# Designing and Implementation of Home Automation System Based on Remote Sensing Technique with Arduino Uno Microcontroller

# Introduction:

# The paper "Designing and Implementation of Home Automation System Based on Remote Sensing Technique with Arduino Uno Microcontroller" by Iman I. M. Abu Sulayman et al. introduces a novel approach to smart home technology. The study aims to develop a home automation system that utilizes remote sensing techniques, with the Arduino Uno Kit serving as the central controller. This system offers two modes of operation: manual control through a smartphone app and automatic control based on sensor inputs.

# Methodology: The proposed home automation system consists of two main hardware components: the PC home main server and the Arduino uno microcontroller board which introduce a variety of digital and analog inputs, serial interface and digital and PWM outputs. It is connected and communicated with the PC through a USB cable. Also, it has free software. The architecture of the proposed system is shown in figure 1. A PC home includes the Matlab-GUI platform management and Arduino uno control algorithm that enables the user to remotely access the home appliances through cellular phone. Some appliances and sensors are connected to ports of the microcontroller board. The home Appliances can be monitored and accessed remotely by user cellular phone.

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# The proposed two scenarios of the system can also manage by using a designed Matlab-GUI interface which is appear in the screen of mobile phone and allow any user to control the home devices from any place of the world and in any time. The Arduino uno kit added to the system many advantages because it connect to computer by USB cable , one of these advantages is cheaper than a lot of electronic devises control , easy to program, variety of digital and analog inputs/outputs give the designers more idea to develop and increase the system applications. Figure 2 and 3 illustrate the flow chart diagrams for the program implemented in Arduino uno kit microcontroller. The flows chart in figure 2 shows the automatic scenario which the Arduinouno kit will manage and process the home devices by using the signals which is coming from sensors. In this scenario the user can only monitor the system fromMatlab-GUI in the screen of his mobile phone. The second flow chart shown in figure 3for the manual scenario, In this case the user can manage and monitor the home devices by selecting the device from Matlab-GUI and turn ON/OFF, the arduinuo uno kit in this scenario will detect the status of the home devices to inform the user about the device condition.

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# Results:

# The proposed home automation system consists of two main components: the PC home main server and the Arduino Uno microcontroller board. The Arduino Uno board provides a variety of digital and analog inputs, as well as serial interfaces and digital and PWM outputs, enabling flexible control of home appliances. Additionally, a Matlab GUI platform is integrated into the system, offering users a user-friendly interface to remotely access and control home appliances via their mobile devices.

# The system's key features include its flexibility and ease of use. The Arduino Uno board can be easily programmed and connected to a computer via a USB cable, making it a cost-effective and accessible option for home automation. Furthermore, the system offers a wide range of digital and analog inputs/outputs, allowing for the development of diverse applications.

# Conclusion:

# In conclusion, the proposed home automation system offers a simple, cost-effective, and flexible solution for smart homes. It empowers users to control and monitor their home appliances remotely, thereby enhancing convenience and energy efficiency.