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Literature Survey on SW-TS [Smart Walking-Tracking Stick for Visually Impaired and Old Age People]

Amruta Amume, Pratiksha Shinde, Vrushket Shivpuje, Sai Singar, Prasad Sonawane, Dipak Padole

Assistant Professor, Department of Multidisciplinary Engineering, VIT Pune, Maharashtra, India[1]

U.G Student, Department of Electronics and Telecommunication Engineering, VIT Pune, Maharashtra, India[2]

U.G Student, Department of Electronics and Telecommunication Engineering, VIT Pune, Maharashtra, India[3]

U.G Student, Department of Electronics and Telecommunication Engineering, VIT Pune, Maharashtra, India[4]

U.G Student, Department of Electronics and Telecommunication Engineering, VIT Pune, Maharashtra, India[5]

U.G Student, Department of Mechanical Engineering, VIT Pune, Maharashtra, India[6]

ABSTRACT: The objective of this paper is to present the design and implementation of a smart walking tracking system that is specifically tailored to address the mobility challenges faced by visually impaired and elderly individuals.The system aims to provide a safe and reliable method for these individuals to navigate their surroundings independently, thereby enhancing their overall quality of life. Additionally, the system is intended to allow caregivers tomonitor the movements and location of their loved ones remotely, providing them with a sense of security and peace of mind. To achieve these goals, the system utilizes wearable devices equipped with various sensors,which transmit location and movement data to a mobile application. The mobile application provides real-time feedback to users, alerting them to potential hazards and guiding them through their surroundings. Overall, this paper seeks to demonstrate thepotential benefits of the smart walking tracking system for visually impaired and elderly individuals and their caregivers.

KEYWORDS : IR sensor,Arduino UNO , GSM, GPS, Arduino IDE

I.INTRODUCTION

A smart walking tracking system is a system designed to assist visually impaired people and old age people with navigation. This technique provided various advancements and features to the greatest assistance and independence to individuals with visual impairment. The smart walking tracking system typically includes a range of sensor techniques that enables it to detect and analyze the surrounding environment. This includes using ultrasonic sensors, GPS, and GSM technology to identify obstacles, track the location and navigate through the unfamiliar area, and send messages to the user.The voice recognition features allow the user to interact with the user through the voice command it can be helpful to the user to identify obstacles.

The smart stick is a comfortable and lightweight system that can be easily carried and usable in various environments, such as indoors and outdoors. It can detect obstacles such as walls, furniture, and objects coming into the environment, and alert the user through the sound or stick that can vibrate.

The smart walking tracking stick is an excellent tool for visually impaired people who want to live their life safely and independently. It provides the greatest safety and the visually impaired can move around them more easily and individually.

II. LITERATURE REVIEW

Ashish Kumar, et al[1] The paper describes a new smart stick that helps visually impaired people move independently. The stick has multiple sensors to detect obstacles, potholes, and darkness, and includes a buzzer and vibrating motor to alert the user. It also has a radio-frequency receiver to prevent displacement. The authors claim the stick is more efficient and cost-effective than previous models and can improve the user's accuracy and self-dependence.

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Amit Kumar Thakur, et al[2] The paper discusses the use of an ultrasonic walking stick with an Arduino system for obstacle detection and navigation. The stick uses an ultrasonic sensor to detect obstacles and provides a vibrational response to the user. The paper also reviews related studies on GPS and artificial intelligence tools for visually impaired individuals. The conclusion is that the ultrasonic walking stick is affordable, easy to use, and can integrate new technologies.

Md. AllamaIkba, et al[3] This paper aimed at developing a smart walking stick that can assist visually impaired people in navige their environment. The walking stick is equipped with sensors that can detect obstacles and notify the user through audio and vibration feedback. The system is controlled by a microcontroller and also includes GPS navigation to help users navigate unfamiliar environments. The project aims to provide an affordable and effective solution to help visually impaired people become more independent and mobile.

Himanshu Sharma, et al[4] This is a device designed to assist visually impaired individuals with navigation. It consists of a walking stick with embedded sensors that detect nearby obstacles and alert the user through audio and haptic feedback. The device is lightweight, portable, and can be customized to the user's needs. The stick is designed to help visually impaired individuals navigate indoor and outdoor environments with greater ease and safety, and aims to improve their overall quality of life.

