International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 02 | Feb - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

A Comprehensive Review of Artificial Intelligence Advancements in Elder-Care

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Abstract - The need for effective, dependable, and sustainable care solutions has surged due to the world's aging population. Issues with traditional caregiving include the need for constant supervision, high expenses, and a lack of staff. With its automated help, predictive analysis, and intelligent monitoring, artificial intelligence (AI) presents a viable substitute. Eight important studies on AI-based elder care systems are reviewed in this literature review, including applications such as activity recognition, fall detection, health and emotion monitoring, and smart home integration. The results show that AI reduces caregiver workload while improving older adults' safety, independence, and quality of life. The need for more research toward adaptive and human-centric AI-driven elder care systems is highlighted by the persistence of problems with data privacy, ethical considerations, sensor dependability, and model generalizability.

Key Words: : Elder Care, Artificial Intelligence, Smart Monitoring, Healthcare Technology, Assistive Systems

1.INTRODUCTION

The increase in the elderly population worldwide has made elder care a key issue in social and healthcare fields. With longer life expectancy and falling birth rates, many countries face a growing gap between older adults and available caregivers. Traditional care methods, which depend largely on manual oversight and human assistance, are becoming less practical due to time, cost, and workforce constraints. This situation has led to a rising need for new, technology-focused solutions that can ensure the safety, health, and independence of older adults.

Artificial Intelligence (AI) has emerged as a promising way to tackle these problems through smart and continuous monitoring systems. AI technologies, combined with sensors, cameras, and wearable devices, can automatically detect falls, track vital signs, analyze behavior patterns, and provide timely alerts to caregivers or healthcare providers. These systems help reduce emergency response time, improve care quality, and support independent living for older adults.

Even with these clear benefits, several challenges slow the widespread use of AI in elder care. Issues surrounding data privacy, algorithm bias, ethical decision-making, and user acceptance need careful attention . This literature survey aims to examine current research on advancements elder care and monitoring systems, showcasing key developments, methods, and limitations. The paper also identifies new trends and future paths that can help build smarter, safer, and more humancentered elder care environments.

2. LITERATURE SURVEY

A. Artificial Intelligence Internet of Things for the Elderly :From Assisted Living to Health-Care Monitoring

With an emphasis on assisted living and healthcare monitoring applications, Qian et al. [1] investigate the role of artificial intelligence of things (AIoT) in elder care. The study uses sensor, audio, video, and text data to classify AIoT systems into fall detection, activity classification, and healthcare monitoring. Strong performance in fall detection is highlighted in the review, with sensitivity surpassing 95 percent when employing audio-video techniques and activity recognition surpassing 90 percent recall when using sensor based methods. Additionally, it contrasts deep learning models like CNNs and LSTM-based RNNs with more conventional machine learning

techniques like SVMs, random forests, and k-nearest neighbors.

The authors list several major obstacles to current AIoT research, such as a lack of data, privacy issues with audio and video monitoring, a lack of real-world validation, and a lack of focus on mental health support. Future directions like explainable AI, unsupervised and semi-supervised learning, multisensor data fusion, and innovative sensing modalities like haptic technologies are all suggested in the paper. Additionally, it highlights how crucial AIoT was to enabling remote health monitoring and early symptom detection in the elderly during the COVID-19 pandemic.

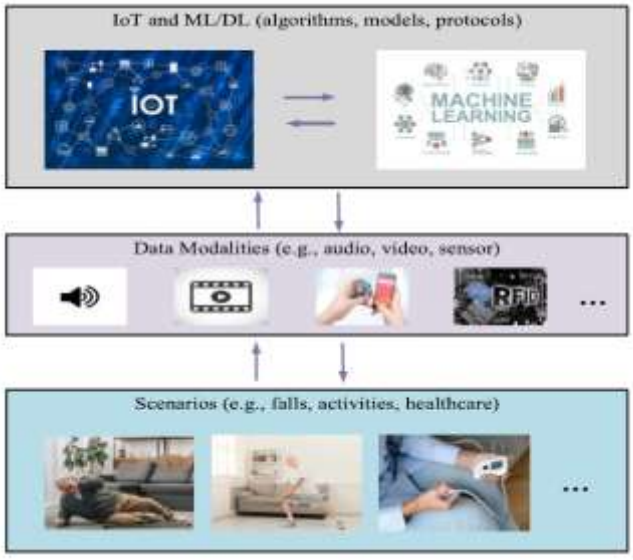

Fig -1. An overview scheme of AIoT for the elderly. The royalty-free images were permitted to use from www.shutterstock.com.[1]

