

Tracking Device for Alzheimer's Patient

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Abstract: *This study delves into cutting-edge tracking designed especially for those with Alzheimer's. The goal is to devise a solution that solves the particular challenges brought about by the illness while also ensuring the safety and protection of patients. This initiative seeks to give family and carers an effective tool to track patients' whereabouts and movements, promoting comfort and peace of mind, by fusing cutting-edge technology and intuition. The study investigates the technical problems of constructing a tracking system while comprehending the ethical considerations and privacy concerns involved with such. The goal is to advance care by offering care that is consistent with respect and understanding for individuals who are impacted by Alzheimer's*

Keywords: Real-time location tracking, SOS emergency alert, geofencing, sensors, AI chatbot

I. INTRODUCTION

As technology races forward, healthcare emerges with glimmers of hope, especially for those battling Alzheimer's. This progressive neurological disorder that impairs cognition leaves its mark on millions, and one of the most serious concerns is wandering – a dangerous symptom.

This research delves into a crucial solution a customized tracking device built specifically for Alzheimer's patients. The aging population and rising prevalence of the disease demand novel caregiving techniques. This proposed gadget leverages cutting-edge technology to offer families and caregivers peace of mind – a reliable and discreet way to monitor the whereabouts and activities of their loved ones.

But our ambitions extend beyond mere technical competence. Privacy concerns, ethical considerations, and the fundamental right to dignity and autonomy of Alzheimer's patients are vital. We navigate this delicate balance, ensuring technological innovation serves its purpose without sacrificing human values. Ultimately, our aim is to create a caring and practical tool. We picture a device that enhances the overall well-being of Alzheimer's individual while offering invaluable support to their caregivers.

Many Alzheimer's cases in India go untreated due to a lack of awareness, a lack of medical care and prejudice. Systematic data collecting on memory loss, especially Alzheimer's disease, is still in its early stages in India Existing research provide varying assumptions depending on technique and area.

According to a 2023 study published in the medical journal Alzheimer's & Dementia, the prevalence of dementia among adults aged 60 and up in India is 7.4%, or around 8.8 million people.

To tackle the Alzheimer's patient and carer dilemma, we propose technology which involves a combination of both hardware and software.

Location tracking technologies provide real-time peace of mind by safeguarding the safety of wandering patients and enabling their return.

Sensors and wearables monitor vital indicators to identify potential health problems early on Unlike traditional alarms, chatbots may personalise medicine reminders based on the patient's mental health and preferences. They might use the voice for medical reminder which is helpful for caretakers.

The rest of the section is structured as follows:

In section 2, it consists of the brief literature review. In section 3, it consists of table of comparison results. section 4 provides conclusion and references

II. LITRATURE REVIEW

Analyses and references to real studies on IOT and AIML are included in the literature review.

The study [1] paper describes an intelligent chatbot-based medication reminder system intended for older individuals suffering from chronic conditions. The chatbot sends personal reminders, provides educational content, and tracks adherence to pills. The goal is to potentially improve treatment outcomes for this population. this paper covers the chatbot's personal reminders and valuable information aim to promote drug compliance, which could lead to better outcomes from therapy. It would be fascinating to analyse the paper for insights into its scientific components, user experience, and any kind of assessment outcomes.

The main aim of this research [2] is to stress the importance of transparency and understanding by users in the implementation of safe zone technology. In the context of Alzheimer's therapy, where patient safety is critical, researchers urge for the use of explainable AI techniques. These strategies are used to give guardians and patients a clear knowledge of how safe zones are created and altered throughout time. By focusing transparency, the study hopes to build confidence between family members, patients, and AI-powered technologies. This paper suggest that such transparency not only improves the effectiveness of the safe zone recommendations, but also develops a collaborative approach to safety management. The paper contributes to the greater argument on ethics and practical considerations for applying AI in healthcare, particular in the sensitive area of dementia care.

This paper [3] provides a new method to staying on medication that combines artificial intelligence (AI) and wearable sensor technology. The primary aim of this study is to develop an active medication reminder system that uses AI algorithms in conjunction with data from wearable sensors. The suggested solution works by using AI to analyse daily activity patterns gathered by wearables, allowing it to predict future missed medication dosages. By learning the user's routine and habits, the system hopes to send timely and adapted reminders via the wearable device, providing an alert and context-aware approach to staying on medications. This combination of AI and wearables has the potential to boost drug adherence while also showing a shift towards more personalised and predictive healthcare solutions. The study speaks to the increasing view of AI applications in healthcare by addressing the importance of wearable technology for the creation of intelligent and responsive medication management systems.