Dr. G. Ramesh, et al[5]The paper "Development of e-stick for blind persons using IoT" presented a design for an electronic walking stick for the visually impaired that utilizes IoT technology. The stick includes ultrasonic and infrared sensors, a GPS module, and a wireless communication module that connects to a mobile application. The application provides audio feedback to the user and alerts them of obstacles and other hazards. The paper discusses the limitations of traditional walking sticks and the need for affordable and accessible smart solutions. The authors suggest that their e-stick can improve the mobility and independence of blind people and can be easily replicated and distributed to a wider audience.

Shalini Singh, et al[6]The paper "Intelligent Walking Stick for Elderly and Blind People" presented an overview of the design, features, and usability of intelligent walking sticks for elderly and visually impaired people. The authors conducted a literature search and analyzed various intelligent walking sticks available in the literature. They found that these devices have several features, including obstacle detection, GPS tracking, fall detection, and emergency alerts, which can enhance mobility and safety for users. However, the high cost and complexity of some devices can be a barrier to their adoption. The authors suggest that further research is needed to explore the effectiveness of these devices in real-world settings and to develop more affordable and user-friendly options. Overall, the paper provides a useful review for researchers, engineers, and designers working on intelligent walking sticks for elderly and blind people.

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Chinmayi A B et all[9]The paper presented a smart stick for blind people that can detect obstacles using an ultrasonic sensor, a vibration motor, and a buzzer. The system is controlled by an Arduino UNO and powered by a 9V battery. The proposed system is designed to be affordable, easy to use, and can detect obstacles that exist on the ground. The ultrasonic sensor and Arduino were tested individually and integrated, and the results showed that the system has a short response time and low error rates. The system offers a low-cost, reliable, portable, low-power consumption, and robust solution for navigation. The study concludes that the proposed system can be improved via wireless connectivity and implementing a technology for determining the speed of approaching obstacles. The system prioritizes visually impaired and blind people in all developing countries.

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N. .Loganathan et all[10] The paper discusses the challenges faced by visually impaired people, particularly in terms of mobility, employment, social interaction, and financial dependence. The paper presents various proposals and innovations that have been developed to address the challenges, such as the Wearable Difficulty Finding Structure and the 3D Ultrasonic stick. However, the paper notes that these proposals have limitations and proposes a new system that uses ultrasonic sensors and a global positioning system modem to provide obstacle detection and vehicle collision prevention for visually impaired people. The proposed system also sends an emergency alert to the person's caregivers via the global positioning system modem. The paper also discusses the limitations of existing electronic assistance devices and proposes the use of ultrasonic waves, camera, global positioning system, and global system for mobile communication in a new electronic assistance device.

Ayat Nada, et al[11] The smart stick is a suggested solution to help persons who are blind or visually challenged recognise their surroundings. It has infrared and ultrasonic sensors to detect stairs and other obstacles within a four-meter range. It uses a microprocessor, vibration motor, and ISD1932 flash memory and can identify all obstacles within a 4 meter range in 39 milliseconds, allowing the blind to travel twice as fast as they would normally.

Ayat A. Nada, et al[12] To feel secure when moving, blind persons require some assistance. The smart stick is a suggested method for enhancing blind and visually impaired people's movement. Stick solutions involve a variety of technologies, including laser, infrared, and ultrasonic, but they still have limitations. In this study, we suggest a smart stick based on infrared technology that is lightweight, affordable, user-friendly, quick to respond, and low power consuming. Within a two-meter range, a pair of infrared sensors can identify the existence of stairs and other obstacles in the user's route. The experimental results are accurate, and the stick can find every barrier.

Mohd Helmy Abd Wahab,etal[13]This paper discusses a study that improves the walking confidence of people who are blind. According to the study, a smart cane that warns visually impaired persons of impending hazards would enable them to walk more safely. The purpose of the article is to discuss the creation of a cane called the Smart Cane, which can notify users through voice alert and vibration. The development process comprises both physical installation and code. The smart cane has been put through a number of tests, and the findings are discussed. According to this study, the Smart Cane works as intended, warning users of potential hazards in front of them.

III. COMPARATIVE ANALYSIS AND RESULT DISCUSSION

We conducted a literature review of 13 papers, out of which we selected 5 papers for the result analysis of a smart blind stick. In this analysis, we focused on three parameters: the mean of the actual distance from the object, the mean of the measured distance from the object, and the probability alert generated by the Address Resolution Protocol (ARP) module.

