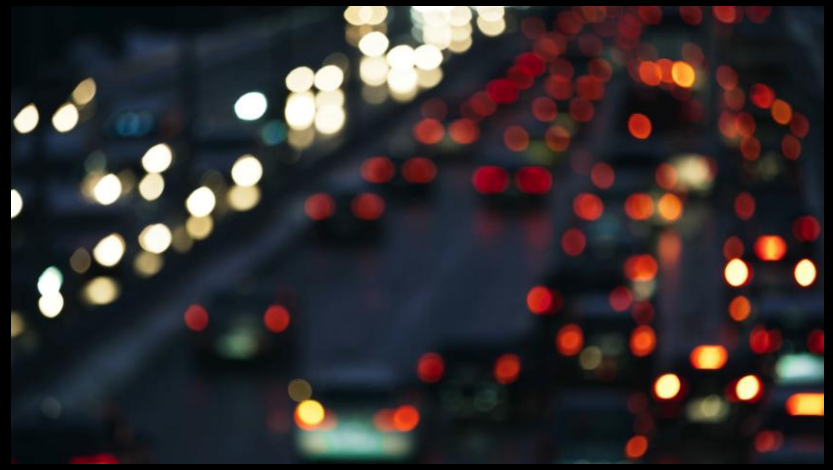
IoT-Based Accident Detection and Emergency Alert System



Student ID:22663281

Student Name: Dhrubo Jouti das Troyee

Bachelor of Technology (computer system and networking)

GLOBAL ACCIDENT PROBLEM

🌎 Global Impact
Road accidents cause over **1.3 million deaths annually** (WHO) making them a major global health issue.

🚨 Challenges in Remote Areas
In remote regions, accidents often go **unreported or delayed**, slowing emergency response.

🕒 Delayed Response Increases Risk
Without quick medical help, survival chances drop drastically.

💡 Need for Automated Alert Systems
Real-time alerts and GPS tracking are crucial to save lives.

Bridging the Gap with Technology
This project integrate IoT and cloud to provide fast detection, instant alert and accurate location sharing.

Project Overview

Designed as a smart IoT based accident alert solution which:

Accident Detection: Multi-sensor collision & condition monitoring

Emergency Alert: IFTTT sends SMS/Email to family members &emergency service,

Safety Monitoring : Tracks temperature, seatbelt, alcohol, smoke/gas leak)

Cloud Dashboard: Real time monitoring vi **Arduino IoT Cloud** .

Data logging:

Remote cloud access to incident history & driver safety

False Alarm control: Driver can cancel alert if accident minor

Project Objectives

Build a Prototype

Integrating accident detection and safety monitoring

Implement GPS Tracking

Accurate location reporting.

Automated Alerts

Notify family & emergency services without GSM.

Cloud Dashboard

Real-time tracking and safety reporting.

Structured Database

Long-term storage for insurance & research.

Testing & Validation

Validate functionality in real-world scenarios.

Core Concepts

IoT Integration: Arduino board (Microcontroller Brain) + sensors for crash detection.

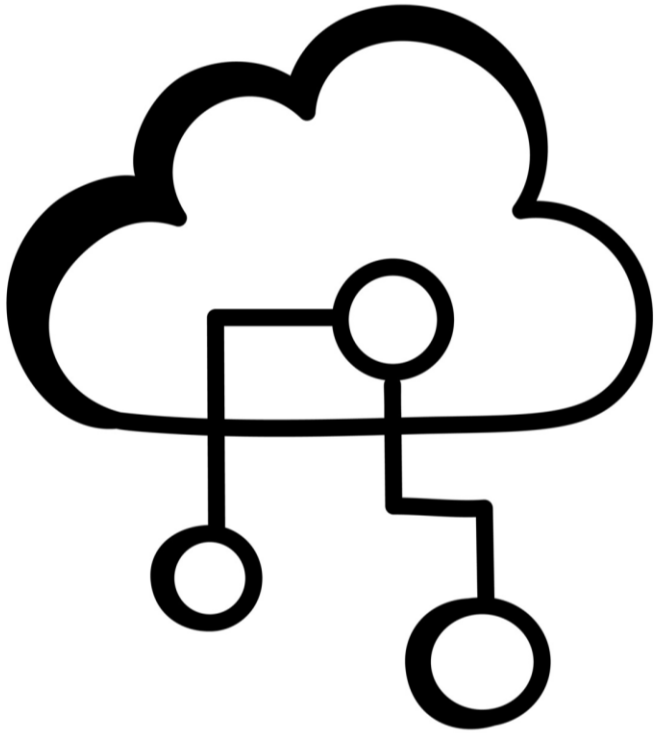
Cloud Sync: Arduino IoT Cloud via Wi-Fi for real-time monitor

Alerting: IFTTT for SMS/email notifications with GPS location

Location Tracking: GPS provides precise coordinates((latitude and longitude)

Data Logging: Firebase or Google Sheets for structured storage

User Control: cancel false alarms vis push button or dashboard toggle



IOT Cloud Platform

Equipment List

Hardware Component

- ❑ Arduino board (MKR WIFI1010)
- ❑ Accelerometer
- ❑ Temperature sensor
- ❑ Seatbelt switch
- ❑ Alcohol sensor
- ❑ Smoke sensor
- ❑ GPS module
- ❑ Push button

Software Tools

💻 **Arduino IDE**

Programming , testing, and debugging IoT components.

🚨 **Embedded Programming**

Arduino IDE uses C/C++ for uploading the program to microcontroller

💭 **Arduino IoT Cloud**

Dashboard management and cloud sync for remote access to system data and alerts

🔔 **IFTTT**

Alert automation (SMS/email) during emergencies, ensuring fast notifications.

📂 **Firebase / Google Sheets**

reliable storage & logging of incident data for analysis & insurance use

Data processing Flow

[Sensors] → [Arduino Board] → [Arduino IoT Cloud]

↓

[Trigger: accident Detected == true]

↓

[IFTTT → SMS/Email to Family & Police]

↓

[Dashboard shows status + GPS location + cancel button]

↓

[Google Sheets / Firebase

↓

Incident Logging]

Expected Outcome

Accident Detection & Alerting
- ❑ Detects impact using accelerometer/gyroscope sensors (front, rear, left, right)
- ❑ Send instant alert with GPS coordinates for emergency response.

Cloud Data Logging & Insurance Support
- ❑ Store incident data (location, time, cause, sensor readings) stored in cloud.
- ❑ Dashboard for reviewing driver performance & accident history
- ❑ Provides verified logs for insurance clams & research.

Driver & Vehicle Safety Monitoring
- ❑ Temperature sensor → overheating / fire risk
- ❑ Alcohol sensor → intoxication check (before &during driving)
- ❑ Speed monitoring → detects over speeding & triggers Warrings.
- ❑ Seatbelt switch → verifies compliance before ignition

Educational & Technical Impact
- ❑ Cost-effective, expandable IoT safety solution.
- ❑ Enhances understanding of IoT , cloud data management, and embedded systems
- ❑ Integrates GPS, Arduino board , IoT cloud platforms, and multi-sensor logic

IoT Flexibility & Future Collaboration
- ❑ Ready for integration into smart city infrastructure
- ❑ Enable real-time vehicle tracking & coordinated emergency response.
- ❑ Supports advanced analytics for public safety improvement

Timeline

Briefing on project objectives, overview, expected outcome, Over view of selected equipment

VIDEO 1

Explanation of why specific equipment (hardware , software)were chosen.

VIDEO2

Details on how the data will be processed.

VIDEO 3: