IoT Enabled Smart Wheelchair with Realtime Fall Detection & Empathetic Voice Response

Aksha Pricilda Reena E[1], Sham S[2], Surya Prasath J A[3]

Department of Information Technology

Kongunadu College of Engineering and Technology, Trichy

Email: suryaprasath20905@gmail.com

ABSTRACT

The increasing demand for advanced mobility solutions for elderly and physically challenged individuals has driven the development of intelligent assistive technologies. This project, titled IoT Enabled Smart Wheelchair with Realtime Fall Detection & Empathetic Voice Response, presents a comprehensive system that integrates physical safety with emotional support. The proposed system employs an MPU6050 sensor, combining accelerometer and gyroscope data to continuously monitor user motion and orientation. A threshold-based fall detection algorithm is implemented to identify accidental falls in real time. Upon detection, a multi-tier notification mechanism is activated, which includes a local auditory alert through a buzzer and a remote emergency notification transmitted via an IoT-enabled communication module to caregivers, providing instant alerts along with GPS location details. In addition to safety monitoring, the system incorporates an empathetic voice response module using text-to-speech technology to deliver calming, pre-defined verbal reassurance, addressing the psychological well-being of the user during distress situations. Built using a scalable and modern technology stack, the proposed smart wheelchair enhances user safety, improves caregiver responsiveness, and supports emotional comfort, thereby offering an effective human-centric assistive mobility solution.