

Home Automation System – Optimization Through Modules And Other Electronic Components (HOME)

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ABSTRACT

The term “**Home Automation System – Optimization through Modules and other Electronic Components(HOME)” today applies to the next level of automating home electronics which is controlled from a single, central location. The development of Smart Home Automation IoT based devices is day by day turning the face of humans by not only helping in handling household tasks but also saving energy, making our lives more enjoyable and resulting in improved quality life. For example, home automation users can control lights in which lights are only ON when they are needed, enhanced securing system when there is nobody at home motion sensor detects the motion, flame sensors which acts as a safety equipment that reacts to the occurrence of fire or flame and many more. The aim / objective of this project is to propose IoT based Smart Automated Home System assisting us do some complicated, strenuous, or repetitious action automatically. The IoT based Smart Home Automation System being proposed via this project is integrated with Arduino Technology mixed with different Sensors**

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INTRODUCTION

OVERVIEW:

The objective of this project is to proposed IoT based “**HOME**” which will automate home electronics and is controlled from a single, central location making our lives more enjoyable and resulting in improved quality life.

PREDICTION:

- **Now**

In 2022, the market for IoT grew by 18% to 14.4 billion active connections. As supply constraints ease and growth accelerates.

- **Future**

Smart home devices often work with voice commands which help in managing and monitoring things easier for the users. The home automation systems market is fast growing and is estimated to be worth \$63.2 billion with approximately 27 billion IoT connected devices by 2025.

SYSTEM REQUIREMENTS

Software Requirements:

- Operating Systems: Windows 7 & Above Operating system
- Software used: Arduino IDE , Fritzing Software
- Coding Language: C

Hardware Requirements:

- Hard Disk: 1GB
- RAM: 1GB
- Arduino uno

MODULES AND SENSORS (REQUIREMENTS)

MODULES:

- Infrared Sensor Module
- Flame Sensor Module
- Servo Motor
- Rechargeable Battery

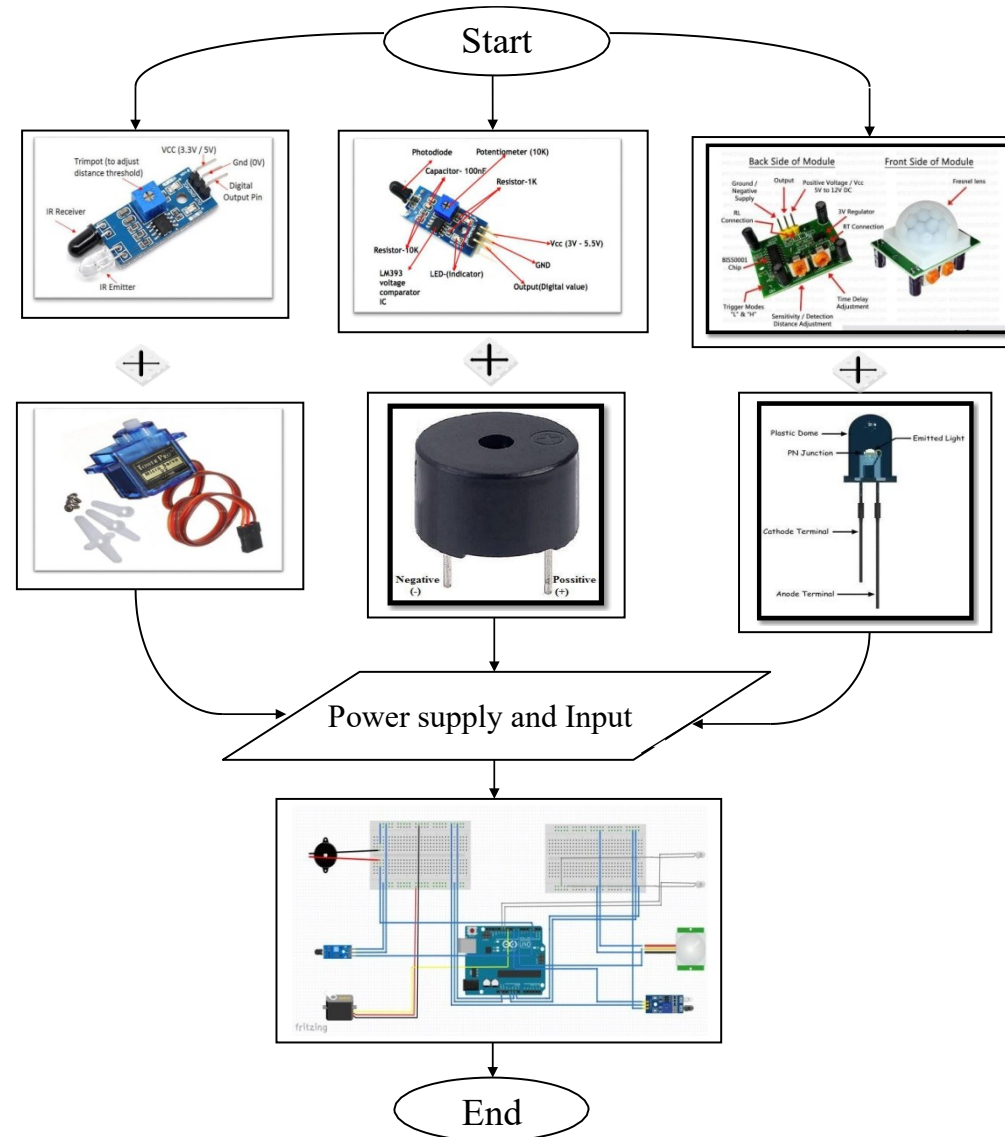
SENSORS:

- PIR Sensor
- Buzzer
- LED

ALGORITHM

- **Step 1:** Start the process
- **Step 2:** Connect Arduino board with the bread boards (+5v and GND).
- **Step 3:** Connect IR sensor module and servo motor to the boards as per circuit diagram.
- **Step 4:** Connect Flame sensor module and buzzer.
- **Step 5:** Connect PIR sensor module and LEDs.
- **Step 6:** Give power supply (power bank) to the Arduino board.
- **Step 7:** Let the sensors collect required input.
- **Step 8:** Repeat Step 6, 7 until desired outputs are shown.
- **Step 9:** End

FLOWCHART



IMPLEMENTATION

MODULES:

A Module is a high level description of a functional area, consisting of a group of processes describing the functionality of the modules and a group of packages implementing the functionality.

- **Infrared Sensor Module** : An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment.
- **Flame Sensor Module** : Flame Detection Sensor Module is sensitive to the flame, but also can detect ordinary light. The flame detectors use Ultraviolet (UV) or Infra-Red (IR) technology to identify flames meaning they can alert to flames in less than a second.
- **Servo Motor** : A servo motor is a type of motor that can rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor.
- **Rechargeable Battery** : An external power supply for the whole circuit .

SENSORS:

A sensor is a device that detects and responds to some type of input from the physical environment.

- **PIR Sensor** : A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects. PIR sensors are mostly used in PIR-based motion detectors.
- **Buzzer** : An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound.
- **LED** : A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it.

COMPONENTS:

- **Bread Board** : A breadboard is a simple device designed to let you create circuits without the need for soldering.
- **Jumper Wires** : Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering.

Software :

- **Arduino IDE:** Arduino IDE is a open source platform that can be used for configuring the Microcontrollers
- **Fritzing:** Fritzing is an electronics design and prototyping platform to easily create and document your electronic projects.

Hardware :

- **Arduino Uno :** Arduino uno is Microcontroller with ATmega238p that performs the given task

TESTING

IOT testing is a type of testing to check IOT devices. It is a process that involves performing several tests on your IoT solution to ensure it is ready for real-life applications. The purpose of IoT testing is to find and fix vulnerabilities in your IoT solution so that you can be confident it will work as expected once it is deployed in the real world.

Testing for IoT devices broadly revolves around Security, Analytics, Device, Networks, Processors, Operating Systems, Platforms and Standards.