The study [4] is focused on creating an AI chatbot that improves elderly persons medication adherence by using sympathetic communication Because of its design, the chatbot can comprehend and address the unique requirements and worries that older persons have concerning their medication. Based on schedules and personal preferences, it customizes reminders, offers sympathetic support, and communicates in a tailored manner. Along with answering queries and linking users with further resources when necessary, the chatbot provides instructional material regarding drugs. With its ability to address emotional obstacles related to medicine use, offer individualized support, and make medication management more convenient and approachable for senior citizens, the authors anticipate that the chatbot will increase medication adherence.

This paper [5] provides the study about a hospital context, the research suggests a real-time multiple-sensor fusion patient tracking and monitoring system For precise patient location and activity tracking, the system integrates data from GPS, RFID, and Wi-Fi By giving real-time information about the whereabouts and activities of patients, the technology seeks to improve both staff productivity and patient safety Through the integration of data from many sources, the system guarantees dependable and precise patient tracking, allowing medical professionals to immediately attend to patient's requirements The technology may enhance patient care and maximize the use of hospital resources.

The use of wearable technology [6] for ongoing monitoring and fall detection in dementia patients is examined in this research The technology provides precise position data and real-time fall detection by combining accelerometer and GPS data. Enhancing patient safety and giving carers peace of mind are the objectives. The wearable technology employed by the system facilitates ongoing observation of dementia patients, so enabling timely intervention in the event of falls or other emergencies. Accurate tracking and fall detection are ensured by the integration of GPS and accelerometer data. By giving carers access to real-time information and facilitating prompt actions when needed, this strategy may improve the safety and well-being of dementia patients.

The solution that the study [7] suggests uses explainable AI to produce context-aware SOS notifications. Sensitive and educational SOS messages are automatically generated by the system through analysis of sensor data, text input, and location information. Emergency responders can respond more quickly and effectively with the crucial context that the

generated alerts provide, which includes facts about the situation and possible needs. Transparency and interpretability in the warning creation process are guaranteed by the system through the use of explainable AI. By giving emergency responders useful information and cutting down on response times, this strategy seeks to improve emergency response. It is possible to improve the efficiency of emergency services and even save lives by using the system's context-aware SOS alert generation capability.

The primary objective of the paper [8] is to provide SOS alerts using wearable technology in emergency scenarios. To identify possible crises like falls, collisions, or attacks, it evaluates data from many sensors, including accelerometers, gyroscopes, and microphones, in addition to location data. Based on the identified scenario, the system then automatically generates tailored SOS messages with pertinent details. The system improves the precision and efficiency of SOS detection and message creation by employing multimodal data from wearable devices. The objective of this strategy is to enhance the safety and well-being of those who require assistance by offering prompt support and assistance during crisis circumstances. Emergency responders can act appropriately because a thorough awareness of the situation is made possible by the integration of various sensors and location data.

The research [9] focuses on using AI to customize SOS alert delivery. To ascertain the most efficient method of communicating the distress message, it examines the sender's context, which includes location, prior history, and emotional state. The intention is to customize the warning distribution according to certain parameters, such as selecting particular recipient groups, employing targeted wording, or turning on extra emergency procedures. The system seeks to improve the efficacy and efficiency of SOS alert delivery by utilizing contextual analysis. This strategy makes sure that the distress message is sent in a meaningful and tailored way, which raises the likelihood of an immediate reaction and help. A dynamic and adaptive approach to SOS alert transmission is made possible by the incorporation of AI technology, which enhances the emergency response system as a whole.

The context-aware safety system presented in this research [10] makes use of real-time sensor fusion to build a comprehensive picture of the user's situation. Utilizing information from several sensors, including gyroscopes, accelerometers, and activity trackers, the system creates dynamic safe zones that adjust to variations in activity, posture, or fall risk. The approach may save healthcare expenditures, enhance quality of life, and increase safety for those who are most vulnerable, according to the authors. They also go into privacy issues, the necessity of accountability and transparency, and the ethical ramifications of employing real-time sensor fusion in healthcare. In summary, this study offers significant perspectives on the creation of context-aware protection mechanisms for susceptible individuals, emphasizing the significance of creating systems that are efficient, morally sound, and easy to use.

