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Efficient Smart Home System Using IoT and Arduino for Enhanced Automation and Security

NT Sandanayake[1#], KR Walawege[1], EGSM Gunathilake[1], and DDGR Karunarathne[1]

[1]Department of Electrical, Electronic and Telecommunication Engineering, General Sir John Kotelawala Defence University, Sri Lanka

[#]nisithasandanayaka@gmail.com

The purpose of this research is to create the smart home concept that is convenient and safe and at the same time, energy efficient. The technologies that are being used in the system include home automation, smart energy efficient appliances, voice recognition and control, home monitoring through an application, smart security by fingerprint and energy control. Using IoT, the system compels the homeowner to control and monitor the various devices in the home with the objective of reaching the preferred level of comfort and energy conservation. The smart security system employs fingerprints for the identification of people, the same system gives alerts whenever there is an intrusion. In addition, the temperature control option operates in cooperation with an air cooler and a water heater, providing comfort while saving power. This is proven in the result with a success rate of 99% for remote access and 97% accuracy as per the voice command. The initial use of the security system gave a False Acceptance Rate (FAR) of 0% and False Rejection Rate (FRR) of less than 1%. The main benefit of the suggested solution is still in its cost and implementation benefits opposed to the existing smart homes systems, as well as by the flexibility depending on the space. Such implications have emerged to suggest that home automation has the ability to transform conventional homes to be smart and efficient in energy use, security, among other aspects.

Keywords: *smart home, IOT, home automation, fingerprint recognition, remote control, energy efficiency, voice control*