Phase 1: Research & Planning

December 1 - December 10

Conducted background research on LoRaWAN technology and healthcare monitoring applications.

Selected required components: motion sensors, environmental sensors, LoRa modules, and microcontrollers.

Developed an initial system architecture and data flow diagram.

Phase 2: Hardware Setup & Sensor Deployment

December 1

Installed sensors throughout the house at strategic positions, including living spaces, corridors, and areas of higher risk like stairs and the kitchen.

Confirmed correct placement of sensors to ensure coverage and accuracy.

Phase 3: Data Acquisition & System Configuration

December 10

Received feedback from Tektelic officials on settings for data transmission and activation for CSV file download.

Set up connectivity to test the sensors and ensured proper logging of data.

Phase 4: Data Processing & Machine Learning Development

January 4 - March 1

Combined raw data imported from CSV files in Python.

Implemented data cleansing with missing value handling, denoising, and normalization.

Developed a machine learning algorithm for tracking movement habits and detecting outliers.

Verified performance of the algorithm using real life test cases and optimized parameters to achieve higher precision.

Phase 5: Analysis & Optimization of Results

March 2 - March 15

Analyzed trends in the data to verify normal vs. abnormal movement.

Tested the responsiveness of the system in catching possible falls or health hazards.

Implemented optimizations in order to prevent false positives as well as making detection more reliable.

Phase 6: Presentation & Finalization

March 16 - Date of Science Fair

Organized key results, graphs, and charts for the science fair display.

Wrote a project report of objectives, methods, results, and conclusions.

Practiced presentation and clarified explanations to effectively report project findings.