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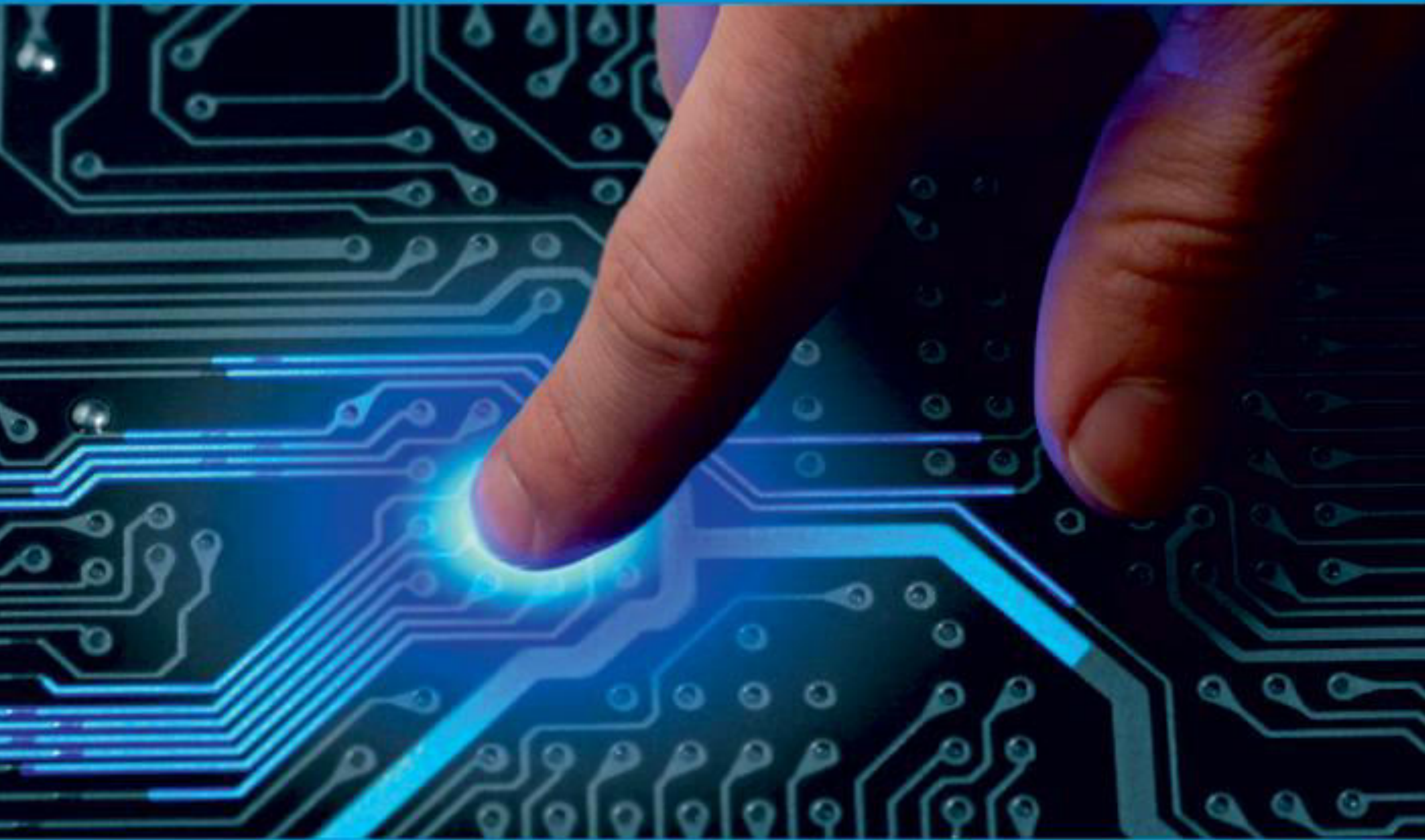

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"Memory Guard" IOT based Alzheimer's Monitoring System for Enhanced Care

Annapoorna S, Chaithra J P

Student, Department of MCA, Visvesvaraya Technological University, The National Institute of Engineering, Mysuru, Karnataka, India

Assistant Professor, Department of MCA, Visvesvaraya Technological University, The National Institute of Engineering, Mysuru, Karnataka, India

ABSTRACT: The project proposes an Alzheimer's Patient Monitoring System using an ESP32 microcontroller and integrated sensors. The system monitors patient movements and environmental conditions using PIR motion, tilt, pressure, and moisture sensors. Real-time data is transmitted to an MQTT broker for seamless communication and analysis. Key features include Wi-Fi connectivity for remote access and a user-friendly interface with a keypad and LCD display. The system also includes a buzzer for immediate alerts, triggered by MQTT messages indicating specific actions like medication reminders. This robust solution enhances patient safety and cognitive stimulation, enhancing the overall patient experience.

I. INTRODUCTION

"Memory Guard" IoT-based Alzheimer's Monitoring System for Enhanced Care is the monitoring system which helps to keep track of the activities and motions of the Alzheimer's patients, so that it helps the care takers. This system will assist the patients in their daily living and social activities which promotes them to lead an independent life. Neurocognitive clutters are the major cause of incapacity recently, dementia is one of the neurocognitive disarranges and Alzheimer is the most common sort of dementia. Alzheimer's patients face abandonment due to burden on their families, so now a days there are lot of demand for the caretakers. The current methods of manual observation are insufficient, so this project aims to address those problems or challenges by using the technology to create a smart home environment.

II. LITERATURE SURVEY

The literature on IoT-based health monitoring systems highlights significant advancements in using technology to improve patient care, particularly for individuals with chronic conditions and the elderly. Kirubaharan and Bharath (2023) designed a remote healthcare system to monitor patients' vitals and provide remote viewing for doctors. Kulkarni et al. (2023) developed an online platform using Arduino and ESP8266 to track body temperature and blood pressure, making data accessible for medical professionals. Ebrahem and Al-Sawaff (2023) focused on Alzheimer's patients, employing NodeMCU, GPS, and the Blynk 2.0 application to monitor vitals and medication adherence. Chandana et al. (2021) proposed an IoT system with sensors and cameras to track Alzheimer's patients' movements and medication usage. Airehrour et al. (2018) introduced a smartwatch-based memory aid for dementia patients, recording biosignals for health analytics. Shaikh et al. (2017) combined GPS, games, and quizzes to enhance cognitive functions and monitor Alzheimer's patients via an Android app. These studies collectively demonstrate the potential of IoT in providing efficient, cost-effective, and accessible healthcare solutions, particularly for monitoring and improving the quality of life for patients with chronic illnesses and cognitive impairments.

III. METHODOLOGY

Project Planning and Scope Definition

- Define the project's scope, objectives, and deliverables, specifying the functionalities and features of the integrated patient monitoring and management system.
- Establish a timeline with milestones and key performance indicators (KPIs) to monitor progress and ensure timely project completion.

Requirement Analysis

- Conduct a comprehensive analysis of user requirements, considering the needs of healthcare providers, patients,

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and caregivers.
- Identify essential functionalities and features necessary for patient monitoring, data collection, analysis, and communication within the system.

Technology Selection and Architecture Design
- Evaluate various IoT sensors, communication protocols, and platforms to determine their suitability for the project.
- Design the system architecture, including hardware components (e.g., sensors), software infrastructure (e.g., cloud storage, databases), and communication protocols (e.g., MQTT).

Hardware and Software Development
- Develop or acquire the required hardware components, such as IoT sensors, and microcontrollers (e.g., Raspberry Pi, Arduino).
- Design and create the software components, including firmware for sensor data collection, backend systems for data processing and storage, and frontend interfaces for user interaction(desktop applications).

Integration and Testing
- Integrate the hardware and software components to build a functional prototype of the integrated system.
- Perform exhaustive testing to guarantee the system's unwavering quality, exactness, and execution over diverse conditions, counting typical operation and push scenarios.

Deployment and Implementation
- Deploy the integrated system in a real-world healthcare setting, such as a hospital, clinic, or home care environment.
- Train healthcare providers, patients, and caregivers on the effective use of the system anddata interpretation.
- Monitor the initial deployment phase and resolve any issues or problems encountered.

