

Let's Have a Blast!
Laser Tag

Department of Electrical Engineering and Computer Science
University of Central Florida

Group 10

Marco Montero - Electrical Engineering
Anuj Yamdagni - Computer Engineering
Shannon Fies - Electrical Engineering
Karlle Brinthaupt - Electrical Engineering



Project Narrative

As videogames and electronic devices become more and more popular, physical activity in kids is on the decline. Traditional games of tag or playgrounds can not compete with the allure of modern technology within videogames. Our team hopes to bridge that gap by combining technology with physical activity.

Laser Tag has been a favorite of kids and adults alike, however it always seems to be limited to expensive arcades with limited game time. This project seeks to make laser tag available to more users at a lower price. By creating a cheap, standalone system that is easy to use, we can bring a fun technology that incorporates indoor and outdoor play.

Our intended audience are kids and adults who are looking for casual entertainment that is not too expensive or difficult to set up. This sets up the project for several different requirements. The laser tag blaster will need to be a light, portable blaster so that it is easy to carry around and use. All the technology should be housed within the blaster, so that the blaster can be taken anywhere. Since kids will be using this blaster in outdoor settings, the outer shell of the blaster should be clearly identifiable as a toy and not a real weapon.

Laser Tag is meant to be played with multiple people, thus the blasters should be able to synchronize with each other using a standalone network. The network should be a mesh network so that the group of players are not tied to any one location. The networking should allow the synchronization of game events such as the start and end of the game, as well as communicating the team score across to each player.

Another important aspect of this project will be to include an easy to use User Interface (UI). This will allow users to create and join games easily and better immerse themselves in the

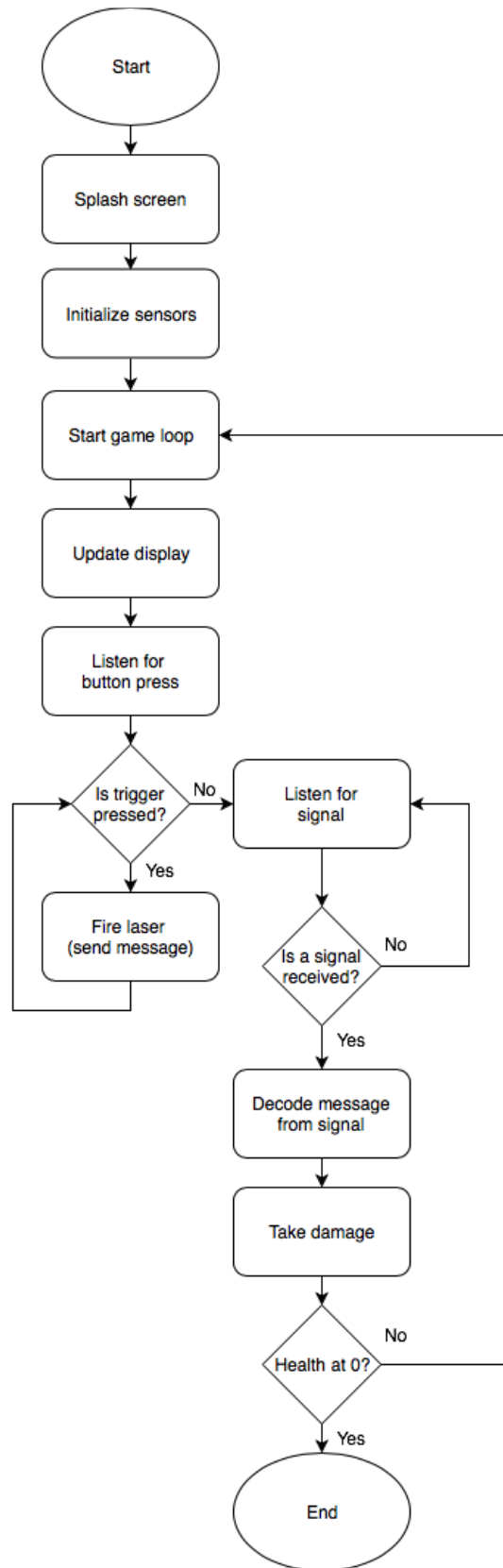
gameplay. The blaster should include a small embedded display to show players information about the game, as well as a menu for setup. The blaster should include buttons for interacting with the menu.