B. Application Status, Challenges,and Development Prospects of Smart Technologies in Home-Based Elder Care

The application of AI in home-based senior care is examined by Shi et al. [2], with particular attention to psychological support, safety and security, smart daily assistance, and health monitoring. The authors examine 103 studies that were published between 2015 and 2024 in order to demonstrate the growing need for AI-enabled home care in China, where a sizable elderly population primarily relies on in-home services. The review demonstrates how IoT-based systems that use deep learning models in conjunction with wearable and environmental sensors allow for more precise real-time health monitoring and improved chronic condition management.

The study also discusses AI-based safety solutions such as fall detection and smart home security, as well as assistive technologies like voice interaction, gesture recognition, and service robots that support daily activities and emotional well-being. Alongside these benefits, the authors point out challenges including data reliability, false alarms, limited user acceptance, and privacy concerns. They suggest future work on non-invasive sensing, emotional AI, and privacy-preserving models to make home-based elderly care safer, more reliable, and user-friendly.

Fig -2. Framework of AI applications in home-based elderly care[2].

C. Health status prediction for the elderly based on machine learning

Qin et al. [3] came up with a machine learning framework to guess how healthy older people will be based on their own reports of their health and functional limitations. The study used data from the CHARLS 2013–2015 dataset and automated feature selection methods like the Maximal Information Coefficient (MIC) and Pearson correlation to find both linear and nonlinear relationships between variables. Various models—including Artificial Neural Networks (ANN), Support Vector Machines (SVM), Logistic Regression, Random Forest, and XGBoost—were evaluated using a 5-fold cross validation approach. The results revealed that ANN achieved the highest classification accuracy, while Support Vector Regression (SVR) obtained the lowest regression error. These findings underscore the effectiveness of MIC in identifying significant socioeconomic predictors and demonstrate how advanced machine learning methods can enhance predictive modeling in elderly health analysis. This study is consistent with earlier works that use ma-

chine learning for predicting geriatric health and analyzing functional decline, including Casanova et al. (2017), Facal etal. (2019), and Artaud et al. (2013). It builds on established machine learning techniques from Breiman (2001), Cortes Vapnik (1995), and Chen Guestrin (2016). It reflects current trends in healthcare AI research that prioritize data-driven in-sights and clear feature interpretation. Unlike previous studies, this work specifically focuses on automated nonlinear feature discovery through MIC and its integration with traditional machine learning pipelines for datasets related to the aging population

D. *Mobile Application for Elderly Care*

The creation and implementation of an Android-based system aimed at improving communication between family members, caregivers, and nursing staff as well as health monitoring for the elderly is detailed by Fernando Jose et al. [4]. User registration, patient data management, weekly health reporting, discussion forums, and access to information about health regulations and senior care are just a few of the modules that make up the application. The system architecture, which was created with Android Studio and is backed by a MySQL database, is depicted through use case and class diagrams that describe its data flow and operations. Even those with little technical expertise can use the application because it is made to be easy to use for both senior citizens and caregivers.It enhances accountability and general support in elder care by facilitating real-time communication and promoting community engagement among caregivers.

