Provided by Client:**

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**Anticipated Cost:** \_\_\_\_\_ **Financial Resources Provided by Client:** \_\_\_\_\_

**Preferred Students for the Project:**

- Electrical Engineering
- Computer Engineering
- Software Engineering
- Cyber Security Engineering
- Other:

**Other Special Skills:** App development, microcomputer programming, sending a signal, demodulating a signal

Course required: EE321,EE224, CPRE 288, CPRE 388

**Anticipated Client Interaction (estimate):**

- 1 meeting per week
  - In person,  Over the phone,  Web / video conferencing
- 1 meeting per month
  - In person,  Over the phone,  Web / video conferencing
- 2 or more meetings per month
  - In person,  Over the phone,  Web / video conferencing
- 1 meeting per semester
  - In person,  Over the phone,  Web / video conferencing

**Meeting ABET Criteria**

Please rate the following statements as they relate to your proposed project:

0 – Not at all

1 – A Little

2 – Somewhat

3 – A Lot

4 – Completely

On this project, students will need to apply knowledge of mathematics, science, and engineering  0  1  2  3  4

This project gives students an opportunity to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability  0  1  2  3  4

This project involves students from a variety of programs, i.e., CprE, EE, and SE  0  1  2  3  4

This project requires students to identify, formulate, and solve engineering problems  0  1  2  3  4

This project gives students an opportunity to use the techniques, skills, and modern engineering tools necessary for engineering practice  0  1  2  3  4

**Project Approval – for use by ECpE Senior Design Committee**

Approved:

Project Assigned:

sdmay22-24

