

RFID-Based Pilgrim Tracking System For Kumbhmela

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Abstract - This study suggests an RFID-based pilgrim tracking system as an effective way to control sizable crowds during the Kumbh Mela. By giving pilgrims RFID wristbands at registration, the main goal is to improve crowd control and safety. By storing distinct identifying information, these tags allow for real-time tracking via RFID readers positioned at different checkpoints. A web application with several roles, such as administrator, registration desk, and support centers, makes up the system. While the registration desk assigns RFID tags and registers users, the administrator manages pilgrim data. Help centers can quickly resolve lost cases by using RFID tag scanning to find absent people and update their status.

keywords: GPS tracking, RIFD, IOT

I.INTRODUCTION

Nowadays, it's quite difficult to control big crowds at occasions like the Kumbh Mela. Real-time tracking of individuals is frequently not possible with traditional methods, which raises safety issues and results in ineffective crowd control. Our system offers an RFID-based pilgrim tracking solution to solve this problem, guaranteeing safe and effective pilgrim monitoring during the event. Each pilgrim receives an RFID tag from our system upon registration, which is connected to their individual identity information. This makes it possible to use RFID scanners to follow their movements in real time across several checkpoints. A webbased application with many user roles, including administrators, registration desks, and help centers, makes up the system. The administrator is in charge of everything, making sure that RFID tags are properly registered and tracked.

While support centers aid in locating missing persons and resolving missing cases, registration desks manage the tagging procedure. With the help of this system, event planners may effectively control crowd flow, improve security, and offer a trustworthy way to find missing people. An effective option for today's large-scale events, RFID technology's integration with a web-based platform guarantees smooth communication between various authorities.

The many technologies and development approaches utilized to create this RFID-based tracking system will be examined in this research, along with its possible uses in guaranteeing public safety and effective mass gathering administration.

II. LITERATURE REVIEW

Parker and Gaines (2022) provide guidance on the Hajj/Umrah pilgrimage to Saudi Arabia, a significant religious event attracting millions of travelers. The research outlines health and safety considerations, vaccination requirements, and disease prevention measures for pilgrims. It highlights the risk of infectious diseases such as meningitis, influenza, and COVID-19, as well as heat-related illnesses and crowd safety concerns. The authors offer recommendations for travelers, including vaccination, medication, and protective measures to minimize health risks during the pilgrimage. This resource serves as a valuable guide for individuals planning to participate in the Hajj/Umrah pilgrimage.

Alsubhy et al. (2020) propose a model for tracking people and property in crowds, addressing the challenges of crowd management and safety. The model utilizes a combination of technologies, including RFID, GPS, and sensors, to enable real-time tracking and monitoring of individuals and assets in crowded environments. The authors

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demonstrate the effectiveness of their model in reducing crowd-related risks, improving emergency response times, and enhancing overall safety[1]. The proposed system has potential applications in various settings, such as public events, transportation hubs, and religious gatherings like the Hajj pilgrimage, where crowd control and safety are paramount concerns.

Boulila et al. (2021) introduce GuideMe, a mobile application that leverages GPS and object recognition technologies to provide personalized tourist guidance. The app utilizes machine learning algorithms to recognize landmarks and points of interest, offering users real-time information and navigation assistance. GuideMe aims to enhance the tourist experience by providing interactive and immersive guidance, reducing reliance on traditional maps and guides. The authors demonstrate the app's effectiveness in facilitating seamless navigation and discovery of attractions, highlighting its potential to transform the tourism industry and promote smart city initiatives[4].

Kulkarni and Shah (2015) present a system for monitoring and ensuring pilgrim safety using stampede detection and tracking technologies. The proposed system integrates sensors, GPS, and mobile apps to detect crowd density and anomalies, track pilgrim locations, and trigger alerts for emergency response[5]. The authors implement a stampede detection algorithm that analyzes sensor data to identify potential stampede situations, enabling proactive measures to prevent accidents. The system also provides realtime tracking and monitoring of pilgrims, facilitating swift assistance during emergencies. The study demonstrates the effectiveness of the proposed system in enhancing pilgrim safety and streamlining crowd management during large religious gatherings.

III. PROBLEM DEFINITION

The problem addressed by the RFID-based pilgrim tracking system for Kumbh Mela arises from the challenges of managing and ensuring the safety of millions of pilgrims in a highly crowded and dynamic environment. Traditional methods of tracking and managing individuals during largescale events are inefficient, making it difficult to locate missing persons, control crowd flow, and manage registration processes. To solve this, the system employs RFID technology to enable real-time tracking of pilgrims using RFID tags and readers. Admins can add, view, and delete registration desks and manage pilgrim data, while registration desks handle user registration and RFID tag assignments. Help centers can log in to scan RFID tags, mark individuals as missing or found, and add missing reports using mobile numbers. This web-based application provides a scalable, real-time solution to improve crowd management, streamline registration, and enhance safety at the Kumbh Mela.

