

Smart Scoreboard System - Project Workflow

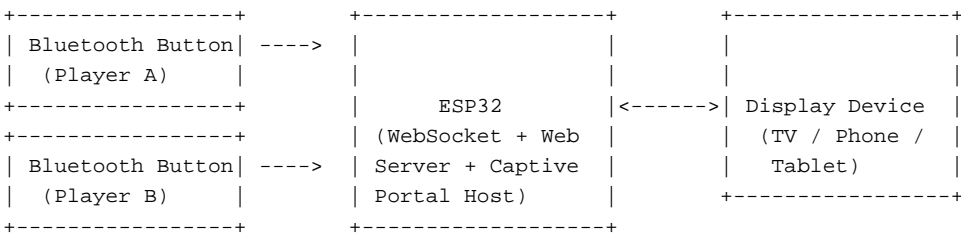
Project Overview

This document outlines the complete workflow and system architecture for a Bluetooth-based Smart Scoreboard System for games like table tennis, badminton, etc. The system allows two players or umpires to update scores via Bluetooth buttons, with live score updates displayed on a screen through an ESP32-hosted web app.

System Components

- Bluetooth Button Devices: Handheld transmitters for score increment/decrement (one per player)
- ESP32: Central controller that receives signals, updates scores, and serves the UI
- Display Device: Smart TV, phone, or tablet that connects to ESP32 to show the live scoreboard
- React Frontend: Single Page Application (SPA) UI built using React and hosted on ESP32

High-Level System Architecture



Workflow Breakdown

- Bluetooth Input:
 - Buttons send signal to ESP32 identifying player and action (increment/decrement).
- ESP32 Processing:
 - Operates in AP mode, receives BLE signals, updates internal state.
 - Hosts React UI and WebSocket server.
- Display Access:
 - User connects to ESP32 WiFi and is auto-redirected via captive portal.
- React Frontend:
 - UI displays scores, allows reset and player name input.
- Live Score Updates:
 - WebSocket ensures real-time updates to all connected clients.

User Flow Summary

- ESP32 boots and starts Access Point and web server.
- Players connect buttons via Bluetooth.
- Umpire/player connects phone/tablet to ESP32 WiFi.
- Captive portal auto-opens the scoreboard.
- Players use buttons to update scores.
- Display updates instantly.

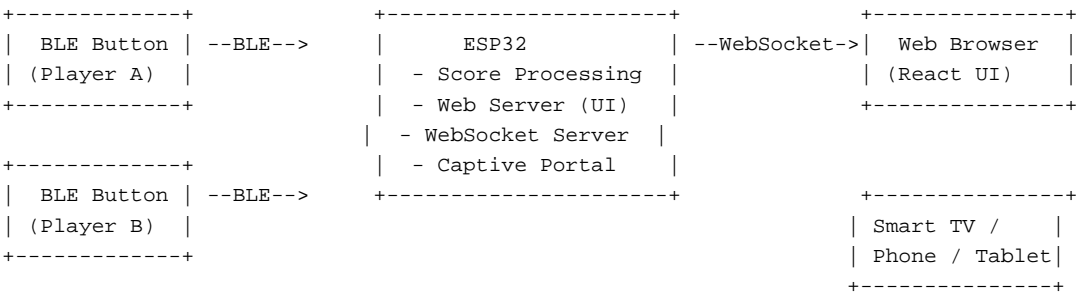
Technical Stack

- Microcontroller: ESP32
- Wireless Input: BLE
- Web UI: React
- Network Mode: ESP32 Access Point + Captive Portal

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Live Updates: WebSockets
Hosting: SPIFFS + WebServer + DNSServer

Data Flow Diagram



Optional Enhancements

- Game timer countdown or stopwatch
- NFC tag for quick launch
- Persistent score saving to EEPROM
- External small OLED screen as mirror display

Project Summary

This system enables seamless, wireless control and display of game scores using ESP32 as a central controller. With a React frontend, BLE buttons, captive portal-based access, and WebSocket live updates, it provides a fully self-contained and user-friendly solution ideal for indoor and outdoor sports environments.