Requirement Specifications

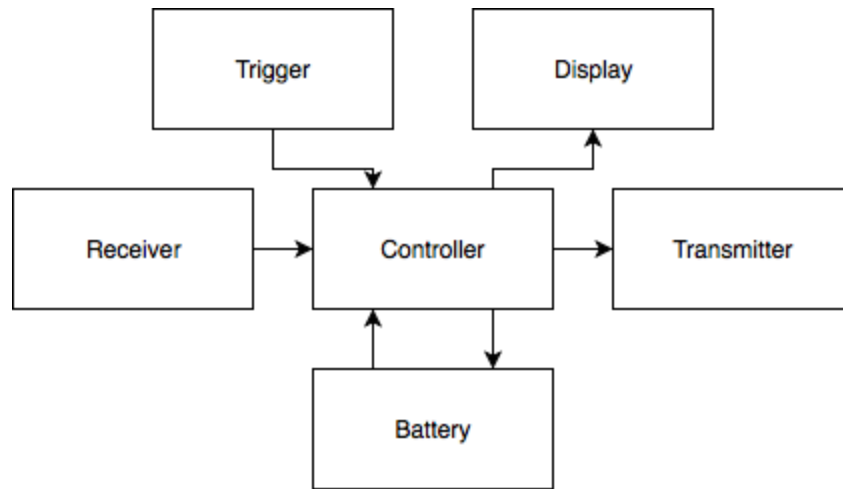
- Battery capable of supporting 30 minutes of game play
 - Standby battery time of at least an hour
 - Rechargeable by USB
- 3D printed housing
 - Sound indicator
 - Haptic feedback*
- Infrared transmitter and receiver for device to device communication
 - Range of at least 20 feet
- User friendly interface
 - Easy to use UI
 - Different game modes (single player, free-for-all)*
- LED display
 - LED indicators for team recognition and user status
 - OLED display for displaying game information (points, health)
- WiFi Mesh networking for game synchronization
 - WiFi based configuration*

