

DEVELOPMENT OF FINGERPRINT-BASED MOTORBIKE IGNITION SYSTEM
WITH AI-ENABLED HELMET DETECTION

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INTRODUCTION

The study aimed to develop a fingerprint-based motorbike ignition system with AI-enabled helmet detection. The system had the ability to manage the number of authorized users who can access the motorbike. It also utilized AI algorithms to determine the presence of the rider wearing a helmet properly. The researchers aimed to explore innovative technologies to bridge the gap in security and safety measures for motorbikes. The study focused on the functionality of the system, evaluating its effectiveness and efficiency. It aimed to ensure the presence or absence of helmets to avoid avoiding the motorbike without detection. Fingerprint system for motorbikes as its key system for the reduction of theft and unauthorized access. System can be modified by one (1) administrator while multiple authorized users can access the motorbike. The system was revealed to be functional up to 120 cm, with an accuracy level of at least 60% in moderate lighting conditions. Prohibit the engine from starting if the motorist is not wearing a helmet or merely faking it. The study did not cover the development of fingerprint recognition technology, as this technology is already commercially available.

METHOD

The system was designed to ensure security for the vehicles and enhance the safety of the riders. The wireless keyboard and mouse attached in the Raspberry Pi were used for modifications. The connection wires for the electrical system of the motorcycle were set up to connect to the system. The user's fingerprint will be scanned, read, and compared with the recorded data in the database. If the fingerprint is allowed, the screen will display "Finger #ID found" and the system will go back to the verification of fingerprint. The system consists of two controllers specifically, the NodeMCU and Raspberry Pi 4B. The Node MCU also consists of Fingerprint Sensor, four buttons that is used to input ID Numbers for recording fingerprints and other commands. The Raspberry Pi is the main controller for this system for helmet detection. The system required numerous essential steps to guarantee its operation and security. The criteria used in the evaluation originated from the TUP evaluation instrument for system development. The evaluation procedure analyzed the system's efficacy, accuracy, and dependability. The system uses a Raspberry Pi for real-time detection and a 5-inch LCD to display the data. The system uses Google Colab to train the AI model. The whole system, including all the functionalities and scope, was tested and evaluated by the evaluators. The evaluation procedure was conducted by preparing a questionnaire using the TUP evaluation instrument. The highest rating is four (4) which is described as "Highly Acceptable" while the lowest rating is one (1) which was described as "Not Acceptable."

RESULTS

The development of fingerprint-based motorbike ignition system with AI-enabled helmet detection was evaluated in terms of Functionality, Aesthetics, Workability, Durability, Economy and Safety. The system only involved the ignition of the motorbike, and continuous detection of the helmet while the motorist was driving. The grand weighted mean for all the criteria was 3.59 interpreted as 'Highly-accepted' and 'Acceptable'. The system was developed in a series of steps from the beginning of the development until the system was accomplished and all requirements were satisfied. The system focused on being a fingerprint-based ignition with AI-enabled helmet detection. The system was capable of managing the number of authorized users who could access the motorbike and could store up to 127 fingerprints. The last phase of the project was the development of the system using the Agile method. The project was then deployed on a motorbike with a Raspberry Pi 4-inch model. The next phase was the deployment of the project Safety Evaluation. The third phase of development was the designing of the hardware. ay Module

SPDTFINGERPRINT-BASED MOTORBIKE WITH AI-HELMET DETECTION 60. The system demonstrated functionality up to 120 cm with an accuracy of at least 60% in moderate lighting conditions. However, the helmet detection feature excluded the passenger from its scope. Since the development was divided into two phases, each component was exposed to testing as it was developed. Through various data sets, AI-enabled helmet detection was made possible in the study.

DISCUSSION

The system was composed of Node MCU Esp8266 with Fingerprint sensor for fingerprint-based ignition system and Raspberry Pi 4B with Carbuncle Raspberry Pi Camera for helmet detection. The system smoothly integrated helmet detection with the ignition system by training the AI model. The fingerprint system effectively served as the key system to avoid foregoing theft and unauthorized access. The development of fingerprint- based motorbike ignition system with AI- enabled helmet detection was successfully designed in such a way that:. The motorbike will continue to move Smart Helmet and Fingerprint Based Ignition System for Vehicle. The Fingerprint-based motorbike ignition system with AI-enabled.helmet detection was evaluated and received a grand weighted mean of 3.59, interpreted as ?Highly Acceptable? Pluggable Relay Circuit Module. If the system detects your skin tone inside the helmet, the ignition will beactivated. The system?s AI was subjected to a Model.urablePerformance Evaluation where it exhibited an AP of 0.9436502 and a Mean Average. Precision (mAP) of 94.37%. Fingerprint based security system for vehicles Design and development of smart safety and navigation system for motorbikes and two wheelers. System had the ability to prohibit the engine from starting if the motorist was not wearing a helmet or was pretending to wear it. Intelligent helmet system using IoT and Raspberry Pi. Fingerprint Keys on Motorcycles Using Arduino Uno R3. Smart helmet to start the motorbike and to prevent accidents. Smart Motorcycle Helmet: Real-Time Crash detection with Emergency Notification, Tracker and Anti-Theft System. Fingerprint sensor can be used to unlock a motorbike. The system well-monitored the motorist to ensure the helmet was worn properly. A prototype of a Fingerprint Based Ignition System in Vehicles has been created. The first user will be designated as the admin and can register or delete the database. The LCD will turn on and display a message Improve helmet detection feature by using a high-end quality camera. If your attempt is successful, the motorcycle's electrical system will be activated. The system was evaluated using a 4-point likert scale using the TUP evaluation instrument. The final model was then attached to the Honda Click 125i motorbike of one of the researchers, Wynard Dela Rosa, done in Caloocan City. The system obtained a grand mean of 3.59

interpreted as 'Highly Acceptable' (3.59 is considered acceptable) The LCD will display 'Printing will display if you have your fingerprint stored!' and 'Finger Detection of Non-metered Riders and Riders' Rider Compliance' Raspberry Pi and Machine Learning will automatically display on the screen when the camera preview is shown. The camera preview will automatically show the camera's view. The system will continue scanning if the first scan is not successful, the system will continue scanning if it is not. The device can also detect skin tone using the visor's skin tone sensor. It can also be used to identify the driver by their visor to prevent theft. It is also used to prevent people from stealing the vehicle. The system was successfully developed using Raspbian OS Desktop, Python, Google Colab, Tensorflow, Thonny IDE, OpenCV, Tensorflow Lite, Google Drive, Arduino IDE, and Arduino C for software. The developed system was tested utilizing the TUP evaluation. The system was also tested using the I2C LCD, Rocker Switch, DC-to-DC buck converter, 5-inch LCD, Intermittent Sound Electronic Active Buzzer and Buttons for hardware tools. Almost 90% of stolen vehicles in the first nine months of 2021 were motorcycles. Almost 90 per cent of vehicles stolen in the last nine months were motorcycles, according to a study by the Indian Institute of Engineering and Technological Research (ICIETIR) The C.A.R.E.S.T. board has developed a language for the development of Motorcycle Sentry and Via SMS Tracker Tracker. The board has also developed a tool to detect helmets in low-light and high-light conditions. Raspberry Pi as a Sensor Web node for home automation. Raspberry Pi as an alarm for 30 seconds if you fail three times to set off the alarm. A helmet detection feature that detects fingerprints can be extended to include passengers for more safety coverage. A study of fingerprints found that wet/oily and with soil/rusty impair the recognition of fingerprint recognition while dry and clean or dry but not clean can still identify fingerprints. A design of rocker switches for work-vehicles.