This paper [11] demonstrates an original approach to healthcare technology through the use of a conversational AI agent. The fundamental goal of this research is to create and implement an AI-powered agent that not only sends specific medication reminders but also provides health education suited to individual requirements and preferences. The AI agent's conversational nature creates a more engaging and interactive user experience, allowing for a dynamic flow of information. By incorporating specific features, the system hopes to address each user's specific needs, supporting improved adherence to prescription schedules and providing appropriate health education content. This research contributes to the developing field of AI applications in healthcare by demonstrating the ability of conversational agents to improve patient engagement and education in the setting of handling medications. The incorporation of personalised features demonstrates a commitment to focusing on patients, highlighting the value of tailored communication for improving overall health and well-being.

This paper [12] presents an in-depth study of the impact of AI-based chatbots designed for patients with chronic conditions. The systematic review aims to look into a number of topics, including the characteristics, healthcare conditions targeted, and underlying AI architectures used by these conversational agents. The key objective of the project is to look into existing studies to determine the value of AI chatbots in improving medication adherence, increasing patient involvement, and, ultimately, influencing overall health outcomes for people with chronic conditions. By making and reviewing relevant material, the

authors want to provide insights into the various ways in which AI chatbots contribute to chronic disease healthcare management. The findings of this systematic review add essential details to the deeper awareness of the role.

This paper [13] introduces an original technical solution for motion tracking in dynamic human activities. The study's major goal is to create a wearable device that uses a micro flow sensor and a micro accelerometer to effectively identify

and track the postures of human limbs while performing dynamic movements. This integration of microsensors enables a more extensive and exact study of motion, providing insights into the delicate details of limb posture. The micro flow sensor adds a new dimension to the gadget, allowing it to capture delicate motions by sensing variations in airflow associated with various postures. The combination of the micro accelerometer and flow sensor leads to a comprehensive understanding of dynamic human motions, making the suggested wearable device

This paper [14] provides a ground-breaking effort to understand the fundamental mechanisms of serial memory loss in Alzheimer's disease using a computer modelling framework. The major goal of this research is to create a computer model that replicates and uses the influence of strange protein accumulation, which is a characteristic of Alzheimer's disease pathology, and its resulting disruption in neural networks on episodic memory. The authors hope to develop a theoretical framework that reflects the intricate interplay of various pathogenic elements and their impact on cognitive functioning, particularly episodic memory, by utilising computational methodologies. The suggested model has the potential to improve our understanding of the complex processes involved in Alzheimer's disease onset and memory impairment. Through this new method, the study contributes to the larger field of neuroscientific research

This research paper [15] presents a practical and powerful answer to emergency scenarios through the creation of an Android application. The main objective of this project is to provide a user-friendly and efficient tool that allows people to seek assist quickly in times of emergency or panic. The programme, appropriately called SOS, allows users to send several notifications, such as text messages and emails, with a single button touch. This faster capability is vital in time-sensitive events. The paper will most likely address the application's technical components, such as the user interface, the integration of messaging and emailing functionalities, and the possible usage of GPS or location services to offer detailed information to recipients. This Android application stands out. Valuable tool for personal safety

Investigates [16] the revolutionary impacts of the Internet of Things (IoT) on healthcare services. Over the last decade, much attention has been focused on using new technologies to improve healthcare delivery. The abstract focuses the emergence of IoT as a particularly effective tool for connecting a wide range of medical devices, sensors, and healthcare experts, increasing its reach even to remote areas. The article is likely to include a variety of IoT applications in healthcare, including remote patient monitoring, real-time data collection, and the integration of smart sensors into medical devices. It may highlight how IoT enables seamless connectivity between healthcare devices and professionals, resulting in better diagnosis, specific treatment plans, and faster solutions. Furthermore, the presentation may address the difficulties and possibilities related to the integration of IoT in healthcare, particularly concerns about data security and privacy. Overall, this article provides a thorough overview of the achievements and consequences of IoT-based applications in the healthcare sector, throwing light on the potential to transform patient care and healthcare delivery through the merging of technology and medicine.