In order to provide real-time monitoring, fall detection, and automated alerts, the authors also suggest future IoT sensor integration into the system. This could greatly improve senior citizens' safety and wellbeing. This study is in line with a larger movement in technology-driven research on elder care that uses Internet of Things and mobile technologies to address issues that older populations face. Didyasarin et al. (2017) investigated the acceptance of applications for senior health, Castro et al. (2011) and Vintimilla-Tapia et al. (2019) investigated mobile applications for nurse-assisted elderly monitoring, and Nuanmeesri and Poomhiran (2020) created an Internet of Things-based smart walking stick.Stutzel et al. (2019), Duran-Vega et al. (2019), Tun et al. (2021),´ Sharifan et al. (2021), and Pires et al. (2018) conducted further research that emphasizes caregiver support systems, wearable IoT monitoring, mobile education for caregivers, and the constraints of smart aging environments.When taken as a whole, these studies highlight the significance of the suggested application as a community-centered, scalable senior care solution.

E. *Artificial Intelligence in Elderly Care: Navigating Ethicaland Responsible AI Adoption for Seniors*

Mhlanga [5] investigates the dynamics of human-AI interaction in the field of mental health, emphasising the potential effects of AI companions on users' emotional health. Based on a thorough examination of more than 24,000 user reviews from the Replika AI companion app, the study pinpoints several important perceived advantages, such as enhanced mental health, less loneliness, and emotional support. Designing conversational agents that emphasise emotional intelligence and meaningful interaction over purely functional responses is crucial, as the results show that users are more likely to form emotional bonds with AI systems they believe to be sympathetic and human-like.

Mhlanga also warns of the dangers of AI-based companionship systems, pointing out four main drawbacks: perceived incredulity, privacy invasion, inappropriate conversational behaviour, and excessive data collection.Such inconsistencies or boundary violations can undermine trust and prevent AI from serving effectively as emotional support.

F. *Design of Home Care System For Rural Elderly Based on Artificial Intelligence*

In a systematic review titled "The Opportunities and Challenges of Using Mobile Health in Elderly Self-Care," Wang, Jia, Chu, and Li [6] detailed the benefits and drawbacks of using mobile health (mHealth) technologies to support older adults' self-care. The authors divide the opportunities and difficulties into three main categories—technical, human, and managerial—after analysing 19 chosen research studies. Key opportunities are highlighted in the review, including lower healthcare costs, improved self-management skills, remote health monitoring, and encouraging seniors to lead active, healthy lifestyles.

At the same time, the study provides a thorough analysis of important obstacles related to the adoption of mHealth. Among the most notable human-related obstacles are older adults' low levels of mobile technology use, resistance to new technologies, and reluctance to change their established lifestyles. Furthermore, privacy

and security issues become crucial since constant surveillance can cause unease, a sense of being watched, or a decreased desire to carry out daily tasks. According to the review, resolving these issues is crucial to the moral and successful implementation of mHealth solutions in senior self-care.

A multi-layer smart elderly care system, from data collection to application services, is depicted in Figure [3]. It demonstrates the transmission, processing, and delivery of sensor data via cloud and IoT platforms and mobile applications for monitoring, safety and healthcare support.

G. The opportunities and challenges of using mobile health in elderly self-care

A thorough analysis of the evolution of integrated elderly care systems is provided by Shahbazi, Bagherian, Sattari, and Saghaeiannejad-Isfahani [7], who also provide important insights into modern strategies for assisting ageing populations. In addition to stressing a paradigm shift away from isolated, diagnostic, or single-function solutions and toward preventive, holistic care frameworks, the authors draw attention to the global need to address both independent and assisted living requirements. In order to better meet the complex and changing needs of older adults, this viewpoint emphasises the significance of unified systems that integrate various care functionalities.

Shahbazi et al. claim that in order to be widely accepted by senior users, platforms for senior care should smoothly incorporate a variety of features, including ongoing activity tracking, quick emergency detection (including fall or illness monitoring), and the use of simple, user-friendly interfaces. Reliability and data privacy are also highlighted in the study as being crucial factors in system design and implementation.

The review makes a significant point: in order to provide advanced data analysis and individualised health insights, nextgeneration elderly care solutions need to go beyond simple alert systems and integrate machine learning and artificial intelligence. These sophisticated frameworks are able to produce practical suggestions that significantly improve older adults' quality of life and increase their degree of independence.

