

# **Ubiquitous Computing for Safe and Efficient Pilgrimage Operations**

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## **ABSTRACT**

Ubiquitous computing is an emerging computing paradigm where many computational devices are integrated in everyday objects and activities. The goal of many researches in ubiquitous computing has been to provide convenient and comfortable life to different sectors of the society (e.g., patients and elderly people). Systems that utilize Radio Frequency Identification (RFID) and Wireless Sensor Network (WSN) are popular examples of ubiquitous computing. WSN have proved promise in applications that provide physical environment monitoring. RFID applications have been utilized in asset identification in the supply chain. Integrating WSN with RFID holds the potential of introducing new ideas of applications in the Ubiquitous Computing paradigm. A system that integrates both RFIDs and WSNs in monitoring and tracking pilgrims can make the pilgrimage operations safer and more efficient. Such system can constantly monitor and track the whereabouts and conditions of the pilgrims. Authorities, and even pilgrims' families, can utilize the system to gain real-time access to the pilgrims' information. This information can be used by authorities to make decisions about whether to take actions. In addition, the information can be recorded for future study by concerned researchers for further improvement of the pilgrimage operations.

In this paper I will present the architecture of a system that utilizes both RFID and WSN in monitoring people and objects as part of pilgrimage operations. I will discuss the prospect of such system as well as the challenges of its implementation. The proposed system is expected to cover a wide range of disciplines such as electrical and electronic engineering, computer science and engineering, and information systems. It will have the potential to broaden the state of the art in these disciplines. The system is also expected to cover a wide range of key aspects such as accuracy of sensed data, network scalability, fault tolerance, data aggregation, remote access of information, and information security. Finally, I will present examples of relevant research studies from the literature.