SmartCityX: The AIoT Hackathon

Ideation Phase REPORT

Project Title: Smart Cradle - An IoT-Based Child Safety and Monitoring System

Team Lead and Roll Number:

1. A. SRI CHARAN – CB.EN.U4ECE23206

Team Members and Roll Numbers:

1. NAVANEETH A B S – CB.EN.U4ECE23001
2. MADHAVH S R K – CB.EN.U4ECE23022

Theme: Child Well-being

Track: 1D model

Idea Brief:

This project aims to monitor an infant's safety and comfort using an intelligent cradle system. It uses sensors to detect abnormal cradle movements, adverse environmental conditions, and infant crying. The ESP32 processes sensor data and triggers alerts via Wi-Fi using cloud services. The goal is to reduce risks like overheating, over-rocking, and unattended crying, thereby ensuring safer childcare.

Required Hardware:

Component	Purpose
ESP32	Main microcontroller with Wi-Fi
MPU6050	Detects rocking, tilt, and vibration
DHT11	Monitors temperature and humidity
INMP441 mic module	Monitors audio signal
Buzzer / LED	Alerts for local feedback
Power supply & wires	To connect components
Breadboard	Connect components

Usage of Cloud platforms, AI models, Augmented Reality:

AI Model:
Edge Impulse Trained on MPU6050 data to detect unsafe cradle movement (abnormal shaking/tilting). Classify child crying pattern based on INMP441 audio data.

Cloud Platform:
Blynk Cloud is used to display live sensor data (temperature, humidity, motion, and cry detection) on a mobile dashboard. It allows parents to monitor cradle conditions and receive instant notifications.

Firebase is used for real-time logging and storage of sensor data (from DHT11, MPU6050, INMP441). It also enables historical analysis and can be used with Firebase Cloud Messaging (FCM) to send alerts.

IFTTT is integrated to trigger automatic notifications such as SMS, email, or Telegram alerts when critical events occur (like excessive cradle shaking or baby crying continuously). Unsafe cradle movement, Poor air conditions, Loud crying

Feasibility:
This system is perfect for daycare centers, hospitals, and homes. It requires little alteration to be deployed on standard cradles. It guarantees that emergency situations, such as loud crying, unusual cradle shaking, or unfavorable room conditions, are immediately communicated to caregivers. AI is responsive and power-efficient because it operates locally on the ESP32. It clearly fills a need in child safety, is reasonably priced, and is very deployable.

Budget:

Item	Cost (INR)
ESP32	₹589
MPU6050	₹289
DHT11	₹118
INMP441	₹334
LED	₹10
Others	₹200
Total Estimate	**₹1540**

Wokwi Project Link: https://wokwi.com/projects/437464521655980033