H. Combating Loneliness with Artificial Intelligence: An AIBased Emotional Support Model

The architecture suggested by Sullivan et al. provides a thorough Sullivan, Nyawa, and Fosso Wamba [8] suggest a cuttingedge AI-powered home care system designed to assist the rapidly aging and frequently socially isolated senior citizens in rural areas. The system incorporates a number of cuttingedge technologies, such as wearable technology for tracking health metrics in real time, such as blood pressure, heart rate, and sleep quality, Internet of Things sensors for monitoring the environment, and intelligent image recognition for safetyrelated features like fall detection, sudden illness identification, and intrusion alerts. The architecture's central component is an AI-driven learning and decision-making

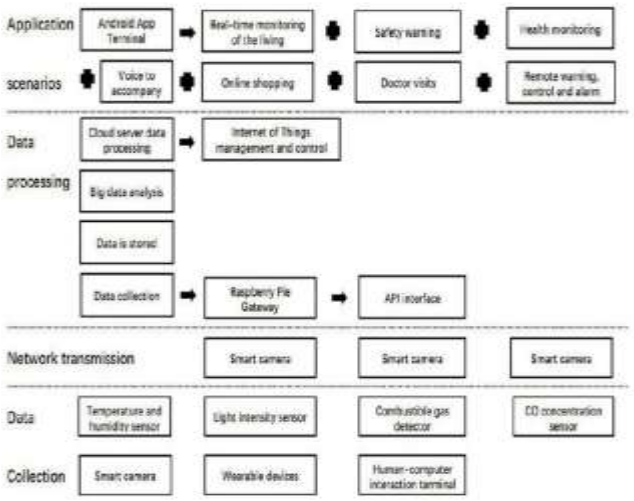

Fig -3. Structure diagram of home care system for rural elderly based on ARTIFICIAL intelligence[6].

engine that processes vast amounts of environmental and health data to facilitate remote monitoring, early warning systems, and intelligent management of home care services. It is backed by cloud computing and big data analytics.AI-based framework for senior care that supports independent living by enabling voicebased services like online shopping, daily task assistance, and remote medical consultations through an Android device's human–machine interaction module. The system's multisensor integration enables a proactive care approach that includes emergency response, safety monitoring, and comfort management. Its remote monitoring features enable family members and medical professionals to monitor the well-being of the elderly in a scalable and economical way.

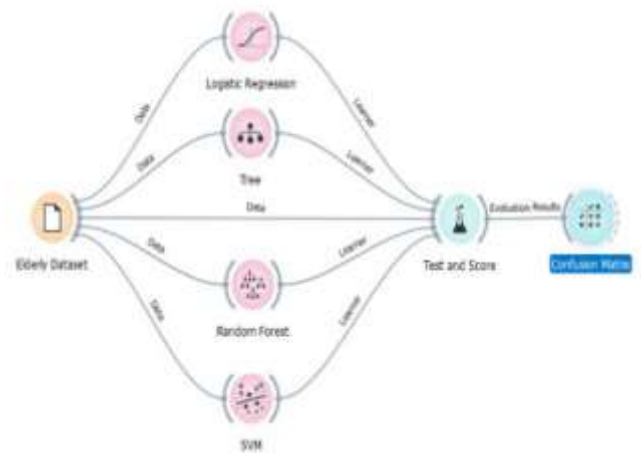

Fig -4. Teaching/Learning the "Long-term care" mHealth prediction algorithms[9].

I. Mobile Application for Improving the Quality of Life andElderly Health Care

A mobile application that digitizes health reporting, caregiver communication, and patient data management is presented by Castillo et al. [9]. The system gives family members, nurses, and caregivers access to real-time information through modules for registration, weekly health status updates, reminders, and a discussion forum. The application was created with Android Studio and a MySQL backend, emphasizing usability and simplicity to ensure that even users with little technical expertise can utilize it efficiently. The application seeks to improve the overall quality of assistance given to senior citizens by centralizing information about elderly care and accelerating communication.