Data Collection and Analysis
- Gather real-time data from the deployed system, including patient activities, vital signs, and environmental conditions.

Evaluation and Optimization
- Assess the system's performance based on predefined KPIs, such as reliability, data accuracy,user satisfaction, and impact on patient outcomes.
- Identify areas for improvement and optimization based on stakeholder feedback, performance metrics, and advancements in technology.

Scalability and Sustainability
- Evaluate the system's scalability to support larger patient populations, additional functionalities, and future expansions.
- Develop a sustainability plan to ensure the system's long-term viability, including regular updates, security patches, and support services.

Documentation and Knowledge Transfer
- Document the entire development process, including design decisions, technical specifications, iplementation details, and testing procedures.

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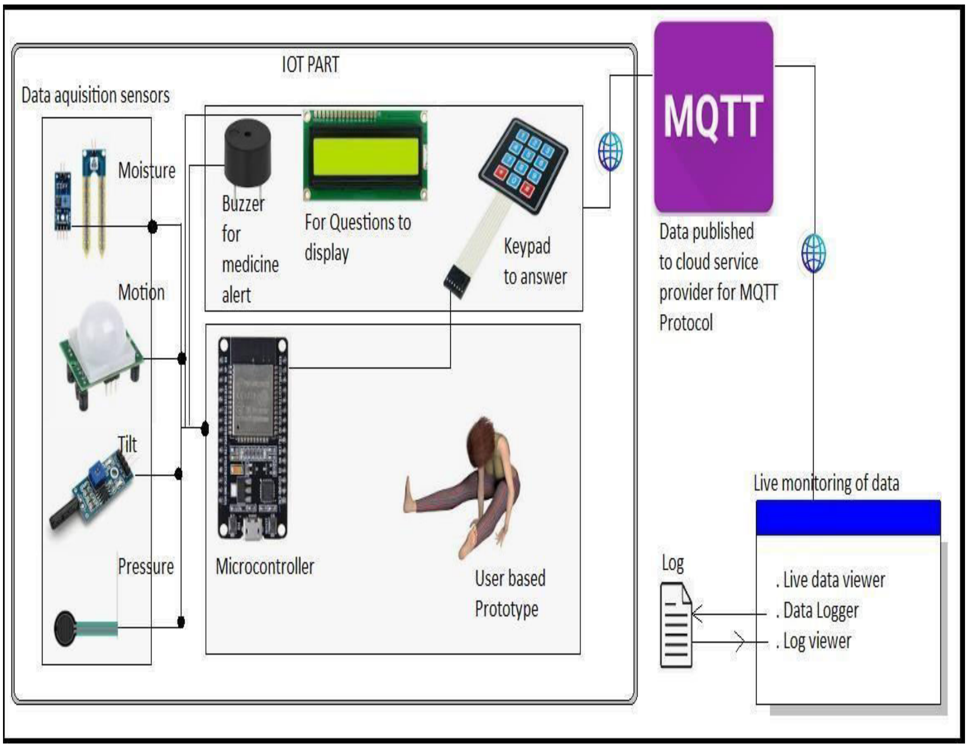

