Exploring the Potential Use of a Novel Integrated ID-Mounted RFID Tag Software System Coupled with Ultrasonic Sensors for Asset Tracking and School Security

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With issues of school safety rapidly becoming more prevalent, a need for a solution to this problem has equally risen. As it stands, no systems track both student location and the location of unauthorized individuals. A potential solution was implemented by designing an integrated asset tracking system for all people inside of a building using Radio Frequency Identification Device (RFID) tags and ultrasonic sensors. A Raspberry Pi was used to implement sensor nodes that interfaced with Google Firebase to transfer data to a web client for reading information. The sensor nodes were programmed using Python. RFID tags were distributed to a total of ten people for testing. Each tag was then assigned to its respective individual in Google Firebase. The secondary system was designed and integrated using ultrasonic sensors mounted facing sideways on doors with the purpose of tracking all individuals within the school building enabling security officers to detect unauthorized individuals. The idea that an integrated system created to keep track of students using ultrasonic sensors and RFID readers will be able to hold an accurate number of people in the building, as well as an accurate number of people who are not authorized, was tested in this study. Results indicate that the RFID system can keep track of the number of people in the school and individual classrooms while the ultrasonic sensors lack the ability to do the same. This information can be applied to schools to increase overall security with the benefit of attendance tracking.

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