**Sustainability and Social Impact**

If the SmartBike retrofit kit was to be produced as a product, it could potentially produce several sustainable effects and have a measurable social impact. It would encourage biking both recreationally and as an alternative to driving while commuting. It would also work to improve engagement in the local community through targeted advertisements for local businesses. In addition, it would encourage longer distance biking, as the phone charging capability allows users to maintain charge to their phone throughout the ride. Additionally, it would improve bike-car interactions, as the turning signals, and other potential future improvements, would make the bike appear as a more familiar vehicle to the car driver, and make the bike user more visible and safe while biking at night.

The SmartBike features, namely accurate distance measurements, time spent biking, calorie count, and money saved on gas, can act as encouragement for both recreational and commute style biking. Recreationally, it provides the user with an accurate measurement of their current biking activites, and can keep a log of past activities, allowing the user to see improvement and be encouraged to bike more. For commuting, the user is able to see how much they are saving on gas, as well as being able to charge their phone and signal in a way recognizable to car drivers. This means that a commuter can measurably see how they are helping the environment and saving money, can keep their phone, a very important device for modern workers, fully functional, and can make commuters feel safer while having to commute on roads without designated bike lanes.

The SmartBike would also work to improve engagement in the local community through targeted advertisements for local businesses. A local business which advertised on the SmartBike app would be able to directly target cyclists in the area. Targeting an audience which is conscious about their carbon foot print and willing to put in effort towards more environmentally friendly measures would encourage the development of green, sustainable local businesses. This directly targeted communication between bikers and store owners would encourage biker engagement within the community, and make biking a more desirable method for local transportation in an area.

In addition, it would encourage longer distance biking, as the phone charging capability allows users to maintain charge to their phone throughout the ride. Long hours of operation drain the battery from phones and other devices. This can be discouraging for riders planning on going long distances, as phones and other devices are often used to enhance the biking experience, whether with music, directions, or other methods. With the SmartBike’s power generation capabilities, the devices can remain fully charged and operational throughout the ride, taking away a potential source of discouragement from long distance bike rides, which promote health, fitness, and physical well-being.

Bike-car interactions are a potentially lethal area for cyclists. According to the CAA, 7,500 cyclists are seriously injured every year, one third of cyclist deaths occur at night, and cyclists are most likely to be killed at signal controlled intersections. The Ontario government passed updated bike safety laws in 2015 that increased the fine for cyclists without lights, a reflector, and reflective tape. The SmartBike turning signals would act to make cyclists more visible to cars in the dark, and would help provide clarification as to a cyclists intention when in a signaled intersection. This would allow for an increase in the bike mode of transportation, as biking would be a safer and more viable option.