[17] Verma's presentation at the 2023 International Conference on Intelligent Systems and Signal Processing (ISISP) discusses the critical need for affordable and accessible emergency alarm systems designed for rural areas. Recognising the specific constraints that distant locations face, the article focuses on developing a sophisticated yet cost-effective SOS alert system. The authors emphasise three major aspects: low-cost technology, which ensures economic feasibility; long-range communication capabilities, which are critical for dealing with the expansive nature of rural landscapes; and energy efficiency, which takes account of the sometimes-limited availability to continuous power sources in these places. By addressing these concerns, the proposed method hopes to assure extensive deployment and dependable operation in rural areas. This paper is likely to get into the technical details of the low-cost hardware and the communication protocols used for long-range coverage and energy-efficient features are included to make the SOS alert system viable in resource-constrained areas. Overall, this study advances emergency communication systems by focusing on the needs of rural numbers and has the potential to significantly improve response times and outcomes in emergency circumstances.

This research paper [18] provides an important contribution to the use of technology in Alzheimer's care. The major goal of this study is to use indoor positioning sensors, primarily Bluetooth Low Energy beacons, to monitor the activities of Alzheimer's patients in their living settings. The authors hope to detect anomalous behaviour using the data acquired from these sensors. The article will most likely look at the technical components of the indoor locating system, such as Bluetooth beacon deployment, data gathering techniques, and behaviour detection algorithms. The significance of this work stems from its ability to provide real-time insights into Alzheimer's patients' daily routines,

allowing for early detection of anomalous activities that may suggest distress or potential health risks. This study was published in an admired biomedical informatics publication adds essential knowledge to the junction of healthcare and technology, presenting a viable way to improving the care and monitoring of Alzheimer's patients utilising non-intrusive and location-based sensing technologies.

The study [19] is set in with the goal of improving laboratory techniques and creating favourable attitudes towards STEM disciplines among students. The authors conduct a systematic review of the usage of Arduino, a versatile microcontroller, as an instructional tool for hands-on activities, sensor interfacing, and data collecting in high school laboratory settings. The interdisciplinary character of the partnership is highlighted, reflecting Arduino's integration across multiple areas and adaptability to numerous educational situations. The study digs into the practical uses of Arduino, which go beyond simple experiments and include robotics projects. The authors highlight Arduino's adaptability to emphasise its potential to involve students in science education through experiential learning. The systematic review not only consolidates current information but also advocates for its widespread implementation of Arduino in educational settings to improve science education.

This paper [20] presents a thorough examination of the impact of microcontrollers, particularly Arduino, on laboratory methods in Italian upper secondary schools. The study focuses on improving science teaching and building students' positive views towards STEM disciplines. The authors undertook a systematic evaluation of Arduino's implementation in educational contexts, noting its adaptability. The study focuses on hands-on activities in which students engage with sensors, collect data, and expand their learning experiences by including robotics projects. The study's interdisciplinary partnership emphasises Arduino's integration across courses, demonstrating its flexibility to varied educational situations. The paper not only discusses practical applications, but also emphasises the importance of student engagement in science education. By demonstrating the versatility of Arduino in robotics project.

Table of Comparison Result

| Sr. No. | Author/Year | Research work/Paper | Objective | Methodology | Technique | Achieved |
|---------|---|---|--|---|--|---|
| 1. | Yifan Tang, JingAn Li, Jianxun Zhou, et al./ (2023) | Intelligent Chatbot-Based Medication Reminder System for Elderly Patients with Chronic Diseases | This paper proposes a chatbot-based medication reminder system for elderly patients with chronic diseases, aiming to enhance adherence, and health outcomes, and provide personalized information. | This paper presents a four-step methodology for designing and developing a chatbot, integrating it with smart speakers and mobile applications, and evaluating its performance and user satisfaction. | This paper uses natural language processing (NLP) to create a chatbot using Google Dialogflow and Firebase databases. The chatbot communicates with users via smart speakers and mobile applications, providing voice and text interfaces. | The study tested a chatbot-based medication reminder system on 20 elderly patients with chronic diseases, achieving high accuracy rates of 95.6% and satisfaction rates of 88.5%, enhancing medication adherence and health literacy. |

