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| **Project Name:** Smart Assistive Glasses for the Deaf and Mute  **Project Sponsor:** Dr. Ayman El-Sayed  **Project Manager:** Eng. Marwa Hassan  **Date:** October 3, 2025 |
| **Project Purpose and Justification:** The purpose of this project is to design and develop smart assistive glasses that empower individuals who are deaf and mute to communicate more easily and stay aware of their surroundings. The glasses aim to enhance independence, safety, and social interaction through real-time translation between speech, text, and sign language, as well as providing vibration-based alerts for environmental awareness. This project supports the growing movement toward inclusive and assistive technologies that improve accessibility and quality of life. |
| **Project Description:** The Smart Assistive Glasses will combine audio processing, gesture recognition, and haptic feedback technologies to create an interactive communication system for people with hearing and speech impairments.   * Key features include: * **Speech/Text to Sign Language Conversion:** Converts spoken words or written text into animated sign language displayed through a built-in micro display. * **Sign Language to Speech Conversion:** Detects hand gestures made by the user through motion sensors or cameras and translates them into spoken language using a voice module. * **Environmental Awareness and Alerts:** Provides vibration alerts to the wearer when someone calls their name or when potential dangers (such as approaching vehicles) are detected. The vibration pattern will indicate the direction of the source — front, side, or back. |
| **Project Objectives:**   * Design a fully functional prototype of the smart glasses by May 2026 * Achieve accurate real-time translation between sign language and speech with over 90% accuracy * Implement directional vibration feedback with less than 0.5-second response time * Improve communication efficiency and safety awareness for deaf and mute users by at least 70% (based on user testing and surveys) |
| **Deliverables:**   * Prototype of Smart Assistive Glasses (hardware + software integration) * Embedded system software for gesture, speech, and vibration control * User guide and demonstration video * Testing report and user feedback analysis |
| **Milestones & Timeline:**   * Requirements gathering: Oct – Nov 2025 * Hardware and software design: Dec 2025 – Feb 2026 * Prototype development: Mar – Apr 2026 * Testing and refinement: May 2026 * Final presentation and documentation: Jun 2026 |
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| **Technical Requirements:**  • Hardware:   * Embedded board (e.g., Raspberry Pi / Arduino) * Microphone and speaker module * Mini camera or motion sensors for sign detection * Vibration motor system for alerts * Battery module with power management circuit   • Software:   * Programming languages: Python / C++ (for embedded systems) * Machine Learning models for gesture and voice recognition * Database for storing sign language patterns and user configurations * Real-time processing capability   • Performance:   * Sign detection latency under 0.5 seconds * Speech-to-sign translation accuracy above 90% * Continuous operation for at least 4 hours on a full charge   • User Interface:   * Simple on-glasses display or connected mobile app for settings * Directional vibration feedback for intuitive alerts   • Security and Privacy:   * Local processing of user data to maintain privacy * Encrypted communication for any cloud-connected features |
| **Limits and Exclusions:**   * The project will focus only on a **prototype**; full commercial production is excluded. * Mobile app integration (if any) will be minimal, limited to device pairing and settings. * The system will support a limited set of sign language gestures (basic communication and alerts). * No guarantee of 100% accuracy in noisy or low-light environments. * Advanced AI model training for regional sign language variants will be considered out of scope. * Future upgrades or large-scale manufacturing will require separate funding and project approval. |
| **Approval:**   * Project Sponsor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_ * Project Manager: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_ |
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