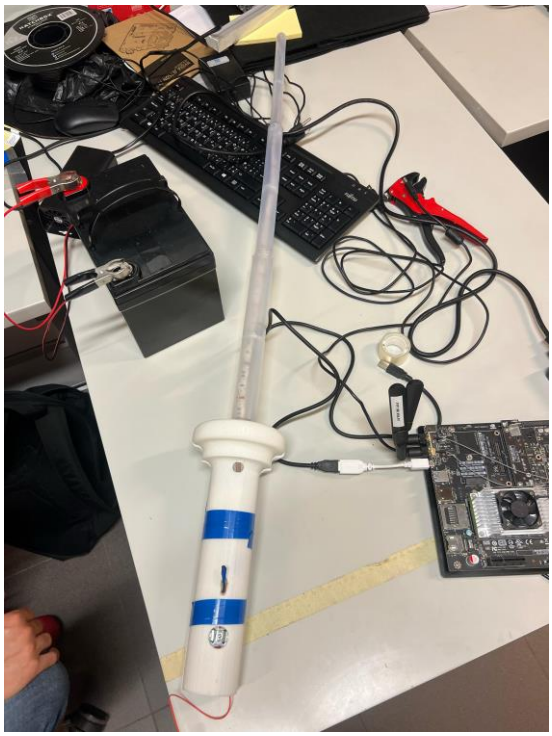

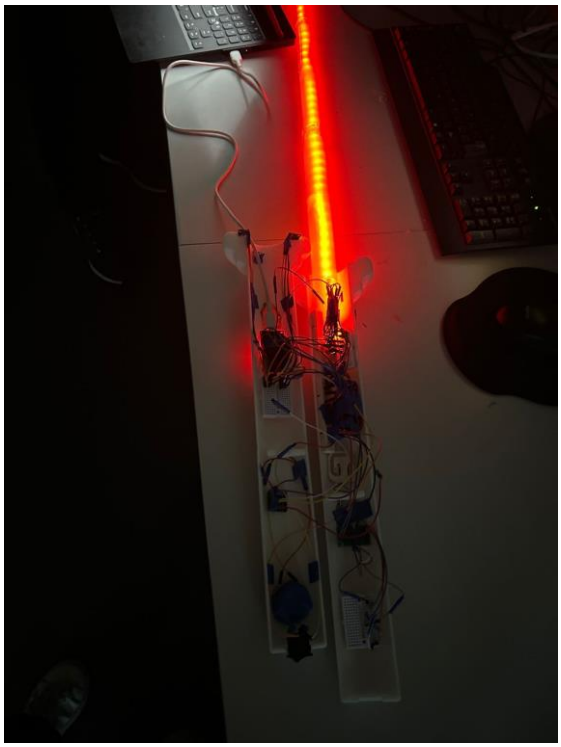

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StarSaber: an Interractive Light Saber Combat Game

Datasheet

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1 Product Overview

The Light Saber Game System is an ESP32-based, sensor-integrated device designed for multiplayer interactive gameplay. Each saber is richly instrumented to detect light intensity, grip strength, proximity to danger zones, among other features. Real-time feedback is collected through the ESP32 that adjusts LED brightness, score, and speaker output accordingly.

2 Typical Applications

- Real-time combat scoring in interactive games
- Motion-based control and feedback systems
- Grip-strength-sensitive input devices
- Proximity-sensitive game logic for competitive settings

3 System Components

Each Light Saber contains:

- An ESP32 microcontroller
- An accelerometer module (MPU6050)
- A photo-resistive sensor (LDR in a voltage divider configuration)
- A 50kg load cell with the accompanying HX711 signal conditioning circuit
- A ToF distance sensor (VL53L0X)
- A push button
- An On-Off power toggle switch
- An RGB LED strip for visual feedback
- A DfMiniPlayer Soundboard & Speaker
- 4 CR2032 3V batteries
- 3 AA 1.5V Alkaline batteries

4 System Description

The system uses sensor readings to trigger different game functions. :

- **LDR Sensor:** Detects ambient light intensity to modulate LED brightness for power efficiency.
- **Load Cell:** Measures grip strength; a higher force applies a multiplier to scoring.

- **Accelerometer:** Measures average acceleration, emits a sound if acceleration is above a threshold.
- **Distance Sensor:** Checks for blade proximity in the active selected danger zone.
- **Push Button:** Toggles between the three danger zones.
- **On-Off Switch:** Powers on/off the LED strip.
- **ESP32 Logic:** Continuously recieves input from all all sensors, updates LED states and soundboard outputs, and publishes score and game-related messages on the main unit.

System Pinout

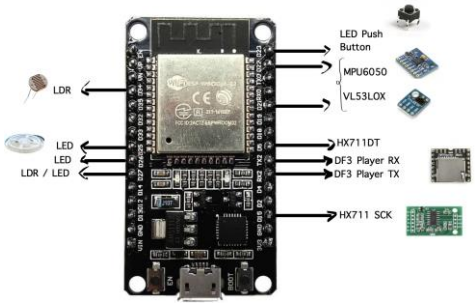

Figure 1: Diagram showing the pinout for the ESP32 in the StarSaber

Pin	Function	IO type
GPIO 34,27	LDR Sensor	analog input
GPIO 5,15	HX711	analog input
GPIO 21,22	Distance Sensor (VL53L0X)	analog input
GPIO 23	Push Button	digital input
GPIO 22	On-Off Switch	digital input
GPIO 25,26,27	RGB LED strip	digital output
GPIO 16,17	DfMiniPlayer & Speaker	analog output
GPIO 21,22	MPU6050 Accelerometer	analog input

Specifications

Sensor	Type	Voltage Range	Typical Output	Resolution	Accuracy	Response Time
LDR Sensor	GL12516	0–3.3 V (analog input)	Bright: 0.2–0.5 V, Dark: 2.5–3.2 V	0.8 mV with 12-bit ADC	±5% (dependent on resistor precision)	30 ms

Sensor	Type	Voltage Range	Typical Output	Resolution	Accuracy	Response Time
Load Cell + HX711	50kg load cell + signal conditioning circuit	5.5V	Digital (binary reading)	24-bit ADC	±0.1% FS (post-calibration)	100 ms
Distance Sensor	VL53L0X	5V	VL53L0X: 20 mm to 2 m	1 mm	±3%	50 ms (button debounce)
LED System	WS2812 RGB Strip	12 V	Dim in lit, Bright in dark	N/A	N/A	N/A

References

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