

EAGER: A Cloud-assisted Framework for Improving Pedestrian Safety in Urban Communities using Crowd-sourced Mobile and Wearable Device Data

Award #1637290, Award Start Date: July 15, 2016

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Challenge

To improve pedestrian safety in urban communities through **accurate** and **real-time detection of distracted pedestrians** and providing **timely** and **usable hazard alerts/notifications** to all concerned users.

Scope

Existing schemes for human activity recognition:

- are unable to detect several **complex** distraction-related pedestrian activities.
- are **computationally heavy** and not feasible for implementation and use on mainstream mobile and wearable devices.
- Do not operate in **real-time** or may require **specialized hardware**.

Solution

- A novel pedestrian distraction detection framework based on an efficient **hierarchical complex activity recognition model**, utilizing real-time dominant frequency matching techniques.
- **Privacy-preserving** and **context-aware** cloud-based service for alerting the distracted pedestrian, and others in the vicinity.

Evaluation Plan

- Initial performance evaluation by **comparing** with **generic complex activity recognition models**.
- Extensive analysis of the framework with the help of a **campus-wide test-bed**.

Scientific Impact

- Advancements in the field of **real-time and on-device complex activity recognition** targeted towards identifying engrossed and distracted user behavior by utilizing **multi-modal** and **multi-source** sensor data from mobile and wearable devices **with limited computational resources**.
- Extensive human factors study on **effective**, but non-disruptive, **methods of alerting** a distracted pedestrian, and others in the vicinity.

Broader Impact

- Reduce/Prevent distraction related injuries and **promote pedestrian well-being**, both at the user and community level.
- A **prototype mobile/wearable app** that will promote pedestrian safety in Wichita State University and the neighboring urban community.
- Deployment of the project outcomes in urban communities across the country with the help of appropriate **industry partnerships**.

Common Pedestrian Distractions

What they see others do:

- 90% Talking on the phone
- 88% Engaging in conversation
- 88% Listening to music
- 85% Using a smartphone
- 64% Generally "zoning out"

Includes "usually/almost always" and "sometimes" answers

4 out of 10 Americans say they have **personally witnessed** a distracted walking incident.

26% say they **have been in an incident** themselves.

Source: American Academy of Orthopedic Surgeons

