

GEOFENCING SMALL E-BIKE RENTAL FLEETS

A How-To Guide for Practical Implementation of Geofencing
for Rental Fleets of 1-25 or More E-bikes

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Hermosa Cyclery's Geofenced E-bike



Our plan: Research geofencing to find an ideal approach and supplier for easy and practical implementation. Our chosen geofencing approach was reviewed by the platform/equipment provider and an e-bike electronics expert who trains e-bike technicians, practices in the trade and is a member of the National Bicycle Dealers Association E-Bike Safety & Standards panel.

GPS Tracker installed: Trackhawk VL03 - Hardwired GPS Kill Switch Tracker. Features include geofence to turn on and off a motor, limit speed, locate and disable a stolen e-bike, among others. Works on 9-90 volts (e-bikes are typically 40-80 volts). Has an internal backup battery. Dimensions: 3.7" x 2.0" x 0.6". <https://trackhawkgps.com/product/gpskillswitch>.

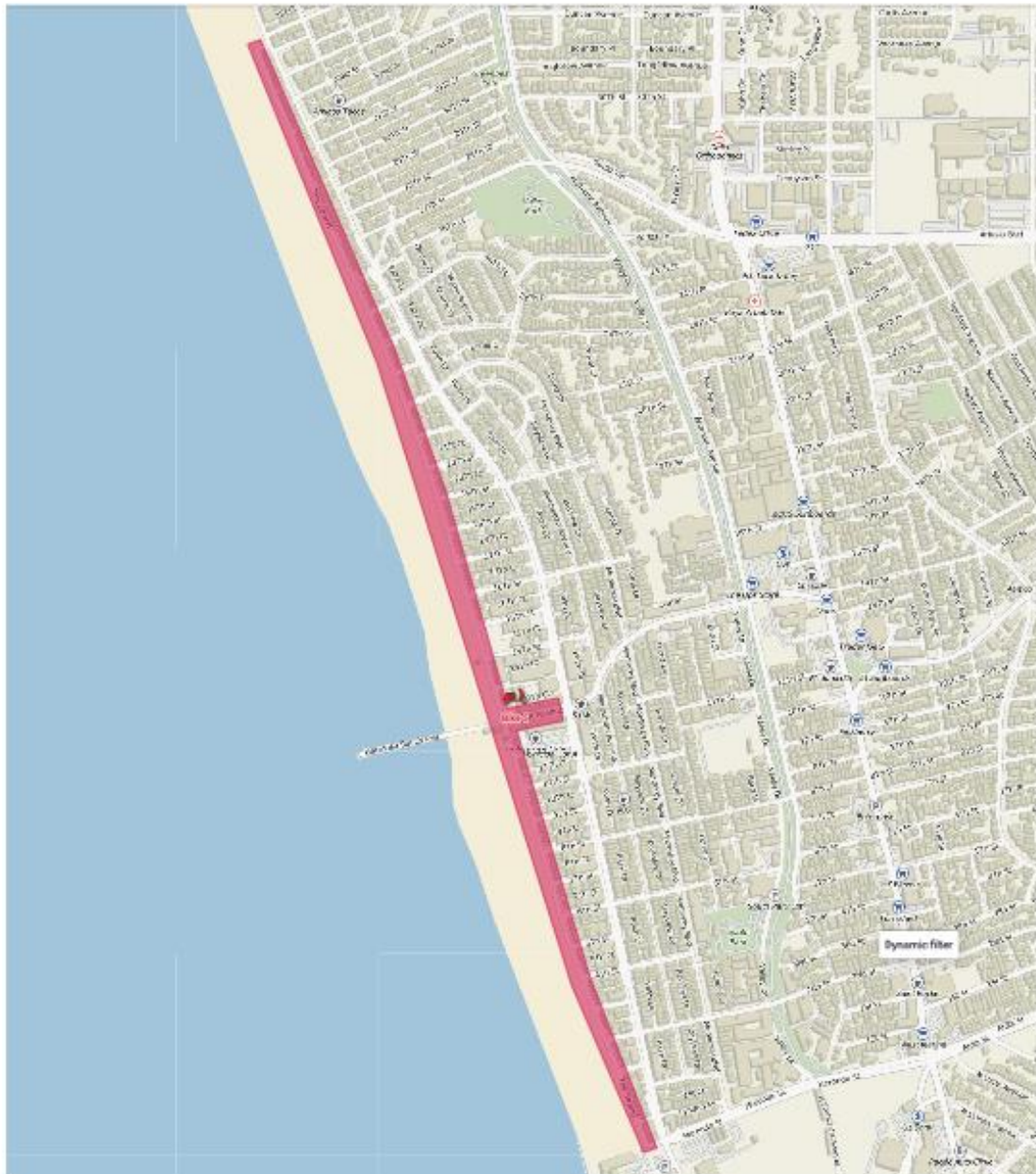
Geofencing platform: The accuracy of geofence boundaries outdoors is 10 feet. Here is a two-and-a-half-minute video by Hermosa Cyclery showing the Web platform included to geofence our e-bike: <https://youtu.be/T1ZQetEvsmY>.

GPS tracker and platform cost: \$100 for 1 GPS tracker plus \$20 per month for the service. Cost drops to \$84 per tracker and \$16 per month for 25 units and up. We stopped looking after finding Trackhawk's all-in-one service, because the price is right and their support is excellent.

Economics of geofencing a fleet of 1-25 or more e-bikes: A typical rental e-bike costs about \$1,000-1,500 and brings in a revenue of around \$500 to \$1,000 or more per month. Compared to the one-time \$84 device cost and \$16 per month service fee, a GPS tracker is a financially inconsequential portion of a fleet investment. For a fleet of just 10 e-bikes using the lower \$500 figure, \$60,000 per year revenue makes the \$1,920 annual GPS tracker service fee for public safety, compliance with local laws, and support of the community very compelling. Although there is a diminishing per-bike revenue on each additional e-bike added to a fleet at some point, even the last bike worth adding easily covers its \$16 monthly fee if rented just 1 time in a month for the typical \$50-\$100 rental fee. Geofencing is often standard practice for e-bike and e-scooter rental operations (see Caltrans 2020 report: [Analyzing the Potential of Geofencing...](#)).

Hermosa Beach Strand E-bike Geofence

The geofenced e-bike's motor shuts off within 15 seconds of entering the red geofenced area and turns back on within 15 seconds of leaving the area.



Installation

Time to install: Figure 1-2 hours for a mechanic to install their first GPS tracker. Multiple installations on a fleet would likely be 1 hour or less, due to learning curve improvements and economies of scale.

Bike shop cost to install: Depending on the mechanic pay rate, the installation cost would be about 1/3 of the above, so \$30-\$40 per e-bike for a rental fleet.

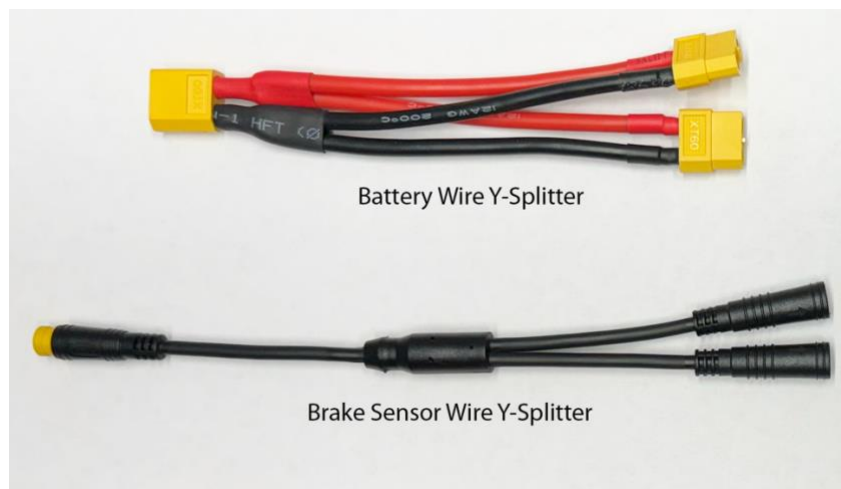
Retail cost to install for perspective: Hermosa Cyclery quotes \$80-\$160 for 1 to 2 hours of e-bike service work. For example, we charge \$150 to assemble an e-bike, \$120 for an e-bike tune-up, and \$115 for brake adjustments with pads. GPS Tracker installation time is comparable to ordinary services bike shops normally provide.

How to install a GPS Tracker (wiring diagram next page):

A GPS tracker with motor shut-off uses 3 wires, 2 of which are standard power wires that connect to the battery (positive and negative). The 3rd wire connects to the e-bike's brake sensor cable (the positive wire). Brake sensors are standard equipment on e-bikes used for rental fleets.

Alternatively, the relay that comes with the GPS tracker may be used to shut off the motor of an e-bike, instead of the brake sensor.

The wiring of the e-bike may remain unaltered by using commonly available plugin Y-splitters that fit standard e-bike plugs, as shown below. The GPS tracker would connect to one side of each Y-splitter by adding plugs to the GPS tracker or by splicing the wires directly (both wiring methods are common practice in e-bike servicing). Another accepted approach is to splice the GPS tracker wires directly to the e-bike's wires, without Y-splitters.



GPS Tracker E-bike Wiring Diagram

