COIN OPERATED SOLAR CHARGING STATION WITH ANTI-THEFT SECURITY

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INTRODUCTION

Mobile phone charging stations have become a staple business in various public places. This study will only cover the charging station?s solar charging system to include a 200-watt solar panel to collect and convert solar energy into electricity to charge the gel/lead acid battery. Other features include a weight sensor to determine if a phone is still in the drawer, a piezo buzzer to alert the user when their charging time is finished, and a charge controller to regulate the voltage coming from the solar panels. Solar phone charging stations face the necessity of being connected to a power grid, which in turn limits the deployment of charging stations in mostly urban areas. With the rise of smart cities, these public charging stations can be improved with RFID, fingerprint, and IoT systems to help enhance security in the case of mass implementation (Pramono, 2022) Solar phone charging station with the following features: A receipt for the customer, which includes the timed password that they will use to open the drawer after the charging session has ended. An alarm system to alert the customer case there is an attempt of incorrect OTPs. Public charging stations will provide a. security system for shared resources like public charging stations, ensuring only authorized users can access the. weight sensor determines if a phone is still placed inside a drawer or no longer has a. charging in it Charging compartments with solenoid lock. Solar powered charging. Administrator access to charging time adjustment5. The system will prove beneficial to the public, business owners and operators, environmental enthusiasts, and future researchers. It will also provide a way to test new technologies.

METHOD

The completed survey from every respondent will then be gathered to be gathered, and to calculate the weighted mean average. The evaluation procedure will serve as the analyzation of the proposed system?s proposed system. The prototype for the charging station will have its main body composed mainly of 1/4-inch plywood for insulation and was made with ample space for all the system components to be connected to each other without having the wires be entangled that will help avoid possible short circuits in the system. The system utilizes a dataset to gather data regarding the number of coins earned by the charging station and to help give insight into the peak hours of usage. The charging algorithm will be described, along with how the Raspberry Pi controls the charging process, tracks the timer for each port, and optimizes power transfer to connected devices. The researchers will elaborate the functionality of the system to the respondents, including the functionalities, objectives, scope, limitations, and operations before the evaluation procedure. The system has 2 drawers, and each drawer has a weight sensor and a relay controlling a solenoid lock and the charging wires. The user interface will be made using Python-based programming language. The charge controller is connected to the 100-AH gel battery to store solar energy. Data gathered can help in making informed decisions about possible system improvements. The highest numerical rating the researchers will get will be 5 corresponding to ?Excellent? The highest numerical rating of 1 is equivalent to ?Poor? The TUP students, professors, and a person who is knowledgeable in solar energy will be given evaluation instrument Flowchart for Extend Mode51. The number of coins inserted is recorded in the database for payment tracking. The alarm systems will activate if the user only has five seconds left of the charging time or when they input and OTP that is incorrect. The printer paper status will be tested if there is no paper it will show a warning and disable the vacant drawers. Overall, the project design, system design, user interface design, and power management measures will be presented.

RESULTS

The developed system of the charging station underwent a variety of tests to make sure that its functionality, reliability, and performance are up to standard and can operate as intended. The system successfully allows the customers to be able to choose which charging drawer they will charge their phones in and the user can see in real time the status of the drawers if they are vacant or occupied. The user can then enter the OTP pin to retrieve their phone as shown in figure 27. The safekeeping and elapsed time features showcase a seamless transition. The Coin-Operated Solar Charging Station can operate fully offline and provide a continuous service for the users without the need for an internet connection. The system is limited to only tracking the inserted coins into the system for the revenue as well as the charging times of the users to determine the battery consumption. Anti-theft security measures include the solenoids locks which lock the charging drawers when there is an ongoing charging session with the OTP system to ensure that only the user can unlock the drawer once the charging session has finished. The Raspberry Pi 4B serves as the CPU for the software and GUI shown on the LCD touch screen. The system updates in real time the status of each charging drawer and their timers as well as the working functionalities on the admin side. It also includes the OTP that is crucial for the customer to type in the LCD touchscreen once they need to retrieve their phone in the drawer. It can gather solar energy with the 200 watts solar panel sufficiently viewpoints and can charge the battery that powers up the whole system of the charging station. The Coin-Operated Solar Charging Station with Anti-Theft Security has two (3) main components: (A) Solar charging Devices, (B) Peripheral Devices and (C) User interface. The device is composed of a solar panel, charge controller, and gel battery to provide power to the charging station. The multi-coin acceptor serves as the payment system for the solar charging station and can accept a variety of coins. The charging session?s length is equal to the number of coins inserted. Safekeeping mode refers to the elapsed time wherein the customer hasn?t retrieved their phone after their charging session has ended. The system was developed mainly using python programming language and Thonny IDE. The Pi 4B microcontroller, solenoid locks, weight sensors, coinacceptor, Bluetooth thermal printer and relay device all work together and function as intended to provide a seamless and convenient experience for the users as they charge their phones. The system is limited to the three most used charging cables in the charging drawers namely USB, type-c and iPhone charging cables. It was developed to provide an eco-friendly way of charging mobile phones.

DISCUSSION

The system that was developed was constructed to include the following components: 200w solar panel and gel battery. Solenoid lockers and an OTP retrieval system. Multi-coin acceptor for flexible payment options. Real-time updates on the charging status, available credits, and remaining charging time of the mobile phones in the charging drawers. A user interface that provides:. Clear instructions and directions that help guide the users with ease through using the charging station. A secure and safe mobile phone charging session.