

**Enhanced LongRange Location Tracking and Fall Detection System**

**MAJOR PROJECT REPORT**

**MCA491P**

*submitted by*

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| **Rajesha C U** | **1RV23MC080** |

*under the guidance of*

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| **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**

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**Department of Master of Computer Applications**

**2024-2025**



**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

ENHANCED LONG RANGE LOCATION TRACKING AND FALL DETECTION SYSTEM

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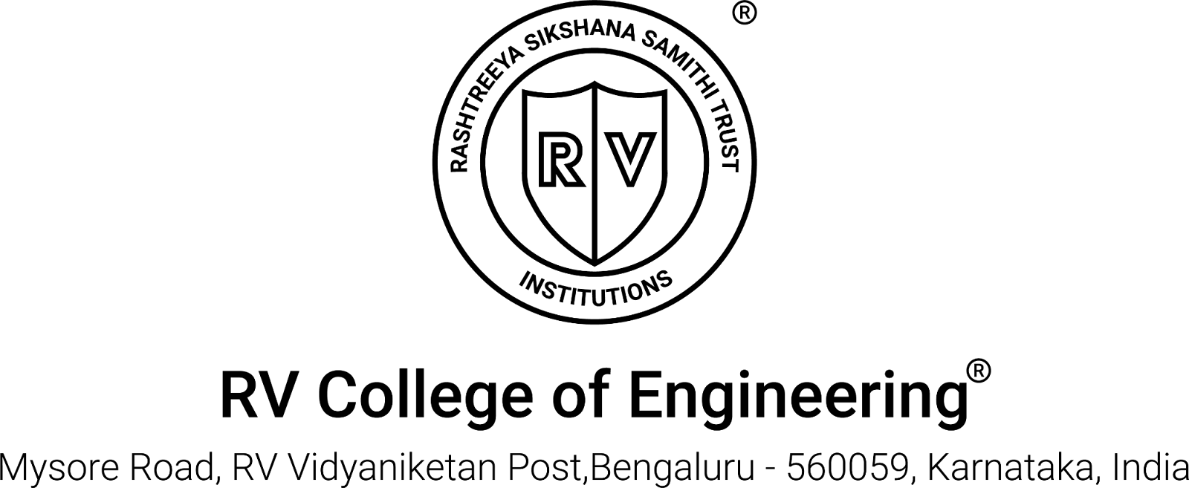
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*in partial fulfilment for the award of degree of*

**MASTER OF COMPUTER APPLICATIONS**

**2023-2024**



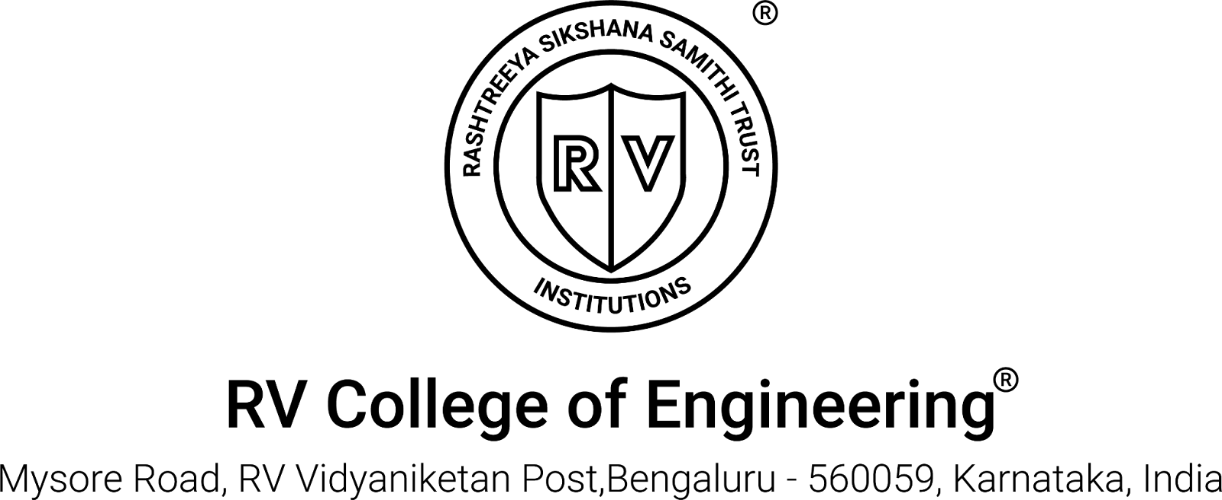
**CERTIFICATE**

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.

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| **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 Signature with Date**



**DECLARATION**

I **Rajesha 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:Rajesha C U

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**ABSTRACT**

The growing demand for reliable safety and tracking solutions in remote, off-grid environments exposes the critical limitations of conventional systems, which are often constrained by cellular network availability, fixed communication ranges, and unreliable performance in GPS-denied areas. This project presents the design and implementation of an enhanced, fully offline LoRa-based location tracking and emergency alert system engineered to overcome these challenges. The system utilizes a decentralized, multi-hop mesh networking protocol to significantly extend communication range and improve data reliability in complex terrain. Each portable node, built upon an ESP32 microcontroller, integrates GPS and environmental sensors, and is capable of switching to an RSSI-based localization model enhanced with machine learning when GPS signals are unavailable.

Our methodology focuses on creating a self-contained, robust ecosystem. All telemetry data is logged locally to SD cards for persistence and transmitted wirelessly to a central gateway. This gateway aggregates the data, processes it for visualization, and hosts a local web server, allowing any user with a Wi-Fi-enabled device to access a real-time dashboard with map-based tracking and environmental analytics without requiring internet connectivity. A key feature is the resilient emergency alert system that leverages the mesh network to ensure group-wide notification. The anticipated outcome is a practical, energy-efficient, and field-ready platform that provides a superior level of safety and situational awareness for trekking groups, expedition teams, and search and rescue operations in infrastructure-less regions.

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