

<b>Marketing Requirements</b>	<b>Engineering Requirements</b>	<b>Justification</b>
1,5	System will be capable of collecting levels of CO, and dust (particulate matter) in the environment.	Primary air pollutants defined by the EPA are ozone, nitrous oxides, sulfur dioxide, lead, particulate matter, and carbon monoxide. Sensors for detecting ozone, nitrous oxides, and lead are far too expensive (hundreds of dollars) to implement. Sensors for CO and particulate matter are affordable and thus implementable on many bikes.
1,5	System will be capable of collecting temperature, humidity levels, and GPS location.	Temperature and humidity are environmental factors that can affect pollutants and sensors and are therefore useful for data analysis. GPS location will be used to correlate the data with the position of the rider.
2,3	System will be housed in a small enclosure that allows copious amounts of airflow.	In order to effectively measure fluctuations in pollutant levels, the enclosure must allow for significant airflow.
2,5	System will be capable of storing large amounts of data internally. Data will be easy to access, analyze, and delete.	In order to accommodate for long bike rides and to keep the system memory from filling up too quickly, records should be stored on large memory units. These records should be written in an easy to view and analyze format, and should be easily accessible by users.
1,5	System will be capable of transmitting the sensor data to the main OBI unit.	In order to save on cost and to utilize the resources already available on the future OBI “smart-locks” (wireless data transmission), the unit will be capable of transmitting the sensor data to the main box.
4	System will be capable of passing power to the main OBI unit from a dynamo for charging of battery.	The OBI bicycles will have a hub dynamo to generate power. Our box will transmit the generated power to the main box in order to charge the batteries but will not make use of the power.
1,4	System will be powered via a regulated rechargeable battery which will turn on using a simple on/off switch.	The box will be completely self-contained and will require a power source. It will have a battery capable of lasting through a long bike ride which will be regulated to the appropriate voltage. In order to maximize ease of use, human interaction will be limited to a power switch will turn the system on and off.
1,4	System will connect with future OBI	The future OBI box will have an RJ45

	“smart-lock” unit through an RJ45 connection.	jack and wireless data to allow for communication with the outside world. Thus, in order to transmit the data and power to the main box in a cost effective manner, the systems will be connected via RJ45.
5	System will be capable of time-stamping data.	In order to correlate the data with other sensors or to get an idea of the time of day for pollution information, each line of data will have a time stamp.
1,4,5	System must use an inexpensive microcontroller.	A microcontroller capable of communication and data collection from all sensors must be implemented.
5	System will collect sensor data every few seconds.	Since pollutant concentrations can fluctuate very frequently, the system must be capable of collecting data often.

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#### **Marketing Requirements**

1. The system should cost under \$200 per unit to manufacture.
  2. The system should not interfere with bicycle rider.
  3. The system should be light and portable.
  4. The system should have somewhat low power consumption.
  5. The system should provide useful data.
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