

Customizable Campus Navigation System

Caiden Henn, Charles Cahill and Hayden Juday

Undergraduate Students
Department of Computer Science
Florida Polytechnic University
Lakeland, Florida, USA
chenn0826, ccahill0901, Hjuday2027@floridapoly.edu

Denis Ulybyshev

Assistant Professor
Department of Computer Science
Florida Polytechnic University
Lakeland, Florida, USA
dulybyshev@floridapoly.edu

Abstract

Currently, there are few options that can provide a software navigation solution to complex systems of buildings and walkways. We propose a customizable and visually impaired friendly navigation solution with a web page that can be served with Near-Field Communication (NFC) tags. Our Global Positioning System (GPS)-based navigation software allows users to choose destinations based on customized filters, for example, “Find buildings that have accessible bathrooms, and accessible computer lab that has computers with Linux operating system” or “Find buildings that have wireless Internet access and where food can be bought” or “Find a parking lot that has at least 50 parking spots and parking spots for visitors”. Audible commands are used to notify users when they are off-track and walk or drive in the wrong direction. The software is implemented as a web client and can work on mobile devices with popular mobile operating systems, such as Android or iOS. The user needs to have a web browser on their smart phone (mobile phone), Internet connection and GPS location turned on. Phone’s gyroscope sensors are used to detect the direction once the user starts walking or driving. The functionality of the GPS component comes from the browser ‘navigator.geolocation’ API, which can be called in most web browsers. The software prototype is currently being developed and tested in Florida Polytechnic University campus. Due to the modular design and the use of popular software libraries and frameworks, our software can be expanded for any outdoor navigation.

Keywords

Navigation Software, Assistive Software, Smart City, Global Positioning System, Near-Field Communication

Acknowledgments

We acknowledge Florida Polytechnic University for providing funding support for this project.

Biographies

Caiden Henn is an undergraduate student at Florida Polytechnic University pursuing Bachelor’s degree in Computer Science. He has worked at MMA Space as a Computer Science Intern in the summer of 2024, developing software solutions for aerospace use. He has also participated in the student government association at Florida Polytechnic

University as a Technical representative. He is interested in software development, specifically in back-end web development.

Charles Cahill is an undergraduate student at Florida Polytechnic University pursuing a Bachelor's degree in Computer Science. He has work experience in software engineering through multiple internships, having worked at SOFWERX and Iron EagleX as a Software Engineering Intern. Additionally, he is currently a Full-Stack Development Intern at Everglades Financial, LLC, where he contributes to building scalable, user-friendly web applications. Charles has a strong passion for Full-Stack Development and Software Engineering, with a keen interest in designing and implementing efficient, high-performance applications. His portfolio showcases over 10 full-stack projects, showing proficiency in React, Next.js, Express.js, PostgreSQL, MongoDB, and more. For the past year, Charles has been actively working on the Campus Navigation System for Visually Impaired Users. Charles is currently seeking a career in the Defense Industry, with a concentration in Software Engineering.

Hayden Juday is an undergraduate student at Florida Polytechnic University pursuing Bachelor's degree in Computer Science. He participated in an internal University internship with a focus on computer vision. Hayden has been working on this project for 6 months.

Dr. Denis Ulybyshev is an Assistant Professor in Computer Science at Florida Polytechnic University. He earned Ph.D. and Master's degrees in Computer Science from Purdue University in 2019. Dr. Ulybyshev is a knowledgeable innovator in Cybersecurity, Artificial Intelligence, Distributed Systems, Software Engineering, and Databases with 24 academic peer-reviewed publications, 8 awards, and 12 years of research experience in the United States. As a PI/Co-PI, he served in 8 research and educational grants in 2019 – 2025. He served as a peer-reviewer for scholarly publications in 3 reputable international conferences and one top-tier journal. Additionally, he has 8 years of industrial experience in developing software for mass market.