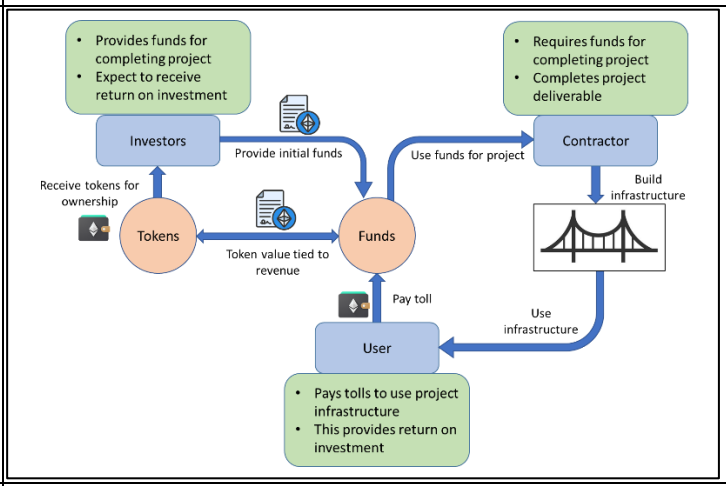
UTC Project Information	
Project Title	Blockchain-based Smart Contracts for Transportation Infrastructure Project Funding
University	Oregon State University
Principal Investigator	Joe Louis
PI Contact Information	Joseph.Louis@oregonstate.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $60,000 Oregon State University $ 60,000
Total Project Cost	$120,000
Agency ID or Contract Number	69A3551747110
Start and End Dates	March 16, 2022-June 30, 2023
Brief Description of Research Project	PPP(private-public partnerships) has been touted as an effective means of sharing project risk across public and private entities for capital transportation projects, critics have noted that it suffers from certain disadvantages including the following: (1) Project procurement is much more complicated due to the need for banding together companies and organizations that have not worked as a team previously. (2) Potential for significant cost and time overruns. (3) Long-term nature of PPP agreements can fail to account for uncertain events and thus increases the budget allotment for contingency planning. These disadvantages specifically relate to the financial methods for funding and recovering cost from transportation infrastructure projects – causing huge delays and cost overruns during project execution. The goal of this proposal is to investigate the use of decentralized financing methods enabled by blockchain technology to provide efficient and effective financial control for capital transportation infrastructure projects. Specifically, this project will result in the creation of a prototype framework for the issuance of a 'transportation infrastructure token' cryptocurrency that is issued by project owners (typically government agencies) for specific capital transportation assets. This cryptocurrency is expected to provide a transparent and efficient means of funding and recovering cost from transportation infrastructure projects using smart contracts for toll collection from the traveling public and issuing dividends to owners. The resulting prototype can serve as a template for its use across multiple capital projects. It will also allow non-traditional methods of financing such projects by making investment available to a wider and more diverse range of investors and enabling crowd-funding – thereby also increasing the equity of transportation funding mechanisms.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	This project provides an overview of blockchain's capabilities for digitizing and automating common financial transactions between various parties involved in the development and operations of transportation infrastructure. A literature review was conducted to set the context for the research by providing an overview of the current state of art in the use of blockchain and smart contracts for infrastructure management, and the conventional practice of PPP-based project financing for capital projects. Next, the project implemented three smart contracts for enabling transactions on the blockchain relating to the financial management of large transportation infrastructure projects. These includes transactions between investors, the contractor, and the users of the infrastructure. Functionality was developed to enable lending between parties and enable owners to receive payments for use of infrastructure through the blockchain.
	
Impacts/Benefits of Implementation (actual, or anticipated)	This project enabled the design of a smart contract project for the Ethereum blockchain that articulated token requirements and decentralized application development for implementing protocols for the lending process between investors and public contractors. Basic functionality for modeling how investors can recoup their investments was also provided. An active solidity project has been created and can be accessed for further development. Cryptocurrencies have the potential to improve the current Private Public Partnership (PPP) process by increasing transparency, accountability, and efficiency through blockchain technology. The blockchain is useful for this process as it can provide a record of all transactions and activities within a project. This allows all parties to have immediate access to all information of a project in real time. Applying governance tokens allow investors to have the ability to vote and change infrastructure if needed. The use of smart contracts in PPPs can automate most if not all of the contractual obligations and payments, reducing the need for intermediaries. Cryptocurrencies can also be used to facilitate payments between parties which can lower transaction costs. The blockchain-based smart contracts platform that was developed in this proposal can be used to bring forth tremendous change to how

	infrastructure development contracts are executed by minimizing delays, reducing cost overruns, and improving overall transparency that are associated with traditional financing models for infrastructure projects. This innovative approach has the potential to not only attract more investors to the sector but also contribute to the growth of sustainable, efficient infrastructure that benefits society as a whole.
Web Links • Reports • Project Website	https://github.com/jlouis2k4/cs46x-eth-smart-contracts-scaffolding