E-Shield: An Anti-Theft SOS System for E-Bikes Using IoT Automation

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Abstract

Global inflation increased as a result of the pandemic, driving up living expenses everywhere. People started selecting affordable and effective modes of transportation, which is a significant industry that was impacted by this inflation. E-bikes were regarded as a potential solution to meet the demands of inexpensive transportation in developed countries as well as in most of the newly emerging countries. The spike in the use of e-bikes caused more thefts, which led to more claims for the e-bikes that were stolen. One of the main issues in the European region is providing proper security measures to prevent e-bikes from being stolen. However, the current physical devices do not provide the level of security needed to reduce the number of thefts. Direct use of GPS (Global Positioning System) trackers on these kinds of mopeds might be beneficial, but the cost of these trackers and their integration with the existing system are not always simple and reliable.

The aim of this research is to identify the IoT sensors and modules that would fulfill the security requirements for the protection of e-bikes and to create an easily integrable system that would be compatible with the existing e-bike architecture. Moreover, the solution would provide features such as user verification and authorization, real-time tracking and monitoring, SOS sharing and alerts along with remote immobilization capabilities that would be a great way to combat the theft against e-bikes. Additionally, the system would possess a reliable communication using the standards of MQTT protocol between the hardware and software components.

Keywords: Internet of Things, E-Bike, Global System for Mobile Communication (GSM), Global Positioning System (GPS), Real-time, Theft Protection and Security

Subject Descriptors:

- Security and privacy → Security in hardware → Embedded systems security.
- Security and privacy → Security services → Authorization.
- Security and privacy → Security services → Access control.
- Security and privacy → Security services → Authentication → Biometrics.