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## IoT Based Smart Home

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### ABSTRACT

Security is the need of the era. We have security implementations in the business organisations and other sectors. But we often neglect our home when it comes to security. Though security implementations are reliable, it may be due to their complexity or higher prices that people tend to ignore about implying security in their homes. Here, we develop a smart home whose prime focus will be a secured door lock. There are also other systems like smart cameras, alarm, temperature sensor, sound sensor, gas/smoke sensor, fire sensor etc. incorporated together into a simple system. A low cost and efficient smart home system is presented. All communication and controls in this system pass through the microcontroller. This system has the intrusion detection which it offers using the motion sensor. The entire system can be controlled through a web browser. This way individual can control his entire house from distance even using a smart phone. It is essential to make it cost effective and easy to configure. If this is granted to people, they will be willing to implement security in their homes and schools.

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Keywords: Arduino, Smart home, IoT

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## 1. Introduction

### 1.1. Smart home

In this proposal we are focusing on implementing security features to a smart home. A secured home means a home with secured access. For having a secured door lock system we are considering 3 scenarios- accessing by authorized admins, giving access to known individual (like friends and family) through distance mode, breaking of the door lock by an intruder. The entire system can be monitored and controlled through a browser by using the IP address of the Wi-Fi module. The web page used to access can also be password protected. The data collected can be pushed to cloud storage.

### 1.2. Related Work

Pooja Patel, Mitesh Patel, VishwaPanchal&VinitNirmal [1], main aim of the project is to develop a system that will provide remote control of home appliances and also provide security against the mishaps when the home host is not at home. This paper is mainly concerned with the automatic control of light or any other home appliances using internet. It is meant to save the electric power and human energy. This project is made with the help of controller and raspberry pi. The various appliances connected to the micro controller and sensor is connected using wireless network.

NishaSangle, ShilpaSanap, ManjireeSalunke, SachinPatil [2], home automation system uses portable device as user interface, monitoring and controlling home appliances will be the demand of new era. The main objective to developed proposed system is to provide remote level control and monitoring by means of few communication protocols like this Wi-Fi, Zigbee. This system uses wireless technology to avoid wired connection between appliances and the gateway. It helps to do complete monitoring and control functionalities of the home environment using wireless sensors and actuators modules than just the switching ON/OFF functionality provided by similar systems. Multiple appliances can be control and monitor using IoT in propose system web portal will play an interface between appliances and android app to be develop.

Based on surveyed study the comparison of home automation systems [3] Microcontroller, user interface, a communication interface and their performance factor are compared. There are a number of do-it-yourself (DIY) platforms available that allow to create Home Automation system quickly and easily with low cost and high performance e.g. Raspberry pi, Arduino, other microcontrollers, etc. In this review explained different home automation system e.g. Web based, email based, Bluetooth-based, mobile-based, SMS based, ZigBee-based, Dual Tone Multi Frequency based, cloud-based and Internet based. In future home automation will more smart and fast. It would be extended to the large-scale environment such as colleges, offices and factories etc.

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Wireless Home Automation system using IoT [4] This system uses mobiles or computers to control basic home control and function automatically through internet from anywhere around the world globally, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The proposed system is a distributed home automation system, consists of server i.e. Wi-Fi module, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Arduino board, with built in Wi-Fi module acts as web server. Automation System can be accessed from the web browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP). Wi-Fi technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability.

**Table 1 – Overcoming the demerits**

SOME DEMERITS EXISTING	OVERCOMING DEMERITS
Few services at a time when Arduino alone is used	Relays are used for high current consuming devices
Memory management issues which can lock up the system for no apparent reason which results in switches not working	Using cloud storage
Slow and Limited communication possible	Different relays for different tasks
Not a swift way to communicate	A web page is created which communicates to the admin's mail as well as emergency contact's mail.

### 1.3. Proposed System

Arduino UNO and Node MCU microcontrollers are used in this system to control the different sensors with their respective hardware devices. The advantage of having a separate relay for separate tasks is to focus only on the desired task of the high current requiring devices. In this proposal, we have a smart home where we can control the entire smart home system from a distant location. Microcontrollers communicate and control many different parts of a home automation system whereas relays are used for controlling IP camera and door lock.

### 1.4. Proposed System Advantages

- Equipment can be placed almost anywhere
- Wi-Fi is the best module for controlling devices from distance
- No messy wires running throughout the home
- Cheap compared to professional home automation
- Provide wide range and is more efficient
- IP cameras do not record unless commanded in the application we use. This reduces the amount of data it generates helping in reducing the carbon footprints.

## 2. Working

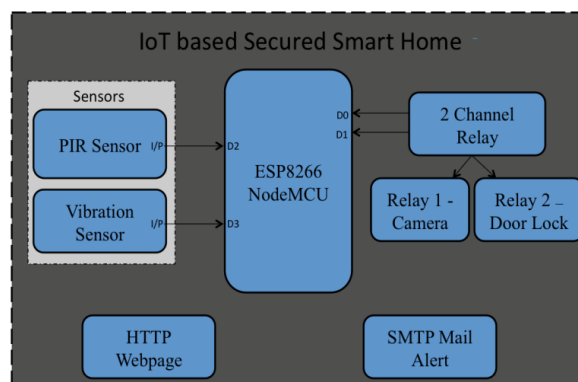


Fig. 1 –Block diagram

Devices of smart home system are door lock system, temperature sensor connected with air conditioners, fire/gas sensor connected with alarm, lights sensors connected to lights, pollution sensors connected to air purifiers etc. Door lock system comprises of a vibration and tilt sensor attached to the door lock, motion sensing camera and an alarm system. All these devices are connected to Arduino UNO and Node MCU microcontrollers. The microcontrollers are programmed with instructions using Arduino IDE application.

In IoT, some devices are not only connected but also communicate with each other. When a motion is detected by the motion sensor it notifies (alarm with snaps of the intruder) to all the admins who can permit or deny access. If it is a known person, admin can permit access or give any instruction via inbuilt speaker in the IP camera. But if it is an intruder who tries to break the door lock, an action must be taken following it. In our system, a vibration sensor is attached to the door lock system. When the vibration and motion sensor are activated, indicating the breaking of the door lock, the admin is sent an alarm to their mail id. Once the admin confirms the incident looking at the video captured through IP camera, he can send alarm to the emergency contacts already set such as police/ neighbours who can take further actions. In our system, alarm is sent through gmail. This can also be done without waiting for admin's confirmation but it may increase the chances of false alarm. The web page used for accessing the system must be highly secured and the details of activity must be recorded and stored to the cloud.

The detection of authorised users can take place using RF Ids which is placed inside card holder shaped Faraday bag. Faraday bags prevent the chances of the RF ID smart cards getting hacked thus providing more security. Multiple admin system is rewarding as one admin cannot be available all the time. Also, we can register family members with RF ID smart cards so they don't have to use phone everytime to access their home. Similarly, the output of sensors is used as input instructions to related devices (example: light sensors to turn on lights)

Since the system is connected to a node MCU which has inbuilt Wi-Fi module, the entire system can be controlled remotely through any browser where notifications are sent and instructions are manually provided. The videos can be viewed/ recorded/ captured by application such as V380. The recorded data with exact time can be sent to the cloud for storage.

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### 3. Conclusion

Thus security can be implemented using IOT devices. This can prove helpful in various places like houses, hospitals, business organizations and also places where human intrusion can prove hazardous. The system can also be expanded for not only monitoring but also automatically taking actions based on child/adult needs in the house.

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