Asterisk () indicates stretch goal.*

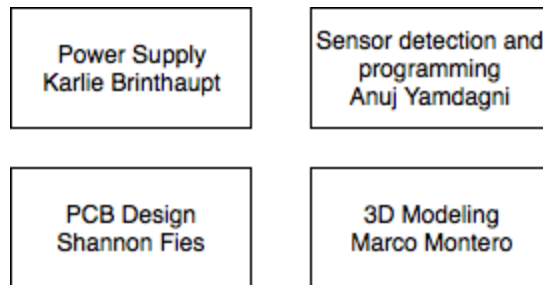
Software Logic Flowchart



Hardware Block Diagram



Group Breakdown

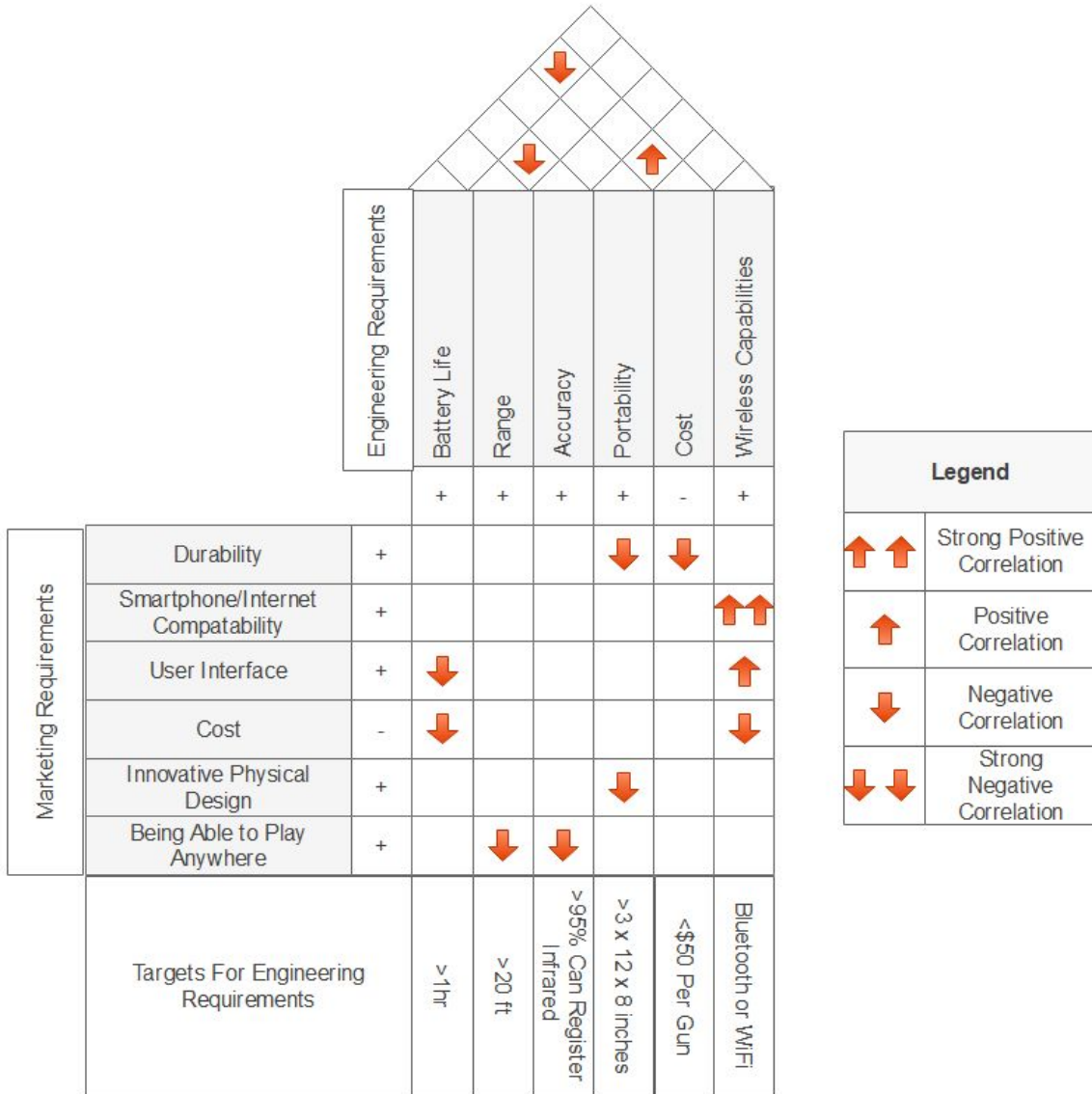


Project Budget:

Below is the cost breakdown to make 4 blasters.

Item	Quantity	Price
MCU	4	\$20
3D printer filament	2	\$60
PCB	4	\$20
Lithium Ion Batteries	4	\$12
Charge controller	4	\$4
Display	4	\$12
Various sensors	4	\$10
Miscellaneous	4	\$20
Total:		\$158

House of Quality



Project Milestones

Senior Design 1:

Week	Dates	Milestone #	Milestone Task
1	8/20-8/26	1	Form groups
2	8/27-9/2	2	Attend SD Bootcamp
		3	Brainstorm ideas
3	9/3-9/9	4	Finalize project idea
4	9/10/9/16	5	Decide on project specifications
		6	Finish Initial Design Document
5	9/17-9/23	7	Research infrared technologies, ranges and absorption
		8	Initial housing 3D models
		9	Research parts
		10	Begin 60 page draft
6	9/24-9/30	11	Upload updated Initial Design Document
		12	Define gameplay rules
		13	Brainstorm additional gameplay modes
		14	Research WiFi mesh connectivity
		15	Finalize parts list
		16	40 page benchmark for 60 page draft
7	10/1-10/7	17	Review and revise housing model
		18	Initial PCB design
		19	Initial software pseudocode
		20	Order Parts

		21	Finish 60 page draft
8	10/8-10/14	22	Review and revise PCB design
9	10/15-10/21	23	Review and revise pseudocode
		24	Initial prototype
10	10/22-10/28	25	75 page benchmark for 100 page draft
			Test and revise prototype
11	10/29-11/4	26	Finish 100 page draft
			Test and revise prototype
12	11/5-11/11	27	Test and revise prototype
13	11/12-11/18	28	110 page benchmark for final paper
			Test and revise prototype
14	11/19-11/25		Test and revise prototype
15	11/26-12/2	29	Final paper review
16	3-Dec	30	FINAL PAPER DUE

Senior Design 2:

Week	Milestone #	Milestone Task
1	1	Finalize PCB design
	2	Order PCB
	3	Finalize housing design
2	4	Finalize initial software package
	5	3D print housing design
3	6	Revise and review housing
	7	Build PCB

4	8	Test and revise PCB
	9	Review and revise software package
5	10	Test and revise PCB
	11	Review and revise software package
	12	Establish WiFi mesh connection
6	13	Test and revise PCB
	14	Review and revise software package
	15	Modify WiFi mesh connection
7	16	Test and revise PCB
	17	Finalize game play options
	18	Review and revise software package
	19	Finalize WiFi mesh connection
8	20	Finalize PCB
	21	Review and revise software package
9	22	Mount PCB to housing
	23	Review and revise software package
10	24	Test full prototype
	25	Review and revise software package
11 through 14	26	Final testing and revision
15	27	FINAL PRESENTATION