To calculate the mean, we used the appropriate formula that considers the sum of the distances divided by the total number of measurements. This allowed us to determine the average distance from the object as reported in the papers.

$$\text{Mean} = x1+x2+x3+.....+xn / n$$

For the probability alert, we applied a specific formula to calculate the likelihood of an alert being triggered by the ARP module. This probability value indicates the possibility of an issue or discrepancy between the actual and measured distances.

Probability - Number of favored outcomes / Total Possible outcome

Paper no.	Mean of Actual Distance	Mean measured distance	Probabilistic alert by ARP (yes/no)
1	101.66	101	yes
2	266.66	240.32	Yes
3	9.8	9.6	No
4	80	78.9	No
5	89.36	87.9	Yes

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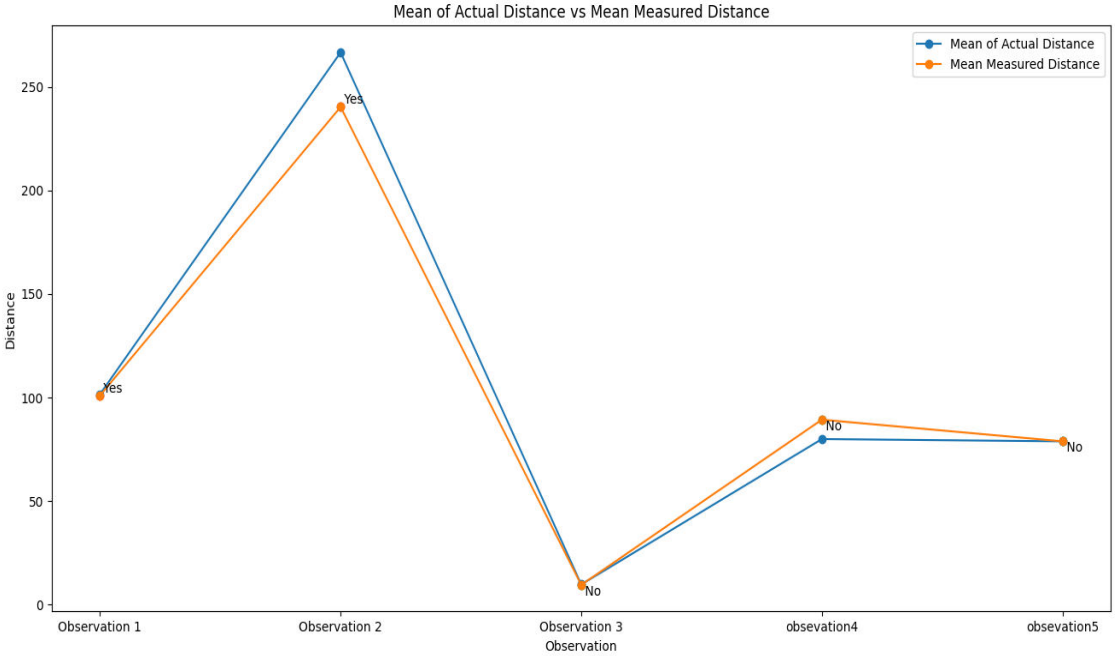

Fig.1 Mean Actual Value vs Mean Measured Value

In the result analysis, it would be valuable to compare the mean of the actual distances with the mean of the measured distances for each paper. This comparison can reveal any systematic deviations or biases in the measurements and provide insights into the accuracy and effectiveness of the smart blind stick.

IV. CONCLUSION

In conclusion, the literature review and analysis of the selected papers provided valuable insights into the performance of the smart blind stick. By focusing on three key parameters - the mean of the actual distance, the mean of the measured distance, and the probability alert generated by the ARP module - we were able to assess the effectiveness of the device.

The calculated mean of the actual distance from the object allowed us to understand the average proximity of the smart blind stick to objects in the environment. This information is crucial for evaluating the accuracy of the measurements and determining how well the device can detect obstacles.

Similarly, the mean of the measured distance provided an indication of the device's ability to estimate distances accurately. By comparing this value with the mean of the actual distance, we could evaluate the device's overall performance in terms of measuring distances.

The probability alert generated by the ARP module served as a metric to assess the reliability of the device in detecting potential issues or discrepancies. A higher probability value suggests a higher likelihood of an alert being triggered, indicating the presence of a potential problem.

By analyzing these parameters across the selected papers, we gained a comprehensive understanding of the smart blind stick's performance. These findings can be used to identify strengths and weaknesses, highlight areas for improvement, and guide future developments in assistive technology for the visually impaired.

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