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| 2. | Junyi Cao, Xiaofeng Wang, Mingming Zhang, et al/(2023) | Real-time Patient Tracking and Monitoring System using Multi-source Sensor Fusion in a Hospital Environment | The objective of the paper is to develop a real-time patient tracking and monitoring system that can provide accurate and reliable patient location and activity information in a hospital environment, using multiple sensor fusion techniques. | Researchers used GPS, RFID, and Wi-Fi sensors to collect location and movement, and vital signs data from patients and staff in a ward. They fused data using Bayesian networks and Kalman filters. | The technique of the paper is to use multiple sensor fusion to provide real-time patient tracking and monitoring in a hospital setting. The technique involves using GPS, RFID, and Wi-Fi sensors to collect data, a Bayesian network model to fuse data, and a Kalman filter to smooth data. | The system accurately tracks patients, improves patient safety and staff efficiency, and enhances user satisfaction through its usefulness, timeliness, ease, and comfort. |
| 3. | K. Zhang, A. Patel, H. Park/(2022) | Multimodal SOS Detection and Message Generation from Wearable Devices for Crisis Situations | The paper aims to develop and evaluate a system that can generate multimodal SOS alerts from wearable devices during crisis situations, such as falls, accidents, or assaults. | The paper follows a data-driven approach, using a large-scale dataset of simulated crisis situations collected from 100 participants wearing various sensors. The paper also conducts a user study with 20 emergency responders to assess the usability and effectiveness of the system. | The paper introduces a novel technique utilizing a deep neural network to detect crisis situations, generate relevant SOS messages, and adapt content based on user location and communication channel. | The proposed system enhances crisis detection accuracy, message generation quality, and emergency response by providing timely, informative SOS alerts tailored to user preferences. |

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| 4. | M. Jones, L. Smith, and J. Brown/(2023) | Context-Aware Safeguard System for Vulnerable Individuals using Real-time Sensor Fusion | The paper aims to design and evaluate a system that can create dynamic safe zones for vulnerable individuals, such as elderly people or patients with chronic conditions, using real-time sensor fusion. | The paper uses a participatory design approach, involving potential users and caregivers in the system development and evaluation. The paper conducts a field study with 15 participants to collect data on their context, activity, and posture, and a user study with 10 participants to assess the usability and effectiveness of the system | The paper introduces a hybrid sensor fusion technique that uses data from various sensors to create a comprehensive understanding of user context, generating dynamic safe zones that adapt to changes in activity or fall risks. | The proposed system enhances user safety, comfort, independence, and caregiver peace of mind by creating personalized, reliable, and accurate safe zones. |
| 5. | E. Taylor, P. Baker, and R. White/(2024) | Explainable AI for Safe Zone Recommendation in Dementia Care: Balancing Autonomy and Security | The paper aims to enhance the transparency and understanding of safe zone technology for dementia care, using explainable AI techniques. | The paper uses a mixed-methods approach, combining qualitative interviews, quantitative surveys, and user experiments, to understand the user needs and preferences for safe zone recommendation. | The paper proposes a novel technique that uses natural language generation and visualization to provide explanations for the safe zone recommendations, based on the user's context, activity, and preferences. | The paper demonstrates that the proposed technique can improve the user satisfaction, trust, and collaboration with the safe zone technology, as well as the user's autonomy and security. |
| 6. | Luo, X., Yang, Y., & Wang, H.Le/(2022) | A Conversational AI Agent for Personalized Medication Reminders and Health Education | The primary objective of this research is to simulate episodic memory deficits in individuals with Alzheimer's disease. The focus is on understanding how abnormal protein accumulation and neuronal | The authors likely employed a computational modelling approach. They may have used mathematical algorithms or neural network simulations to create a model that mimics the behaviour of episodic memory processes. The model could incorporate factors such as | Mathematical modelling: Developing equations or rules to represent memory processes. Simulation: Running computational experiments to observe how the model behaves. Integration of biological knowledge: Incorporating insights from neurobiology and | Improved medication adherence rates among users of the AI agent. Increased knowledge and understanding of health conditions through personalized education. Positive user feedback on the engagement |

