

*UPISC - Plenary Panel: National, State, and Regional Perspectives on Infrastructure Sensing*

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University Transportation Center for Safety

**Carnegie Mellon University**

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# Overview

- Introduction to Metro21 & Safety21
- Intelligent Transportation Systems
- Infrastructure Case Studies
- Stay in Touch



# Introduction to Metro21

**Mission:** To develop and deploy **21st century solutions** to the challenges facing metropolitan regions

- University-wide institute with a unique **interdisciplinary** platform
- Strong **partnerships** with government, private and non-profit sectors
- Addressing **real-world issues** through research, development and deployment
- Collaborated/ing on over **70 projects** with municipalities and equity deployment partners



# Safety21 Overview

## Safety21: US DOT National University Transportation Center on Safety

- Safety21's mission is *Innovating Safety For All*

### Our Focus Areas

- Connected and Autonomous Vehicles (CAVs)
- Physical & Digital Infrastructure that enhances safety and enables connectivity

### Our Objectives

- Improve the safety, equitability & comfort for vulnerable users on the road
- Deploy solutions and impact real-world usage
- Fostering faculty & students through our education & workforce development initiatives



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- [412 Food Rescue](#)
- [Access Transportation Systems](#)
- [AECOM](#)
- [AFL-CIO](#)
- [Airport Corridor Transportation Association](#)
- [ALCO Parking](#)
- [Alcosan](#)
- [Allegheny Conference on Community Development](#)
- [Allegheny County](#)
- [Allegheny County Airport Authority](#)
- [Allegheny County Office of Children, Youth and Families](#)
- [Allegheny General Hospital](#)
- [Allies for Children](#)
- [Alstom \(formerly Bombardier\)](#)
- [Ambulance Service Management Corporation](#)
- [American Association of Retired Persons](#)
- [American Association of State Highway and Transportation Officials](#)
- [American Public Transportation Association](#)
- [American Traffic Signals \(part of Verra Mobility\)](#)
- [American Transportation Research Institute](#)
- [ARGO AI](#)
- [Association of American Railroads](#)
- [Aurora Innovation](#)
- [Automatic Labs \(a SiriusXM company\)](#)
- [Azuga](#)
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- [Benedum Foundation](#)
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- [Beth's Barricades \(part of Roadsafe\)](#)
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- [Intel](#)
- [Intelligent Transportation Society of America](#)
- [International Council on Clean Transportation](#)
- [Jackson/Clark Partners](#)
- [JITSIK](#)
- [Knight Bus](#)
- [Lawrence County](#)
- [Pi-Lit](#)
- [PITT OHIO](#)
- [Pittsburgh Community Reinvestment Group](#)
- [Pittsburgh Downtown Partnership](#)
- [Pittsburgh International Airport](#)
- [Pittsburgh Parking Authority](#)
- [Pittsburgh Regional Transit](#)
- [Pittsburgh Technology Council](#)
- [Pittsburgh Transportation Group, Ztrip](#)
- [Port of Pittsburgh Commission](#)
- [Portfolio Associates](#)
- [PPG Industries Inc.](#)
- [Precision Neuroscopics LLC](#)
- [Propel IT, Inc.](#)
- [Puget Sound Regional Council](#)
- [Quaker Valley Council of Governments](#)
- [Qualcomm](#)
- [Quality Control](#)
- [Rapid Flow Technologies](#)
- [Regional Industrial Development Corporation Pittsburgh](#)
- [Richard King Mellon Foundation](#)
- [Roadbotics by Michelin](#)
- [Robotics Institute Summer Scholars](#)
- [RobotWits](#)
- [RubyRide](#)
- [SAE](#)
- [Safety Vision](#)
- [Salvo Strategies](#)
- [Schweiger Consulting](#)
- [Southeastern Pennsylvania Transportation Authority](#)
- [Southwestern Pennsylvania Commission](#)
