U.S. DOT's Small Business Innovation Research (SBIR) Program

SBIR Fiscal Year 2024.2 Phase II Awards

Project Title	Company Name
Artificial Intelligence Processing and Analysis Framework for Infrastructure Planning, Design, and Maintenance	Creare, LLC
Complete Urban To Rural Balanced Streets By Artificial Intelligent Design (CURBS-AID)	Kitware, Inc.
Urbanomy: AI-Driven, Multi-Modal Decision Support for Smarter, Scalable Transportation Design, Planning, and Asset Management	OpalAI, Inc.
AI for Comprehensive, Efficient, & Safe Streets (ACES): Delivering a Data-Driven Transportation Decision Support & Predictive Analytics Software	State of Place
GRACE: Generative AI for Roadway Design, Safety Assessment, and Compliance Evaluation Using LiDAR and	TrAnalytics, LLC

Creare, LLC (Hanover, NH)

Artificial Intelligence Processing and Analysis Framework for Infrastructure Planning, Design, and Maintenance

PI Name: Mattheus Ueckermann **PI Email:** mpu@creare.com

Abstract: The U.S. Department of Transportation (DOT) seeks artificial intelligence (AI) decision support tools to help U.S. transportation agencies in designing, planning, and maintaining infrastructure projects. These tools will generate and continuously update critical infrastructure data to support decision making. Transportation agencies have a wide variation in infrastructure data needs. Some agencies have detailed data and asset management databases, while others lack basic information, such as sidewalk data. Even when transportation network data is available, it is often incomplete and lacks detailed geometric information like lane widths, turning radii, clearances, and condition. Given the staffing and budget constraints faced by municipalities across the U.S., obtaining basic infrastructure data at one time is difficult, let alone continuously updating and systematically analyzing it to create effective infrastructure plans. AI tools are essential for efficiently updating and analyzing infrastructure data to support effective transportation infrastructure projects.

To address this need, Creare is developing StreetPulse. This system automatically generates a functional digital twin of a city and allows users to extract customized data needed for implementing transportation infrastructure policies. StreetPulse enables data driven decision support tools, allowing U.S. agencies to implement more effective transportation networks with greater efficiency.

Company Website: https://www.creare.com

Kitware, Inc. (Clifton Park, NY)

Complete Urban To Rural Balanced Streets By Artificial Intelligent Design (CURBS-AID)

PI Name: Connor Greenwell **PI Email:** connor.greenwell@kitware.com

Abstract: Transportation planning is currently limited in scope by human bandwidth. Modeling and analyzing traffic infrastructure is time-consuming and does not scale to large study areas. Kitware, along with NYU and MJ Engineering, proposes to build a transportation AI assistant that can analyze infrastructure, answer queries, and make suggestions at scale. The web-hosted interface marries an AI chat dialog with a map-oriented GIS workspace to greatly accelerate planning workflows. The tool will interface with a wide variety of data sources and formats, but an accurate transportation network model is key. Pedestrian traffic infrastructure is frequently missing in existing road network models. Building on our successful Phase I results, our approach automatically extracts walkway networks from overhead image surveys using state-of-the-art trained computer vision models. Additional computer vision algorithms applied to ground-level imagery collection auto-generate ground truth to train the overhead models and can provide enhanced accuracy and finer details such as curbs and sidewalk conditions in key study areas. If successful, our novel AI transportation assistant will revolutionize the way transportation planners interact with their data and greatly accelerate their workflows. Furthermore, our overhead image processing approach will automate the generation of walkway networks at a national scale with minimal cost.