In order to create clear workflows for senior care services, the paper also emphasizes the significance of incorporating structured software engineering techniques, such as UML usecase diagrams and class diagrams. The authors stress that adding new health metrics or caregiver features is made simple by the modular architecture. According to their assessment, the platform minimizes delays in caregiver decision-making, cuts down on data duplication, and promotes community involvement with its integrated discussion feature. In addition to suggesting future improvements like expanding the application to IoT devices for real-time monitoring, the study concludes that mobile technology can greatly increase efficiency in facilities that provide care for the elderly.

J. Smart Collaborative Mobile System for Taking Care of Disabled and Elderly People

In order to identify anomalous circumstances like falls, direction changes, loud distress noises, or separation from a group, Sendra et al. [10] present a clever collaborative mobile system that makes use of several smartphone sensors, including an accelerometer, gyroscope, GPS, microphone, magnetometer, and light sensor. Through the use of a wireless ad hoc network, the system enables neighboring devices to exchange sensor data and jointly determine whether to sound an alarm. This cooperative sensing technique greatly lowers false alarms and assists in differentiating between benign deviations and actual emergencies. Simulations and real-world measurements are used in the paper to show how sensor variations among devices aid in the prediction of important events in elderly or disabled people. By adding reinforcement learning to the alarm-decision process, the paper advances the field of elderly-monitoring research. The system learns from previous occurrences to improve the accuracy of its future alarm decisions through the use of Q-Learning and a Markov Decision Process (MDP). The authors also demonstrate how network behavior impacts alarm transmission and assess the effectiveness of various ad hoc routing protocols under various mobility scenarios. Their findings demonstrate how adaptive learning and collaborative sensing can be used to develop a more dependable and responsive monitoring system for both indoor and outdoor senior care situations. According to the study's findings, these mobile-based solutions can successfully lessen the workload of caregivers while enhancing the safety of those who are more susceptible.

Fig -5. Sensors embeded in a smart device[10].

3. COMPARATIVE STUDY

Table-1: SUMMARY OF REVIEWED AI-BASED ELDER CARE STUDIES

Sl.No	Paper	Author(s)	Methodology	Purpose
1	AIoT Elderly Care	Qian et al. [1]	AIoT framework; ML/DL models	Fall detection; activity monitoring
2	Smart Home Elder Care	Shi et al. [2]	Systematic review (2015–2024)	Analyze home-care AI applications
3	Elderly Health Prediction	Qin et al. [3]	MIC feature selection; ANN, SVM, RF	Predict elderly health outcomes
4	Mobile Elder Care App	Fernando Jose et al. [4]	Android app; sensor-based tracking	Health monitoring; caregiver communica-tion
5	Ethical AI for Seniors	Mhlanga [5]	Qualitative analysis; user studies	Assess ethical and emotional impacts
6	Rural Elderly Home Care	Wang et al. [6]	IoT–cloud architecture	Enable remote rural healthcare
7	mHealth Self-Care	Shahbazi et al. [7]	Narrative literature review	Support elderly selfcare practices
8	AI Emotional Support	Sullivan et al. [8]	AI conversational agents; IoT sensing	Reduce loneliness and isolation
9	Elderly QoL App	Castillo et al. [9]	mHealth app; PCA-based analysis; ML	Assess ADL; improve quality of life

The rapid growth of the elderly population, along with advances in AI and mobile technology, has led to the development of various digital solutions for elderly care. These systems include review studies, machine learning models for predicting health risks, and mobile or IoT-based applications for real-time monitoring and assistance. Some focus on health prediction, while others emphasize emergency detection, daily support, emotional well-being, and ethical concerns like privacy and trust. Overall, there is a clear shift toward integrated, user-friendly systems that combine monitoring, prediction, and emotional support to help older adults live more safely and independently.

Analysis of these studies reveals that the most effective systems are those that integrate multi-sensor data fusion to reduce false alarms while maintaining high sensitivity. However, a persistent challenge identified across this literature is the "Human-Technology Gap"; while the AI frameworks are becoming more sophisticated, user acceptance remains limited by concerns over privacy and the technical complexity of the interfaces. Consequently, the most successful future models will likely be those that prioritize **explainable AI** and **privacy-preserving architectures** without sacrificing the real-time response capabilities essential for elderly safety.