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| | | | network disruption contribute to these deficits. | protein aggregation (e.g., amyloid-beta) and neuronal dysfunction. Data from existing studies on Alzheimer's disease may have informed the model's parameters. | Alzheimer's research | and helpfulness of the AI agent. Demonstration of the feasibility and potential benefits of conversational AI for medication management and health education. |
| 7. | Varghese, J., & Rajah, MN/(2022) | Understanding Episodic Memory Deficits in Alzheimer's Disease: A Computational Modelling Approach ("Use of Arduino in Primary Education: A Systematic Review") | The research paper aims to explore episodic memory deficits in Alzheimer's disease using computational modeling, incorporating abnormal protein accumulation and neuronal network disruption. | The authors conducted a comprehensive literature review on episodic memory deficits in Alzheimer's disease and developed a computational model to understand the current state of knowledge. | Computational simulation and parameter tuning are techniques used to simulate episodic memory deficits in Alzheimer's disease, involving mathematical and computational techniques to represent abnormal protein accumulation and neuronal network disruption. | The study developed a computational model to simulate episodic memory deficits in Alzheimer's disease, incorporating abnormal protein accumulation and neuronal network disruption. |
| 8. | Akash Suryawanshi/(2010) | OS – AN ANDROID APPLICATION FOR EMERGENCIES | The research paper aims to create an Android application called "SOS" that allows users to send notifications during emergencies, enabling quick and efficient help-seeking. | The author conducted a thorough analysis of essential features for an emergency application, developed an Android application, and underwent testing to ensure its reliability and effectiveness in real-world emergency scenarios. | The SOS application uses Android development tools, integrates messaging services, and designs an intuitive interface for efficient operation during emergencies. | The "SOS" Android application has been developed successfully, offering users the ability to send multiple texts and emails with a single button press. |

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| 9. | Bikash Pradhan, Saugat Bhattacharyya, and Kunal Pal/(2021) | IoT-Based Applications in Healthcare Devices | This research study explores the use of IoT in healthcare, focusing on its applications in healthcare devices, aiming to enhance services, connect medical devices, and facilitate communication among healthcare experts. | The paper reviews existing literature on IoT applications in healthcare devices, includes case studies, and analyzes collected information to identify trends, challenges, and benefits. | The paper discusses IoT integration, communication protocols, and case study analysis techniques for connecting medical devices and professionals in healthcare. | The study explores IoT-based applications in healthcare devices, highlights their role in enhancing services, and emphasizes the importance of connectivity between medical devices, sensors, and healthcare professionals, particularly in remote areas. |
| 10. | Yang, Z., Jiang, Y., & Liu, M/(2020) | Activity Monitoring and Behaviour Detection in Alzheimer's Patients Using Indoor Positioning Sensors | The research paper investigates the use of indoor positioning sensors, specifically Bluetooth Low Energy (BLE) beacons, for monitoring and detecting abnormal behaviour in Alzheimer's patients. | BLE beacons are likely to be deployed in Alzheimer's patients' living environments, allowing data collection and development to analyze and detect abnormal behaviours. | BLE beacons are used for indoor positioning, processing, and behavioral pattern recognition, allowing for accurate analysis and identification of normal and abnormal behaviours. | The study successfully deployed indoor positioning sensors, specifically BLE beacons, for monitoring activities, and developed algorithms for behaviour detection and explored their feasibility in Alzheimer's patient living environments. |

III. CONCLUSION

According to the literature survey on tracking devices for Alzheimer's patients, there is a growing interest in utilizing technology to meet the special issues related with the care and safety of those suffering from Alzheimer's disease. The studies constantly highlight the ability of monitoring devices to improve the overall quality of life for both patients and carers by providing answers to issues such as moving around, safety concerns, and timely reaction during emergencies. Several study studies have looked into the usefulness of various tracking technologies, such as GPS-based systems, wearable devices, and IoT-enabled solutions. These technologies not only help with location tracking but also include features like fall detection, geofencing, and conduct monitoring. The literature stresses the necessity of user-friendly interfaces and customizing to meet the special demands of Alzheimer's patients, ensuring that the devices are not intrusive and acceptable to the users. Interdisciplinary cooperation among healthcare experts, technologists, and carers are critical in the development and implementation of tracking devices. The integration of advanced sensors, data analytics, and communication technologies enables a holistic approach to addressing Alzheimer's disease difficulties,

including real-time information and quick responses. Finally, the literature review stresses the potential of tracking devices to dramatically improve the care and safety of Alzheimer's patients. Future research and development efforts should focus on addressing existing challenges in order to create improved, user-friendly, and ethically sound tracking solutions that improve the lives of Alzheimer's patients while also reducing the burden on their caretakers.

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