I. PROPOSED WORKING

The proposed RFID-based Pilgrims Tracking System is a comprehensive solution for tracking and managing pilgrims during Kumbh Mela. The system utilizes RFID tags and readers to track pilgrims' movements, and a web application for administrators, registration desks, and help centers to manage the tracking process. The system allows administrators to add/view/delete help centers and registration desks, while registration desks can register pilgrims, view registered users, and assign RFID tags. Help centers can scan RFID tags to report missing or found pilgrims, manage missing cases, and add missing persons by mobile number. The system provides real-time tracking, automated registration, and swift reuniting of missing individuals, ensuring pilgrim safety and reducing chaos. The proposed system is a scalable, efficient, and user-friendly solution for large-scale event management, making it an ideal solution for Kumbh Mela.



Fig 1. Block Diagram

IV. IMPLEMENTATION OF PROPOSED SYSTEM

Millions of pilgrims attend the Kumbh Mela, and the RFID-Based Pilgrim Tracking System is made to effectively manage and monitor their movements. During registration, an RFID tag with a unique identification number is given to each pilgrim. Real-time tracking is made possible by RFID readers that scan these tags at key checkpoints, temples, and access gates. A web-based application that is available to various user roles, such as administrators, registration desks, and support centers, controls the entire system.

The administrator serves as the main point of contact, supervising tasks including running registration desks, keeping an eye on pilgrim data, and making sure assistance centers are operating correctly. Enrolling pilgrims, allocating RFID tags, and securely preserving pilgrim records



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are the responsibilities of registration desks. By scanning RFID tags to identify found pilgrims and adding missing people to a centralized database, help centers play a critical role in helping those who have gone missing. Using RFID scan data, the device also enables authorities to track a missing pilgrim's last known position.

This RFID-enabled system enhances crowd control, safety, and efficient management of missing persons, ensuring smooth operations during the massive gathering. By integrating RFID technology with a web-based monitoring system, event organizers can improve security, reduce risks, and provide a better experience for all attendees.

V.RESULT



Fig 3. Admin login

The Admin module is designed for the overall management of the system, providing the authority to control and maintain Help Centers and Registration Desks. Through the Admin interface, authorized users can log in securely to access the system. The admin can add, view, or delete Help Centers, which are essential for locating and assisting pilgrims, and Registration Desks, where pilgrims are registered and assigned RFID tags.



Fig 4. Registration desk

The Registration Desk module is the primary point of interaction for pilgrims entering the event. Staff members at the Registration Desk can log in to perform key registration tasks, such as registering new pilgrims and assigning them unique RFID tags. By capturing personal information, assigning RFID tags, and viewing registered user details, the Registration Desk ensures that every pilgrim is accounted for and can be tracked throughout the event area. This module is crucial for establishing the first contact with pilgrims and is vital for enabling subsequent tracking and support.



Fig 5: Help center

The Help Center module focuses on reuniting lost pilgrims with their groups and addressing any missing person cases. Help Center staff can log in and scan the RFID of pilgrims to check their status or update it. The module includes options to add individuals to the "missing" list, mark "found" pilgrims, and initiate missing case records for pilgrims reported missing through their RFID data. Additionally, if RFID information is unavailable, the Help Center can use the pilgrim's mobile number to log them as missing. This module is essential for responding quickly to missing person alerts, providing a reliable support system, and ensuring the safety of pilgrims in real-time.



The RFID reader is connected to a laptop via USB, allowing it to scan RFID tags assigned to pilgrims. Each RFID tag (UID) is linked to a pilgrim's details in a centralized database. When a pilgrim taps their RFID card on the reader, the UID is captured and processed by the system, logging the timestamp and location. The system continuously updates the real-time movement of pilgrims across various checkpoints, enabling authorities to monitor crowd density, track lost individuals, and enhance security. All scanned data is stored and analyzed to improve event management and emergency response. This system ensures efficient tracking, crowd control, and enhanced safety at Kumbh Mela.



VI.CONCLUSION

The RFID-based Pilgrim Tracking System for Kumbh Mela provides a robust solution for managing the large influx of pilgrims, ensuring their safety and improving event coordination. By leveraging RFID technology, the system allows for efficient registration, real-time tracking, and quick response to missing person reports, helping families and authorities locate individuals swiftly. The modular design, encompassing Admin, Registration Desk, and Help Center functionalities, ensures that each operational aspect is streamlined and secure. This system not only enhances the experience for pilgrims but also facilitates better crowd management for organizers, making it a valuable asset for large-scale events. With further advancements, such as GPS integration and mobile accessibility, the system has significant potential to become a comprehensive tracking solution for future gatherings.

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