Company Website: https://www.kitware.com/

OpalAI, Inc. (Beverly Hills, CA)

Urbanomy: AI-Driven, Multi-Modal Decision Support for Smarter, Scalable Transportation Design, Planning, and Asset Management

PI Name: Ryan Alimo **PI Email:** ryan@opal-ai.com

Abstract: OpalAI introduces, "Urbanomy", is an AI-powered decision-support platform designed to transform transportation planning and asset management for safer, more accessible cities. Addressing the U.S. DOT's AI Transportation Planning and Design Initiative, Urbanomy integrates multimodal data from diverse sources, including but not limited to street-level imagery, LiDAR, traffic sensors, and demographic information to extract detailed information about urban infrastructure, traveler behavior, and local conditions. Its user-friendly interface empowers city planners with tools to assess infrastructure conditions, prioritize repairs, and simulate the impacts of proposed changes on traffic, safety, and accessibility. Building on Phase I's success in Los Angeles, Phase II will expand data collection across diverse U.S. regions, refine and improve AI-driven analytics, and deliver a cloud-based platform with interactive scenario modeling. Urbanomy supports federal and state policies like the ADA and Vision Zero by offering actionable, equity-focused insights for Complete Streets planning. With partnerships from the selected municipalities and private-sector collaborators, Urbanomy aims to streamline urban planning, reduce costs, and enhance safety. By providing a scalable, transparent tool that keeps experts in the decision-making loop, Urbanomy paves the way for smarter, inclusive transportation systems, with strong potential for widespread adoption by cities and engineering firms nationwide.

Company Website: https://www.opal-ai.com/

State of Place (Boston, MA)

AI for Comprehensive, Efficient, & Safe Streets (ACES): Delivering a Data-Driven Transportation Decision Support & Predictive Analytics Software

PI Name: Mariela Alfonzo **PI Email:** mariela@stateofplace.co

Abstract: Gaps in jurisdiction-wide, block-level data on infrastructure, context, and travel behavior inhibit agencies' ability to deliver safe streets. Existing sources—manual audits, fixed sensors, cellphone data, and federal datasets—are expensive, non-scalable, limited, and too aggregated for actionable planning. In Phase I, ACES addressed this by capturing over 2M images across 8,000 blocks in Philadelphia in coordination with SEPTA. We extracted 150 built environment and travel behavior features and developed forecasting models for pedestrian and vehicle counts. Phase II builds on that success-leveraging our NSF-SBIR-funded commercial software-to deliver a user-friendly, privacy-preserving decision-support tool that combines open-source hardware, AI-powered feature extraction, forecasting, and scenario planning. Working with five cities across varied contexts, ACES will 1) deploy an upgraded, weatherproof multi-sensor platform (e.g., imagery, LiDAR, environmental), 2) improve feature accuracy and expand extraction to address prioritized transportation needs; 3) extend travel mode, collisions/near misses, and accessibility forecasting; 4) allow users to visualize/filter existing conditions, set transportation targets, and receive corresponding segment and network level built environment recommendations; and 5) enhance our processing pipeline to ensure security, reliability, integration with city workflows. ACES provides critical data that helps agencies prioritize effective and cost-efficient transportation projects and secure funding, approvals, and buy-in.

Company Website: https://www.stateofplace.co

TrAnalytics, LLC (Bedford, MA)

GRACE: Generative AI for Roadway Design, Safety Assessment, and Compliance Evaluation Using LiDAR and Multimodal Data

PI Name: David Raucci **PI Email:** draucci@tranalytics.us

Abstract: This Phase II project will develop StreetGPT, a generative Artificial Intelligence (AI)-powered tool that converts Light Detection and Ranging (LiDAR) data into actionable insights for roadway design, evaluation, and safety improvement. Building on Phase I's success in classifying LiDAR point clouds, extracting pavement markings, and assessing retroreflectivity using mobile and airborne LiDAR, Phase II will automate the generation and analysis of roadway cross sections. StreetGPT will extract key design elements, including lane configurations, widths of lanes and sidewalks, median types, and bike lane characteristics, from LiDAR data. By integrating AI models with the Streetmix API and referencing national and local design manuals, the tool will identify design deficiencies and generate standards-compliant alternatives. A cloud-based, user-friendly dashboard will allow planners and engineers to visualize cross sections, evaluate compliance, and receive AI-generated recommendations. This project aims to create a domain-specific GPT solution that combines the spatial precision of LiDAR with the analytical power of AI to support data-driven decision-making, reduce the workload of transportation professionals, and streamline project delivery. StreetGPT addresses critical needs of transportation agencies and design firms and offers strong commercialization potential through a subscription-based software platform.

Company Website: https://tranalytics.us/