- [SPIN](#)
- [Bike Pittsburgh](#)
- [Blind & Vision Rehabilitation Services of Pittsburgh](#)
- [Boeing Horizon X/NeXt](#)
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- [Borough of Dormont](#)
- [Bosch Research and Technology Center, North America](#)
- [The Breathe Project](#)
- [Carnegie Mellon University Campus Development and Facilities Design Department](#)
- [Carnegie Mellon University Center for Air Particle Studies](#)
- [Carnegie Mellon University Metro21 Smart Cities Institute](#)
- [Caterpillar](#)
- [Center for Hearing and Speech](#)
- [Christiana Hospital Authority](#)
- [Children's Hospital of Philadelphia](#)
- [Children's Hospital of Pittsburgh](#)
- [Cisco](#)
- [Coastal Motor Vehicle Inspection Committee](#)
- [City of Greensburg](#)
- [City of Philadelphia](#)
- [City of Pittsburgh](#)
- [City of San Jose](#)
- [City of Seattle](#)
- [Clarence Technologies](#)
- [Comcast](#)
- [Commercial Vehicle Safety Alliance](#)
- [Common Caches LLC](#)
- [CompuSpecctions](#)
- [Conference of Minority Transportation Officials](#)
- [Cranberry Township](#)
- [Crown Castle](#)
- [Daimler Trucks North America LLC](#)
- [Dalian University of Technology](#)
- [DC Highway Safety Office](#)
- [Delaware Valley Regional Planning Commission](#)
- [Locomotion](#)
- [League of American Bicyclists](#)
- [Manchester Citizens Corporation](#)
- [Marshall Township](#)
- [Masite](#)
- [Meter Feeder](#)
- [MetroLab Network](#)
- [Mid-Ohio Regional Planning Commission](#)
- [Mileage-Based User Fee Alliance](#)
- [Millvale](#)
- [Miovision](#)
- [MOVEPGH](#)
- [Municipality of Monroeville](#)
- [Municipality of Penn Hills](#)
- [National Aging and Disability Transportation Center](#)
- [National Association of Area Agencies on Aging](#)
- [Near Earth Autonomy](#)
- [North Hills Community Outreach](#)
- [North Huntingdon Township](#)
- [Oakland Business Improvement District](#)
- [Oakland Transportation Management Association](#)
- [Ohio Department of Transportation](#)
- [OSHER](#)
- [Panasonic](#)
- [Partner4Work](#)
- [PathVu](#)
- [Peloton Technologies](#)
- [PennDOT](#)
- [Penn Hills Community Development Corporation](#)
- [Pennsylvania Motor Truck Association \(PMTA\)](#)
- [Pennsylvania Public Utility Commission](#)
- [Pennsylvania Rural Robotics Initiative](#)
- [Pennsylvania Turnpike Commission](#)
- [Stanford University](#)
- [Street Sense, Inc.](#)
- [Sustainable Pittsburgh](#)
- [Technical University of Munich](#)
- [Technische Universität Clausthal](#)
- [The Autoware Foundation](#)
- [The Philadelphia Office of Transportation, Infrastructure, and Sustainability](#)
- [The Heinz Endowments](#)
- [TheBUS, City and County of Honolulu](#)
- [Three Rivers Optical](#)
- [TierIV](#)
- [Tiramisu Transit Inc](#)
- [TIRES](#)
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# Deployment Consortium Members

# Intelligent Transportation Systems (ITS)

- Its origins at CMU (Rapidflow Technologies), ITS is a collection of technologies that use communications to improve transportation safety, mobility, and efficiency including:



- Traffic control
- Traveler information
- In-vehicle systems
- Transit systems
- Dynamic message signs
- Automatic tolling

- **ITS is probably the most successful example of “smart cities” in the US (if not the world)**
- **ITS has potential to help cities prioritize its policies– such as encouraging high occupancy vehicles (vs. single occupancy); multimodal transportation (such as bikes) and protecting vulnerable road users**

# Infrastructure Case Studies



# Using Technology to Predict Landslides

## Background

The United States Geological Survey estimates that each year 25-50 deaths are related to landslides, as well as \$2-4 billion in annual losses due to property damage.

