**Project Requirements: The Speed Demon**

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**Needs Statement:**

With an infrastructure that supports 350 miles of bikeways, Portland, Oregon is one of the friendliest cities for non-motorized transportation. In Portland, 7.2% of commuters travel by bike. In addition to bicyclists, pathways are also enjoyed by skateboarders. Skateboarding remains a popular pastime, and since the year 2000, skaters have enjoyed the same legal status as cyclists. Curious commuters may need to know how fast they are moving for many reasons, including safety and timing commutes. Skaters may want to know their speed for completing a jump or for breaking personal speed records. The fitness-conscious like to keep track of their distance travelled, and thrill seekers always want to know how fast they are moving. For all these reasons, an adaptable system is needed to record the speed, along with other statistics, of a moving bicycle or skateboard.

*\*Statistics provided by the Portland Bureau of Transportation*.

**Objective Statement:**

Our objective is to provide a battery powered device that will measure and display speed for bikes, skateboards, and other wheeled conveyances. The device should work with vehicles with differing wheel diameters, and will be able to switch modes for different units of speed. The user will be able to interact with the device via mode-switch buttons. The device will then display the appropriate information on the integrated screen.

**Requirements:**

**Functionality**

* Modular, end user-replaceable, chassis mounted Hall effect sensor which pairs with wheel-mounted magnet, interfaces with main unit via connector
* Display screen on head unit with large character size, visible in variety of lighting conditions
* Based around STM32F0xxx family MCU
* Head unit must have small form factor, suitable for mounting on bike handlebars or front of skate deck
* Parameterizable, nonvolatile memory stored wheel diameter, ideally with space for several different vehicle specs to allow different modes for different vehicles
* Modes and data entry controllable with two-or three-pushbutton interface

**Performance**

* Magnet/sensor combination sensitive enough to leave sensible air gap (~1 cm) between them
* Works at high wheel speeds, up to and exceeding 40 MPH for small-diameter (i.e. skateboard-sized) wheels.
* Battery powered, with power consumption low as possible to restrict size and prolong battery life. Ideally should run on coin-cell battery.
* Water-resistant enough to withstand regular rainy conditions

**Economic/Marketing**

* Retail cost of device not to exceed $60
* Wheel sensor unit can be sold separately with differing cable lengths and mounting brackets (‘Bike Speedometer Kit’, ‘Skate Speedometer Kit’, etc)