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All content: Times New Roman, Line Spacing-1.0, All Paragraph-justify

TITLE: Voice integrated user interface for geospatial map based web-applications.

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Mr. Aryan Abhijit Bamane, Mr. Atharva Arun Khamkar, Mr. Abhishek Sambhaji Patil, Ms. Hrituja Sambhaji Desai

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Undergraduate Student, Computer Science & Engineering, D Y Patil Technical Campus Talsande, Kolhapur, Maharashtra, India
Undergraduate Student, Computer Science & Engineering, D Y Patil Technical Campus Talsande, Kolhapur, Maharashtra, India
Undergraduate Student, Computer Science & Engineering, D Y Patil Technical Campus Talsande, Kolhapur, Maharashtra, India
Undergraduate Student, Computer Science & Engineering, D Y Patil Technical Campus Talsande, Kolhapur, Maharashtra, India
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ABSTRACT
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This research explores the integration of voice assistants in geospatial web platforms, aiming to enhance human–computer interaction through natural language commands. We introduce a voice-enabled interface within the BStreams platform, employing tools such as the Web Speech API, Leaflet, and Mapbox geocoding to enable dynamic geospatial data visualization. A structured, mixed-methods approach guided the study, beginning with the identification of commonly used geospatial commands through a survey of 66 participants. These results were compared with language model predictions from ChatGPT, revealing a strong correlation ($r = 0.81$, $p < 0.01$) between model-suggested terms and user-reported terminology. Building upon this, we developed a specialized geospatial discourse framework and implemented a working prototype to validate its effectiveness. Usability testing confirmed the system's potential for intuitive map interaction via voice, though challenges remain in domain-specific language interpretation. Additionally, the study highlights the significance of user profiles and contextual language understanding in designing accessible and efficient voice user interfaces for GIS applications. All data and the open-source codebase are provided to support future research and development in this domain.

Keyword: *voiceGIS, geovoice, offlinespeech, LeafletVoice, OpenLayersVoice, mapinteraction, ondevicevoice, GPUVUI, NLPGIS, webGIS.*

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1. TITLE-1(Font-11, Bold)

The project, "A Voice Enabled User Interface Geospatial Map-based Web-Applications," cover many scenarios and much content, related advanced services are lacking in the field of geographic orientation, despite it being an environment of early technology adoption. For instance, methods of user–computer interaction underwent a revolution related to the introduction of graphical user interfaces (GUIs) and their popularization by the Apple Macintosh in the early 1980s. Geographic information systems (GISs) adopted them at an early stage for logical reasons . Now, even Appl. Sci. 2023,13, 2083. https://doi.org/10.3390/app13042083 https://www.mdpi.com/journal/applsci Appl. Sci. 2023, 13, 2083 2 of 16 with the help of the GUIs, GISs are inherently complex, and their interactions are often complicated [4]. Therefore, interest has been sustained over recent decades in creating new interaction models, including voice control . However, this has not directly translated into practice. Appl. Sci. 2023, 13, x FOR PEER REVIEW 2 of 17 popularization by the Apple Macintosh in the early 1980s. Geographic information systems (GISs) adopted them at an early stage for logical reasons (Now, even with the help of the GUIs, GISs are inherently complex, and their interactions are often complicated. Therefore, interest has been sustained over recent decades in creating new interaction models, including voice control . However, this has not directly translated into practice.

1.1 Sub Title-1(Font-10, Bold)

Voice-enabled user interfaces (VUIs) are revolutionizing how users interact with technology, offering an intuitive, hands-free approach for controlling digital systems. This project focuses on the development of a lightweight, scalable VUI specifically designed for geospatial map-based web applications. The goal is to enhance map interaction by allowing users to issue natural language voice commands that are interpreted and executed in real time. While many existing solutions rely heavily on cloud-based APIs, this system explores the possibility of on-device voice recognition using GPU/NPU acceleration to ensure minimal latency and increased privacy. The application leverages open-source GIS libraries such as Leaflet and OpenLayers to perform common geospatial actions like zooming, panning, and toggling layers. This not only improves accessibility for non-technical users but also addresses the challenges of making GIS tools more responsive, adaptive, and user-centric.

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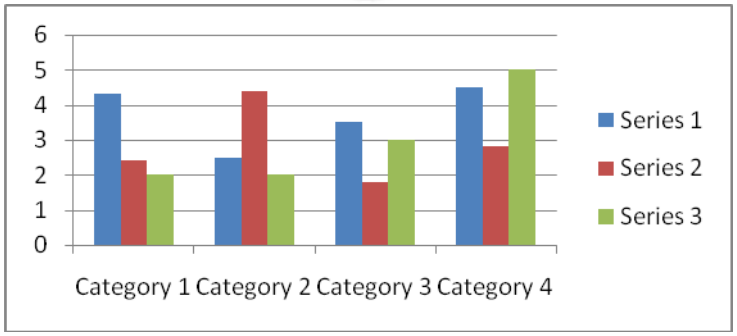

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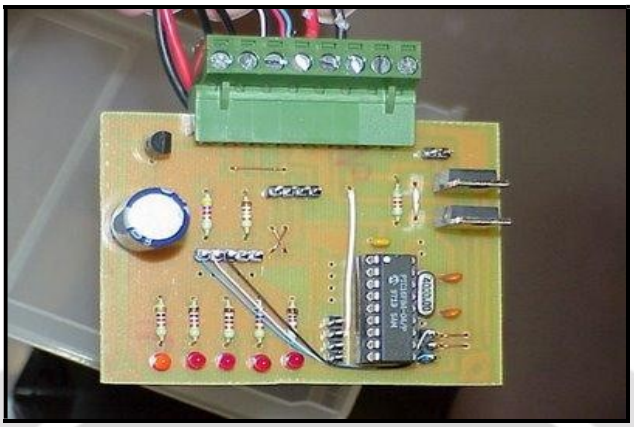

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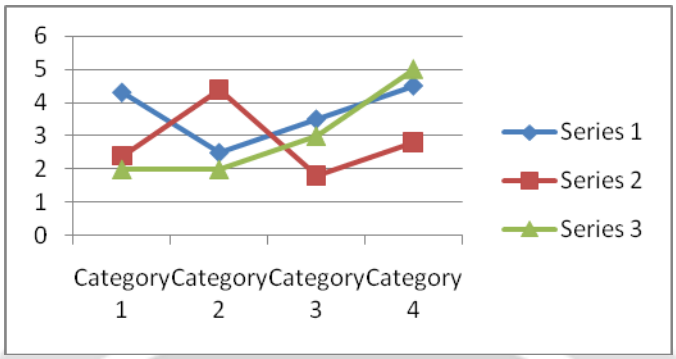

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5. ACKNOWLEDGEMENT (Font-11, Bold)

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6. REFERENCES (Font-11, Bold)

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BIOGRAPHIES (Not Essential)

Author Photo-1	Description about the author1 (in 5-6 lines)
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