- CMU's Christoph Mertz (co-founder of Roadbotics, now part of Michelin), using deep learning to detect signs of impending landslides
  - Working with Pittsburgh suburb (North Huntingdon) with technology installed on buses
- CMU partnering with Penn State University, City of Pittsburgh and Pittsburgh Water and Sewer Authority to use fiber optic cables as sensors to better predict and address environmental hazards like landslides, sinkholes and floods



Pittsburgh's Polish Hill neighborhood, October 2024



# PedPal Lite:

An ATSC-Independent Safe Intersection Crossing App

Project Lead: Stephen F. Smith

- **Goal:**

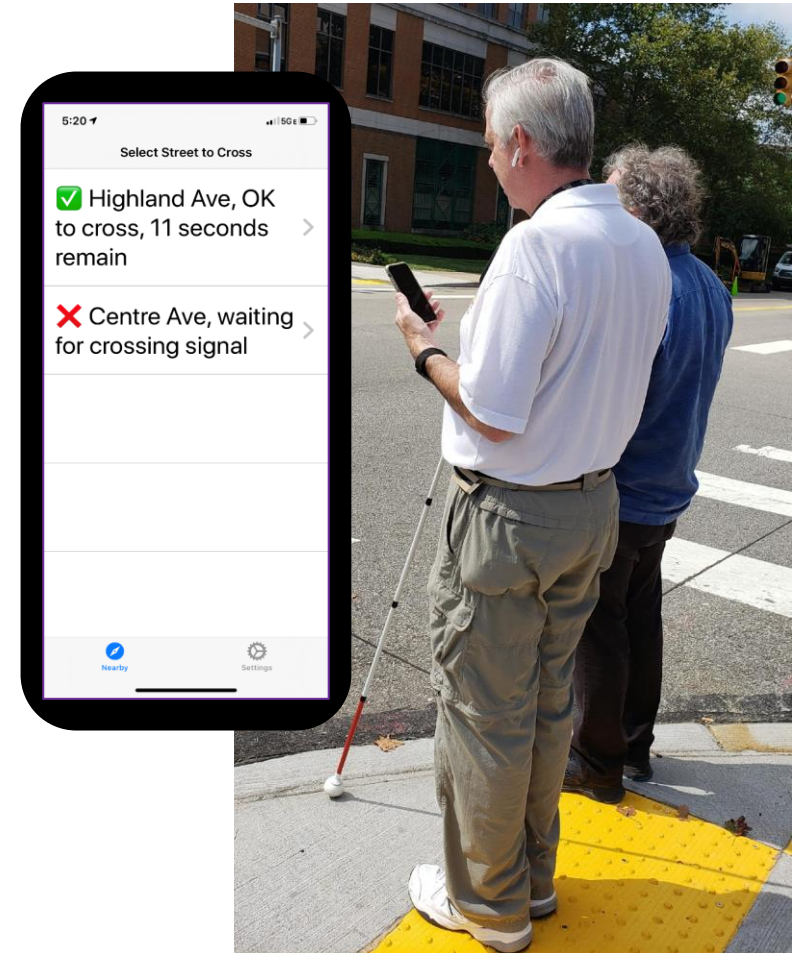
- A low-cost, broadly deployable app for safe intersection crossing

- **Technical Approach:**

- Developing a version of PedPal that operates with conventional timing plans and removes the need for surtrac signal control

- **Partners**

- **miOVISION** – Deployment partner and intersection safety challenge collaborator
- **pathVu** – Deployment and equity partner



# Check us out - Stay in touch

- Safety21 website ([safety21.cmu.edu](https://safety21.cmu.edu))
- Safety21 monthly e-publication:  
“What’s Happened at Safety21?”
- Weekly newsletter reaches over 5,000 subscribers from 13 countries
- 120+ videos shared on our YouTube Channel

