**Accuracy without PPS at room temperature**

Every minute 0.36ms aka every hour 21.6ms

1ms accuracy with lap times <1minute or with gps

10ms accuracy with lap times >1minute and no gps

A diagram of a computer chip

AI-generated content may be incorrect.

A computer chip with many colored wires

AI-generated content may be incorrect.

Planning out the whole system.

The Timing Gate will have a Wifi Antenna, GPS Module, and Beam Break trigger. The Timing gate sends and receives TCP messages on port 5000. Sends ETC time of the gate event. Can be paired with multiple gates that also send their trigger time. Each is identified by “Serial” number. Server side software logs the raw events in a file for autosave ability and calculates sector and lap times from the raw events. Simple labels in a menu will show connected devices and allow to select where it is placed. Maybe in the future it’ll show gate locations.

In the same application I would also like to view the live telemetry of the car. This will consist of a UDP stream of filtered can data. This is in hopes to have a little lag as possible, and save compute for other functions. This module will also have a GPS antenna that will sync the internal clock and send the GPS coordinates of the car to the server using TCP to ensure receival. The Server will log both of these data streams and save to a file. Ideally the server would also graph the coordinates relative to the gates. The server will also send the Timing Gate times and any flags to the car to be transmitted over CAN to the vehicle’s dashboard. Flags will be transmitted as a simple integer.

0 – Green

1 – Yellow

2 – Red

3 – Checkered

4 – Black

Lap time will be sent in seconds and milliseconds. Both will only be sent on an update. Eventually this will also be able to send commands to change settings on certain devices in the car.

Eventually the wireless link might get switched to a lora system or 900mhz and just use wifi to create a high speed uplink. The live telemetry module could also work with just the long range link and then I have a separate data logger to micro sd card module that has wifi for high speed log starting, stopping, and file transfer.

Links 2 stuff

Esp32 with removeable antenna - <https://www.digikey.com/en/products/detail/olimex-ltd/ESP32-S2-WROVER-DEVKIT-LIPO-EA/21662599?gad_campaignid=20243136172>

Potential USB c to battery charger circuitry