UTC Project Information	
Project Title	E-Scooter Design
University	Virginia Polytechnic Institute and State University
Principal Investigator	Mike Mollenhauer
PI Contact Information	mmollenhauer@vtti.vt.edu, 970-227-3373
Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D: $75,000 Ford/Spin: $212,472
Total Project Cost	$287,472
Agency ID or Contract Number	Grant No: 69A3551747115 Project: 00-032
Start and End Dates	Start: 5/1/2020 End: 3/31/2023
Brief Description of Research Project	E-Scooters are a popular new service that provide last mile transportation, and can potentially replace car trips and potentially make transit more palatable, but there are reports of safety concerns for riders and other users of rights of way in areas where e-scooters are already deployed. Very little formal research has been conducted on the safety of this form of transportation as well as the optimal design for e-scooters. Safety concerns may limit widespread adoption of e-scooters as a legitimate transportation option. This project will focus on determining the external factors (infrastructure, environmental, behavioral) that may contribute to e-scooter riders' injuries and finding ways to address some of those external factors in the design of the e-scooter itself with the aim to reduce accident and injury rates. The project will result in an updated scooter design that will induce safer riding behavior.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	**Deliverables of the Final Report and Data**: The product of this project will be a new e-scooter design and/or countermeasures to the existing design that provides enhanced rider protection. Through its work on the original e-scooter data collection project, VTTI has developed a good working relationship with Spin personnel who are responsible for specifying their design features to the e-scooter manufacturers. The VTTI project team will engage Ted Sweeney at Spin to be a stakeholder and project champion for this project. It is our expectation that Spin will implement the recommended design features during their next iteration of scooter technology upgrades. In addition to the final report, we plan to publish general findings and suggestions for e-scooter designs to

	reduce safety concerns. This publication may be a journal article and/or we may target transportation magazines and websites relating to innovation in transportation. **Education and Workforce Development Plan**: One Masters or PhD graduate student of Virginia Tech, likely from the Mechanical Engineering or Biomedical Engineering departments, will be assisting with this project. This student will be heavily involved in all stages of this project, especially with the development and testing of the prototype solutions in Task 3. The student's involvement in this project will provide the student with valuable hands-on research and experiment experience, to include, experimental design, human factors, and data collection and analysis. In addition to the graduate student, the project team may engage one or two undergraduate research students to assist with project tasks throughout the life of data collection, analysis, and reporting. A course module will also be created by the project team and presented in Dr. Zac Doerzaph's Advanced Vehicle Safety System R&D course, within the Biomechanical Engineering Department at VT. **Planned T2 Activities and Products**: In addition to the final report, we plan to publish general findings and suggestions for e-scooter designs to reduce safety concerns. This publication may be a journal article and/or we may target transportation magazines and websites relating to innovation in transportation.
Impacts/Benefits of Implementation (actual, not anticipated)	The anticipated impacts/benefits of the updated scooter design are reduced accident and injury rates, and safer riding behavior.
Web Links • Reports • Project website	https://www.vtti.vt.edu/utc/safe-d/index.php/projects/e-scooter-design/