

PedX: Automation for Safer Pedestrian Street Lighting at Intersections

Data Collection

What data will you collect or create?

Three items are proposed in this project: (1) Control of LED luminaires' individual array diodes to improve crosswalk visibility, (2) luminary positioning for optimal driver visibility of pedestrians in crosswalks and at intersection sidewalks, and (3) synchronization of the proposed PedX system with Safety21's PedPal app at intersection streetlights.

Data collected in these three activities are described below. We will carry out literature and patent research, including overview of current LED streetlight luminaire products and analysis of diode and control management. This data collected will be stored and organized in an appropriate literature storing platform, such as Zotero. We will purchase and investigate typical streetlight luminaire lighting mechanics, circuiting, and data communication. Take in-field lighting measurements of lumens of Pittsburgh intersections (typical and amplified intersections [4 luminaires]), this data will be used to confirm assumptions. We will explore circuiting options for individual diode control and data communication protocol. We will virtually investigate geometric models for streetlight in-situ positioning and related diode control to match crosswalk locations. We will work with PedPal team to design communications protocol with luminaire control system. PedPal's team is in charge of pedestrian data (please see their Data Management plan for this), and we will be in charge of collecting and transmitting luminary data. We will define equipment and circuiting feasibility leveraging PI Flanigan's fully-equipped Advanced Infrastructure Systems Lab (all hardware and development equipment already exists), communications protocol, geometric models for virtual testing, and literature research as needed. Lumen data will be collected experimentally under varying conditions in the lab, and this data will be stored for use in our geometric models.

How will the data be collected or created?

Experimental data will be collected in CMU's Advanced Infrastructure Systems laboratory and in the field as described previously in the "What data will you collect or create?" section.

Documentation and Metadata

What documentation and metadata will accompany the data?

Metadata will include computational models in MATLAB and source code written in C, spatio-temporal measured data from light sources under varying configurations, and model descriptions.

All data can be provided in a standard .csv format to any interested party.

Ethics and Legal Compliance

How will you manage any ethical issues?

Any ethical issues will be reported to the PI's university and subject to the university's Ethics policy.

How will you manage copyright and Intellectual Property Rights (IP/IPR) issues?

Any copyright and IP/IPR issues will be reported to the PI's university and subject to the university's policies.

Storage and Backup

How will the data be stored and backed up during the research?

All data will be stored and managed in a cloud-based server and backed up on a local server and external hard drive at CMU. All data will be regularly backed up to ensure full data recovery in the event of failure.

How will you manage access and security?

The aggregated data in this project are fully anonymous and do not contain any private or confidential information. This data will not require additional layers of security beyond using a secure, commercial-grade cloud-based server for storage.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

As previously described, the primary data collected will be of lumens measured in experimental settings. This data---in addition to the geometric models developed---are of significant long-term value, especially since this project will likely continue through several phases over the course of a few years (as described in the proposal's project description).

What is the long-term preservation plan for the dataset?

All data will be stored and managed in a cloud-based server and backed up on a local server and

external hard drive at CMU. All data will be regularly backed up to ensure full data recovery in the event of failure.

Data Sharing

How will you share the data?

The PI will communicate all intellectual contributions with the scientific community through journal publications, conference presentations/papers, and seminars. When sharing data, the PI will protect privacy, confidentiality, and security. The research team will discuss making data publicly available with the deployment partners (i.e., City of Pittsburgh) prior to sharing information. Should the research findings lead to intellectual property, the PI will work with CMU's Technological Transfer Office to protect proprietary data. The PI will not publicly post any raw data that the PI does not have permission to share.

Are any restrictions on data sharing required?

None. The aggregated data in this project are fully anonymous and do not contain any private or confidential information. The research results belong to the PI's university. When not in violation of agreements made with third parties in order to collect data from their systems, the project data will be made available to stakeholders and the research community.

Responsibilities and Resources

Who will be responsible for data management?

The PI, Katherine Flanigan, will be responsible for data management.

What resources will you require to deliver your plan?

No resources outside of PI Flanigan's existing Advanced Infrastructure Systems Lab will be required, aside from the technology described in the proposal, namely, a commercial streetlight luminaire used for the experimental tests. She already has all of the raw materials and hardware needed for the project. CMU's TechSpark will be used to gain any skills required that PI Flanigan and the PhD student do not already have (e.g., cutting and building a stability system for the streetlight in the lab during testing).