System Architecture

IV. RESULTS

Fig 1: Login Screen

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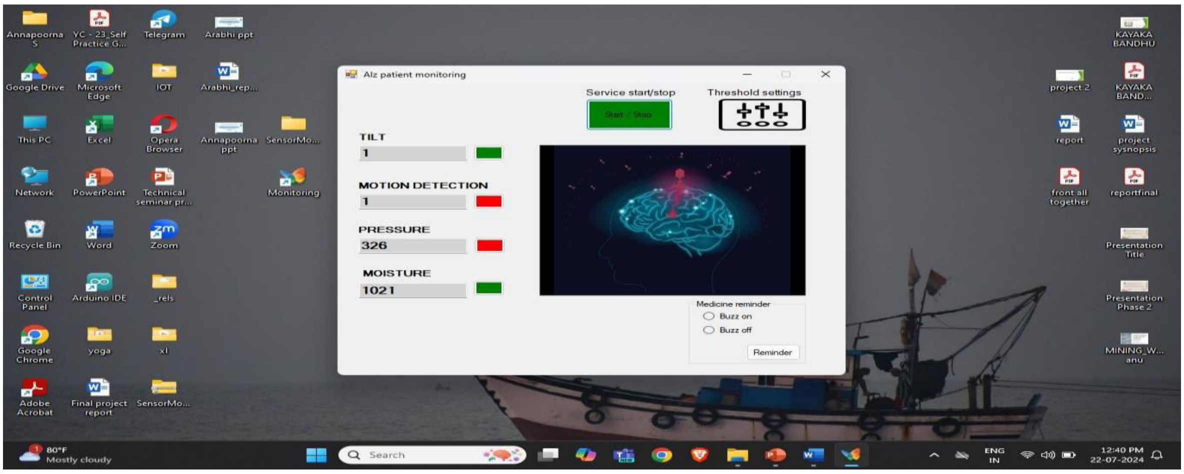

Fig 2: Patient Monitoring Screen

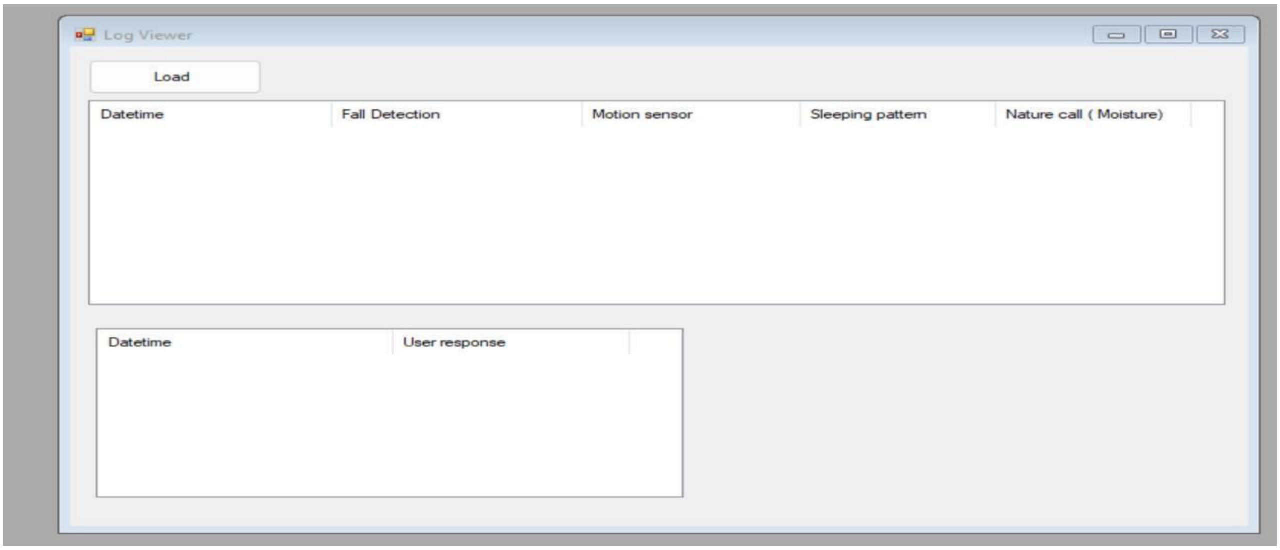

Fig 3: Log Viewer

Fig 4: Readings of sensor in LCD

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V. CONCLUSIONS

The proposed system for monitoring elderly patients has been successfully implemented, albeit in a smaller scale to accommodate physical constraints and resource limitations. Despite the scale, the core functionalities and features of the system have been realized to demonstrate its effectiveness and feasibility. The system's functionality is demonstrated through simulated monitoring of patient activities. Sensors collect data on various activities, such as motion detection, wetness in the bed, and sleep patterns. By leveraging technology, the system eliminates the need for manual monitoring of elderly patients. Instead, it automates the data collection, analysis, and reporting processes, reducing the burden on caregivers and healthcare providers while ensuring continuous and accurate monitoring of patient activities.

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