Title of Project: Impact of Electric Vehicles on the Grid

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Congratulations on your selection as a participant in our e-bike field study! This letter will tell you more about our work and its anticipated benefits.

Electric cars are in the news, and with 100,000 electric cars sold in the US alone in 2012, their use is growing rapidly. However, academic studies of electric cars are limited by the fact that they are expensive. Our idea is to deploy a fleet of approximately 25 electric bicycles or e-bikes at the University of Waterloo. E-bikes are regular bicycles augmented with a battery and an electric motor and instrumented by a set of sensors. This fleet would allow us to pursue three lines of research:

1. To study electric cars usage at a much lower price point ($1500 vs. $30,000).
2. To study e-bikes in their own right. This is important because e-bikes are the world’s fastest growing mode of low-carbon urban transportation (China has over 200 million e-bikes already). Insights gained from this work will help in understanding the scope and impact of e-bikes on transportation infrastructure in the Canadian context, for example, when used to move people to and from an LRT line.
3. When charged by a solar panel, e-bikes are a cost-effective off-grid and low-carbon transportation solution.

Summary of the Project:

In this field study, we will deploy a fleet of approximately 25 e-bikes and collect usage data from them using custom-built sensors. This data would then serve as the foundation for several research projects, such as evaluating the impact of temperature on battery life, designing solar charging stations for e-bikes, evaluating the impact of electric cars on the grid by extrapolating from e-bike charging behaviour, and efficient design of the data collection infrastructure itself.

Procedure:

The procedure used for the study is as follows:

a. Selection of participants in the field study based on a survey (this step has already been carried out). We will select participants to represent four distinct populations of e-bike users: (i) Car users who would consider using e-bikes instead of cars for some trips. (ii) Bike users who would consider using e-bikes instead of cars for some trips (iii) Public-transit users who would consider using e-bikes instead of cars for some trips. (iv) Walkers who would consider using e-bikes instead of cars for some trips. We are not targeting any specific gender, age-range, or special characteristics: our selection of participants aims to be a representative sample of the UW population. However, all participants must: a) be at least 18 years old b) wear a helmet when operating the e-bike c) anticipate residing in the KW region and retain a connection with the University of Waterloo for the next three years and d) undergo a training session on safe e-bike use.

b. Buying e-bikes and equipping them with sensors developed in our lab at the University of Waterloo.

c. Pickup of e-bikes from our partner, Cycle Electric, 10 Wyman Road, Waterloo, ON, N2V 1K7 by participants. You will receive brief training on e-bike use at the time of pickup. You need to take part in an orientation and information session on safe and proper use of e-bikes as outlined by the manufacturer/supplier and the Ministry of Transportation.
d. Use of e-bikes for normal transportation needs by study participants. Location (GPS), battery state, and accelerometer data collected during this study will be automatically sent over a secure link to a secure server any time the e-bike is brought on to the UW campus, within range of the 'eduroam' WiFi network.

e. The electric portions of the e-bike (i.e. battery, motor, and controller) have a three-year manufacturer warranty. If you have any problems with these components, please take the e-bike to Cycle Electric for servicing. You are responsible for routine e-bike maintenance, such as flat tyres, oiling the chain etc. Please note that you can get help for these services from the bike clinic at the Student Life Center.

f. We will conduct additional surveys every three-to-six months. These will be user surveys with approximately the same set of questions as you answered earlier.

g. We expect you to ride the bike at least once a week during summer months (May 1 to September 30) other than when you are away on vacation. We do not expect you to ride the bike during winter months (October 1 to April 30). If you do not use your e-bike at least once a week during the period from May 1 to September 30, other than during vacation periods you’ve told us about, you will be sent a warning by email. If, subsequent to the warning, you still do not use your e-bike regularly (i.e., at least once a week), we will request that the bike be returned to us so that it can be given to another participant.

h. At the end of the three-year study, you may keep the e-bike for your personal use at no additional cost. The purchase price of a new e-bike is approximately $2,000 + HST.

i. If the bike is stolen, please let us know immediately by calling (519) 888 4567 and asking for Mr. Costin Ograda-Bratu or sending email to cogradab@uwaterloo.ca. We will be able to locate the bike using GPS and retrieve it with the help of Waterloo Police.

j. If you move away from the Kitchener/Waterloo area and/or cease employment or study at the University of Waterloo, your participation in the study will automatically come to an end. Please let us know so that we can reclaim the e-bike.

You can withdraw from participation at any time by advising the researcher. If you choose to withdraw, the researcher will immediately erase any data obtained from your participation in the study and also take back the e-bike.

Risks and Benefits:

The risk from using an e-bike is comparable to that of using a regular bicycle. You will need to sign a waiver and release form that releases the University of Waterloo from any consequences arising from the study as a condition for participation. Please note that the Ontario Ministry of Transportation has outlined rules and FAQs about e-bike use at http://www.mto.gov.on.ca/english/dandv/vehicle/emerging/e-bike-faq.shtml

Your benefit from participation will be the ability to use an e-bike for personal use.

There is no publicly available data on fine-grained e-bike use. Our study will be the first to provide such models, and, therefore, will greatly aid research in the area of electric vehicles. This will a net benefit to society. The design of solar charging stations will allow carbon-free transportation for developing regions.

Confidentiality and Data Security:

All information you provide is considered completely confidential. Your name will not appear in any publication resulting from this study. Data collected during this study will be retained for seven years on password-protected computers in a secure location accessible only to researchers associated with this project. Electronic data will be de-identified before being stored.

Individual e-bike usage data may be presented or reported; however, it will not include any personal identifiers.
Contact Information and Research Ethics Clearance:

If you have any questions about participation, or would like additional information to assist you in reaching a decision about participation, please contact me at the University of Waterloo at (519) 888-4567 extension 34456 or by email at keshav@uwaterloo.ca.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin in the Office of Research Ethics at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

Thank you for your assistance in this project.

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