10	Smart Mobile Monitoring	Sendra et al. [10]	Smartphone sensors; reinforcement learning; MANET	Emergency and fall detection

4. CONCLUSIONS

This literature survey highlights the growing role of Artificial Intelligence in tackling the challenges of elder care and monitoring. The studies reviewed show that AI-powered systems can greatly improve the safety, health, and independence of older adults through continuous observation, smart decision-making, and early detection of risks. By combining AI with IoT devices, wearable sensors, and cloud or edge computing, these systems allow for real-time data analysis and personalized care support. However, despite significant progress, several issues remain, such as data privacy, ethical concerns, technological reliability, and limited user adaptability among older individuals. Tackling these challenges is essential for building trust and ensuring widespread use of AI in healthcare settings. Future research should focus on creating transparent, secure, and user-friendly AI models that respect individual autonomy while improving well-being. Overall, AIbased monitoring systems have great potential to make elder care more proactive, efficient, and caring.

REFERENCES

1. K. Qian, Z. Zhang, Y. Yamamoto, and B. W. Schuller, ”Artificial Intelligence Internet of Things for the Elderly: From Assisted Living to Health-Care Monitoring,” IEEE Trans. Cogn. Develop. Syst., vol. 13, no. 4, pp. 934-949, Dec. 2021.
2. J. Shi, N. Zhang, K. Wu, and Z. Wang, ”Application Status, Challenges, and Development Prospects of Smart Technologies in Home-Based Elder Care,” Electronics, vol. 14, no. 12, p. 2463, Jun. 2025.
3. F.-Y. Qin, Z.-Q. Lv, D.-N. Wang, B. Hu, and C. Wu, ”Health status prediction for the elderly based on machine learning,” .
4. F. Jose, Livaldo, M. H. Mahardhika, N. A. Sukiman, H. L. H. S. Warnars, A. Ramadhan, and W. H. Utomo, ”Mobile Application for Elderly Care,” in Proc. Int. Conf. Artif. Intell. Smart Syst. (ICAIS), Coimbatore, India, Feb. 2022, pp. 1-6.
5. D. Mhlanga, ”Artificial Intelligence in Elderly Care: Navigating Ethical and Responsible AI Adoption for Seniors,” SSRN Electron. J., 2024. [Online]. Available: https://ssrn.com/abstract=4675564
6. L. Wang, L. Jia, F. Chu, and M. Li, ”Design of Home Care System For Rural Elderly Based on Artificial Intelligence,” J. Phys.: Conf. Ser., vol. 1757, no. 1, p. 012057, 2021.
7. M. Shahbazi, H. Bagherian, M. Sattari, and S. Saghaeiannejad-Isfahani, ”The opportunities and challenges of using mobile health in elderly selfcare,” J. Educ. Health Promot., vol. 10, p. 80, Feb. 2021
8. Y. Sullivan, S. Nyawa, and S. Fosso Wamba, ”Combating Loneliness with Artificial Intelligence: An AI-Based Emotional Support Model,” in Proc. 56th Hawaii Int. Conf. Syst. Sci. (HICSS), Kauai, HI, USA, Jan. 2023, pp. 4443-4452.
9. C. Nithikathkul, C. Meenorngwar, J. Krates, and R. Kijphati, “Mobile Application for Improving the Quality of Life and Elderly Health Care,” Int. J. Geoinformatics, vol. 20, no. 7, pp. 93–101, Jul. 2024,doi: 10.52939/ijg.v20i7.3409.
10. S. Sendra, E. Granell, J. Lloret, and J. J. P. C. Rodrigues, “Smart Collaborative Mobile System for Taking Care of Disabled and Elderly People,” Mobile Netw. Appl., vol. 19, no. 3, pp. 287–302, Jun. 2014, doi: 10.1007/s11036-013-0445-z.