SmartCityX: The AIoT Hackathon

Prototype Phase REPORT

Project name: 45. ToddleTrack - 1D - Child
Team name: Hack 'n Chill

Team Lead:
1. Subhalakshmi Balakrishnan – CB.EN.U4CCE24053 – CCE 2nd year

Team Members:

1. Riya Mehta – CB.EN.U4CCE24041 – CCE 2nd year
2. Vandhana M – CB.EN.U4CCE24057 -CCE 2nd year
3. Pabolu Amrutha Sai Spandana – CB.SC.U4CSE24336 -CSE 2nd year

Theme: Child Well-being

Track: 1D model

Idea Brief:

ToddleTrack is a smart safety band for toddlers to be used in crowded areas. It uses an MPU6050 sensor to detect sudden movements using a 1D AI model(with edge impulse) and a button for manual alerts, triggering an alarm. An ESP32 microcontroller reads sensor data, runs the AI model, handles button presses, triggers the buzzer, and manages communication between modules. QR code input via serial identifies the child and displays details about the child's guardians. When the button is pressed, GPS data using NEO-6M GPS module, is sent to help parents locate their child. The device is supported by a mobile application that allows guardians to monitor the child's live location, receive instant alerts, and access to safety information in real time.

Software Requirements:

Cloud platforms such as Blynk play a crucial role in enabling real-time communication between the safety band and the guardian's mobile device. When a panic signal is triggered—either by detecting abnormal motion through the sensor or by pressing the alert button—the ESP32 sends immediate alerts and GPS location data to the parent via these cloud services. A 1D AI model, developed and deployed using Edge Impulse, runs directly on the ESP32 to analyze motion data from the MPU6050 sensor and detect patterns such as sudden jerks or falls, indicating potential danger. MIT App Inventor is also used, to create an application that integrates with the device, enabling parents to continuously monitor their child and receive emergency alerts.

App Tech Stack: MIT app inventor, Blynk
AI/ML model: 1D model using Edge impulse

Dataset: ://www.kaggle.com/datasets/saadmansakib/smartphone-human-fall-dataset?
Wokwi link: https://wokwi.com/projects/43752373842247065
Cloud Platform: Blynk, Edge impulse

Feasibility:

ToddleTrack is designed for real-world deployment in high-footfall public areas like temples, railway platforms, tourist spots — places where toddlers can easily get lost and panic or get hurt. The band is worn directly on the child's wrist or belt, making it completely portable and always with the child. It continuously runs on a 5V rechargeable Li-ion battery, with low-power components like the MPU6050 sensor and ESP32-WROOM optimized for energy efficiency. Using the TP4056 charging module, the battery can be charged easily and reused, supporting multiple days of operation on a single charge depending on alert frequency. ToddleTrack's compact, wireless and affordable design allows for scalable deployment at city level.

ToddleTrack is also paired with a mobile application built using MIT App Inventor, which acts as the guardian's interface for monitoring the child's safety. It connects with the safety band via cloud platforms. The app provides live GPS location tracking, an emergency alarm system that bypasses silent mode, previous alert history, battery monitoring of the device, and a geofencing feature that lets parents set a safe zone for their child-if the child veers outside this zone, an alert is sent through the app. This integration of ToddleTrack with its mobile app provides parents with a powerful, real-time tool to ensure their child's safety making it easier to monitor, respond to emergencies, and stay connected no matter where they are.

Budget:

S. No.	Name	Count	Purchase link/Offline store	Status	Price
1.	ESP32_WRoom	1	https://robu.in/product/esp32-38pin-development-board-wifibluetooth-ultra-low-power-consumption-dual-core/	Yet to order	343
2.	NEO-6M	1	https://robu.in/product/gps-neo-6m-satellite-positioning-module-development-board-for-arduino-stm32-51/	Yet to order	512
3.	MPU6050	1	https://robu.in/product/mpu-6050-gyro-sensor-2-accelerometer/	Yet to order	165
4.	TP4056 Charging Module	1	https://robu.in/product/mpu-6050-gyro-sensor-2-accelerometer/	Yet to order	17
5.	buzzer	1	-	Already have	-
				Total required	1037
				Total Available	-
				Total Budget	1037