



# **RV College of Engineering<sup>®</sup>**

Mysore Road, RV Vidyaniketan Post, Bengaluru - 560059, Karnataka, India

## **Enhanced Long Range Location Tracking and Fall Detection System**

### **MAJOR PROJECT REPORT**

**MCA491P**

*submitted by*

**Rajesha C U    1RV23MC080**

*under the guidance of*

**Dr. Deepika K**

Associate Professor

Department of MCA

**RV College of Engineering**

*in partial fulfilment for the award of degree of*

**Master of Computer Applications**

**Department of Master of Computer Applications**

**2024-2025**





**RV College of Engineering®**

Mysore Road, RV Vidyaniketan Post,  
Bengaluru - 560059, Karnataka, India

www.rvce.edu.in  
Tel: +91-80-68188100  
+91-80-68188111  
+91-80-68188112

## **DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

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## CERTIFICATE

Certified that the Major Project titled '**Enhanced Long Range Location Tracking and Fall Detection System**' is carried out by **Rajesha C U (1RV23MC080)** a bonafide student of RV College of Engineering®, Bengaluru, in partial fulfillment for the award of Degree of **Master of Computer Applications** of **Visvesvaraya Technological University, Belagavi** during the year **2024-2025**. It is certified that all corrections/suggestions indicated for the internal assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed by the institution for the said Degree.

### Internal Guide

Dr. Deepika K

Associate Professor

Department of MCA

RV College of Engineering

### Head of the Department

Dr. Jasmine K S

Associate Professor & Director

Department of MCA,

RV College of Engineering

### Principal

Dr. K N Subramanya

## External Viva Examination

### Name of Examiners

1.

2.

### Signature with Date



# RV College of Engineering®

Mysore Road, RV Vidyaniketan Post, Bengaluru - 560059, Karnataka, India

## DECLARATION

I **Rajesh C U**, the student of Fourth semester Department of MCA, RV College of Engineering®, Bengaluru-560059, bearing USN: **1RV23MC080** hereby declare that the project titled **Enhanced Long Range Location Tracking and Fall Detection System** has been carried out by me. It has been submitted in partial fulfilment of the program requirements for the award of Degree in **Master of Computer Applications** of **Visvesvaraya Technological University, Belagavi** during the year **2024-2025**.

Further, I declare that the content of the dissertation has not been submitted previously by anybody for the award of any Degree or Diploma to any other University.

**I also declare that any Intellectual property rights generated out of this project carried out at RVCE will be the property of RV College of Engineering®, Bengaluru and I will be among the authors of the same.**

Place: Bangalore

Date of Submission:

**Signature of the Student**

Student Name: Rajesh C U

USN: 1RV23MC080

Department of Master of Computer Applications

RV College of Engineering®

Bengaluru - 560059

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**Rajesh C U(1RV23MC080)**

Department of MCA

RV College of Engineering®

Bengaluru-59

## ABSTRACT

The Enhanced Long-Range Location Tracking and Fall Detection System is designed to provide reliable tracking and safety monitoring for trekkers, hikers, and individuals in remote areas lacking conventional communication infrastructure such as GPS, cellular, or Wi-Fi networks. The system leverages LoRa (Long Range) communication technology in a star topology, enabling low-power, long-distance data transmission between multiple wearable nodes and a central gateway. Each wearable node integrates an ESP32 microcontroller, GPS module, BMP180 environmental sensor, fall detection mechanism, and an emergency alert button. These devices periodically capture location, temperature, pressure, and alert signals, transmitting them to the central node for real-time monitoring.

At the central gateway, received telemetry data is processed, validated, and stored on an SD card for logging and analysis. A local Wi-Fi Access Point, hosted on the central node, serves a modern web-based dashboard that displays live positional updates on an offline Leaflet.js map, along with sensor readings and emergency alerts. The dashboard is accessible to all connected users without internet dependency, ensuring continuous situational awareness in challenging environments. Fall detection alerts and emergency button triggers are prioritized for immediate visual indication, improving the safety response time in critical situations.

This system demonstrates a robust, low-power, and offline-capable solution for safety-critical tracking applications in remote terrains. By combining LoRa's long-range communication capabilities with real-time web visualization, it overcomes the limitations of traditional tracking systems that rely on cellular or satellite networks. Potential applications extend beyond trekking to include disaster relief operations, remote workforce safety, and wildlife monitoring. Future enhancements could include multi-hop LoRa mesh networking, AI-based fall detection, and integration with solar-powered modules for extended operational autonomy.

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