

Objective Based Laser Tag with Player Sensing Technology

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Statement of problem:

Current laser tag systems do not have a way of actively communicating with or monitoring players/objectives in real-time on the playing field. Additionally, present day laser tag objectives do not have autonomy; meaning the player must physically interact with an objective. This means taking their eyes and aim off the playing field, leaving them as an open target to the enemy. These flaws in the industry inhibit player experience, as well as the market of interest among the public.

Solution:

Our laser tag system will utilize wireless communication schemes such as Radio Frequency Identification (RFID), Bluetooth and Wi-Fi to acquire real-time data, to create a unique laser tag experience with autonomous objectives, and communication of in-game statistics to and from individual players and the main hub, or “Battle Box”.

Systems:Battle Box:

The main hub or “Battle Box” will be the central system that connects all of our subsystems together. The Battle Box will be wirelessly connected to each of our flags and players, providing a method of communication for sending and receiving information to and from each subsystem. In order to handle all incoming/outgoing data, the battle box will be implemented on an embedded Linux environment.

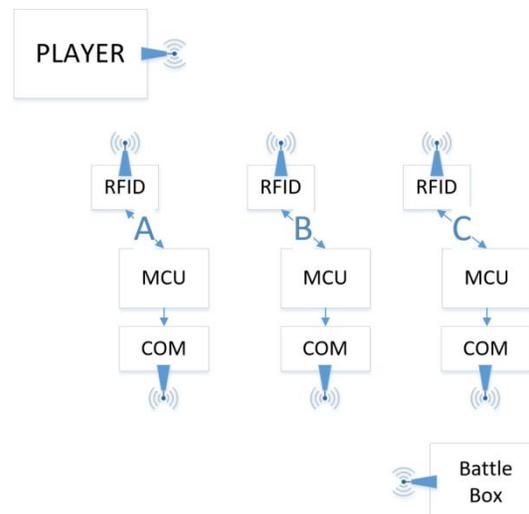
Communication:

Figure 1. “Whole system communication flow chart”

Wi-Fi will be the primary method of communication for the Battle Box to communicate with players and objectives. See Figure 1 for the communication diagram.

Vest and Laser Gun:

Each player will possess a vest and a laser gun. They will be connected through a cord, and contain subsystems such as a Wi-Fi module, Infrared (IR) sensors and LEDs, a speaker, RGB LCD, and RFID tag. See Figure 2 for the communication diagram of the gun.

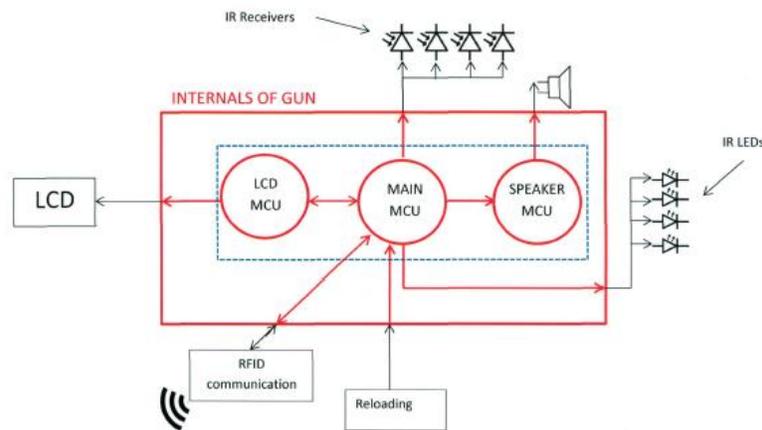


Figure 2. "Communication diagram of gun internals"

Flags:

Each flag will be outfitted with an RFID receiver, Wi-Fi module, and LED light ring. The RFID receiver will be used to detect the RFID tag on each player, and determine if they are within the flag boundaries. A Wi-Fi module will be the primary method of communication between the flag and the Battle Box. A light ring will serve as an indicator to the status of the flag, such as which team owns the flag, or if the flag is contested.

Sub-systems:

IR Sensors and LEDs:

Each vest and gun will have IR sensors to detect a "bullet" and inform the player when they have been shot. The gun will also have IR LEDs to shoot a "bullet" at enemy players.

LCD Display:

Each gun will have an LCD mounted on the stock that displays information about the current game. This will be done through multiple menus that will be available on the LCD. Figure 3 gives an example of what some of the menus will look like, as well as the information that the LCD will display. One menu will present information about player statistics such as eliminations, times eliminated, and

number of flags captured. The other menu will provide the status of all flags. While on either of the menus, the player will be able to see their remaining ammo and health. At any given time, the player will be able to seamlessly switch between each of these menus by tapping on the resistive touch LCD.

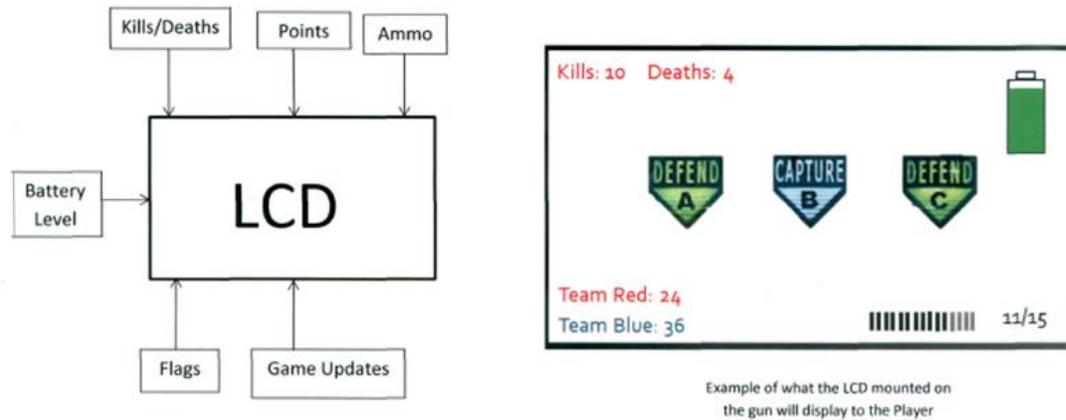


Figure 3. "LCD data flow and graphics display"

Speaker:

A speaker will be mounted on each vest/gun to inform the player on major game changes such as the enemy capturing a flag. The speaker will also be used to create in game audio cues, such as shooting, reloading, getting shot, or needing a medic. The speaker will play audio files in unison with the LCD as it updates.

Power system:

Custom power systems will be designed to power the individual subsystems on the gun/vest, as well as the flags and Battle Box. Due to the fact that each system will be modular and mobile, rechargeable battery packs will be used as power sources, and battery recharging circuitry may have to be constructed.