ViSMo: An AI-Integrated Vital Status Monitoring Robot With IoT for Intensive Home-Based Care, Solitary Individuals

Cayabyab, Jose Rafael (School: Quezon City Science High School)
Lipango, Cassandra Aubrey (School: Quezon City Science High School)
Riduca, Eirah Gabrielle (School: Quezon City Science High School)

Living alone should not mean dying alone, yet loneliness and unattended deaths continue to rise as global isolation increases; research shows a 32% increase in mortality among solitary individuals. ViSMo aims to aid solitary individuals by providing security to both patients and caregivers through an automated, interoperable vital status monitoring system. It integrates an AI voice companion, customizable facial display, and soft, user-friendly design to enhance interaction, reduce loneliness, and improve user acceptance. The system utilizes AI models to detect skin discoloration, human audio, and motion. A passive human-tracking locomotion system enables continuous surveillance. The discoloration model was trained on Edge Impulse using MobileNetV2 96x96 0.35, while an ESC-50-based model was used for audio detection via a modified Google Colab notebook. YOLOv8 Small Pose Estimation was applied for motion detection and locomotion. A mobile application displays and notifies users of patient status, while a web application enables sensor calibration, emergency alerts, and vital readings beyond scheduled intervals. A MAX30102 sensor measures temperature, oxygen saturation, and BPM. The skin discoloration and audio models achieved F1 scores of 0.97 and 0.95, while motion detection and locomotion showed 100% response accuracy in real-world testing. Results demonstrate that ViSMo effectively monitors vital status by providing non-invasive surveillance, alerting users to abnormalities and absence, and preventing unnoticed deaths among solitary individuals.

Awards Won:
Third Award of $1,200
Association for the Advancement of Artificial Intelligence: AAAI Student Memberships for each finalist that is part of the 1st, 2nd, and 3rd Prize Winning projects and 5 Honorable Mention winning projects (up to 3 students per project) (in-kind award / part of the 1st-3rd prize)
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $32,000 each)
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $32,000 each)
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $32,000 each)
Society Alumni Special Award: Excellence in Science Communication