ECE EECS 473

ALL-IN-ONE OUTDOOR SPORTS COMPUTER

M-TRACK

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Prof. Mark, GSI Michael, Sri, Luke; Pengpeng, Cirilla Xue.

Repository:
https://github.com/Flanker-E/All_In_One_Outdoor_Sports_Comupter

Introduction

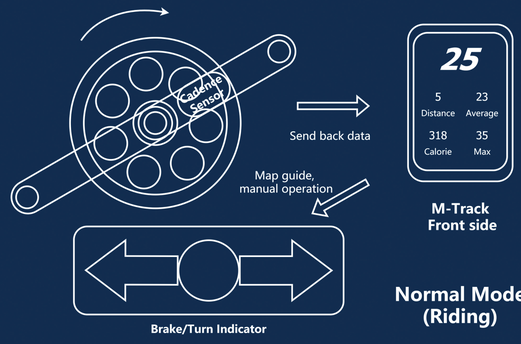
We propose an all-in-one outdoor sports computer, the M-track, that offers map navigation and sports recording functions for outdoor sports lovers. It integrates a dual-screen display, SD card, and solar panel. Serving as a terminal, it can cooperate with some customized components to provide more types of data or functionality. Some other features, including a cadence sensor and a turn/brake indicator provided for cyclists, can give users a more professional experience.

Structure

We separate outdoor sports into two typical scenarios and provide different modes for them.

1) For sports like cycling, we provide a normal mode, which uses an LCD touch screen for clear navigation and sports data display to facilitate their training.

2) For sports like hiking, we will change to a low-power mode. These users can use a secondary E-ink mounted on the back to get succinct information. A solar panel is integrated to extend the M-Track's battery life.



M-Track Front side

Normal Mode (Riding)

M-Track Back side

Low Power mode (Hiking)

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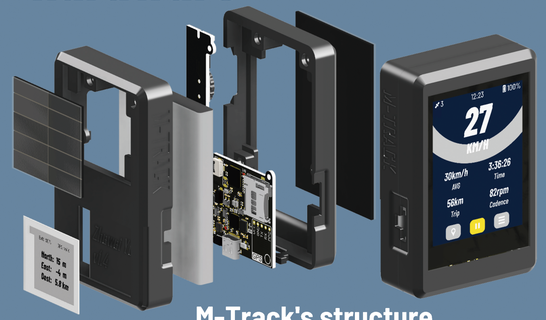
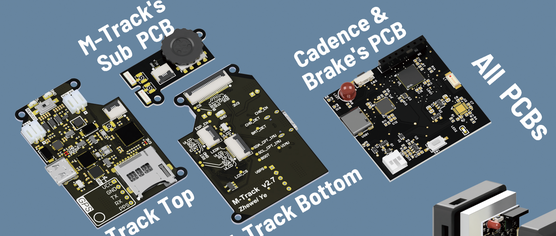
Hardware



M-Track's structure

From left to right: solar cells & E-ink; bottom case; battery; two PCB boards; top case; LCD.

The Terminal supports touch and encoder input; It has GPS, IMU, BLE and TF card; The battery has 2800mAh, which can support normal mode for around 15h, low power mode for around 50h; It also supports type-C recharge and solar cell recharge.

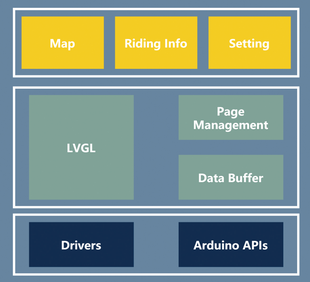


From right to left: Cadence Sensor, Brake/Turn Indicator

The Cadence & Brake Light share same PCB. The difference is the software and whether use LCD matrix

Cadence & Brake/ Turn Indicator's structure

Software

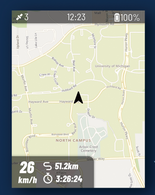


Software structure

We design the M-Track's software using the notion of abstraction. We encapsulate the hardware part as the hardware abstraction layer (HAL) and the software that provides service for the apps we would like to use as the framework layer. The apps are designed to satisfy our request: information display and navigation.

Graphics UI's Logic

Features



Mode Switch

The M-Track has normal mode and low power mode. This mode switch is provided when user is in LiveMap. The user can switch between two mode by double click on the encoder. Under low power mode, user can refresh the E-ink by long press the encoder.

Route Navigation

The M-Track can navigate the user with routes. It is an offline feature, the M-Track will load pre-planned route stored in TF card and display it on the screen. When the user is moving, the M-Track will analyze the distance between user and route, and decide whether it should provide navigation or warining that the user is off the route.