Compatibility Testing:

There are lots of devices which can be connected though IOT system. These devices have varied software and hardware configuration. Therefore, the possible combination are huge. As a result, checking the compatibility in IOT system is important.

(Connecting modules and sensors together and programming them using Arduino IDE)

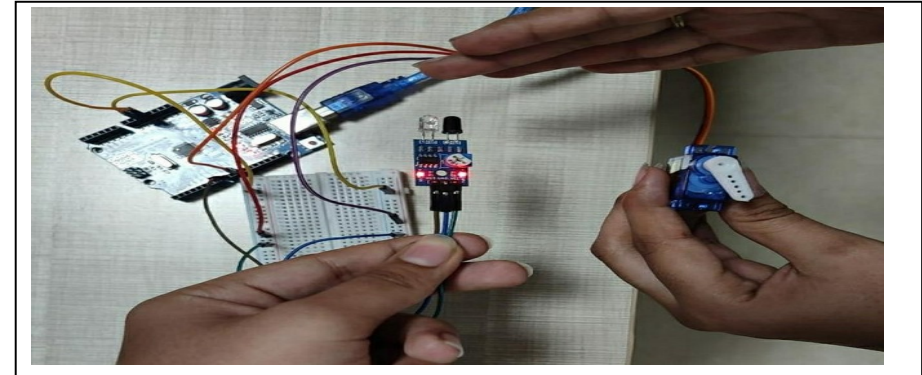
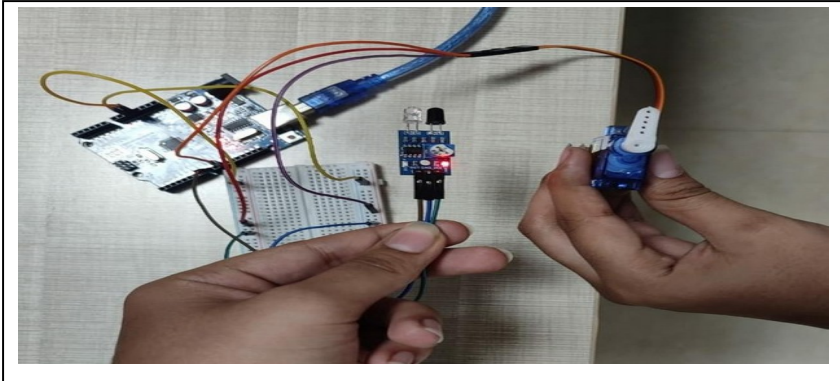
Performance Testing:

Performance testing is the practice of evaluating how a system performs in terms of responsiveness and stability under a particular workload.

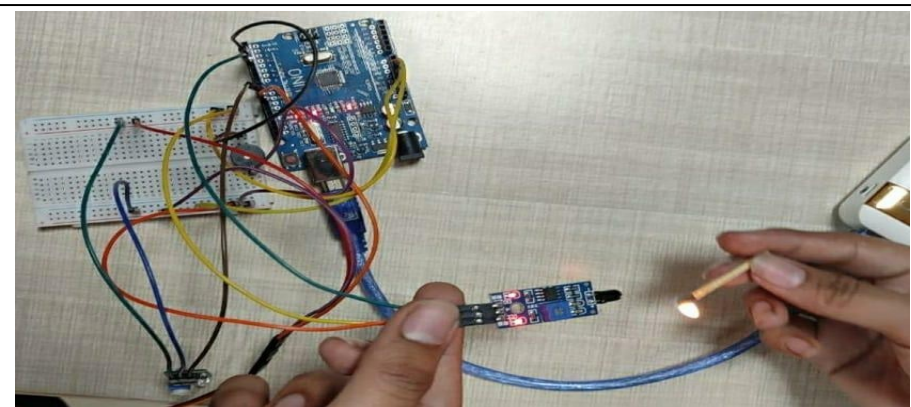
(Checking the performance of modules and sensors while connected to one another)

OBSERVATIONS AND RESULTS

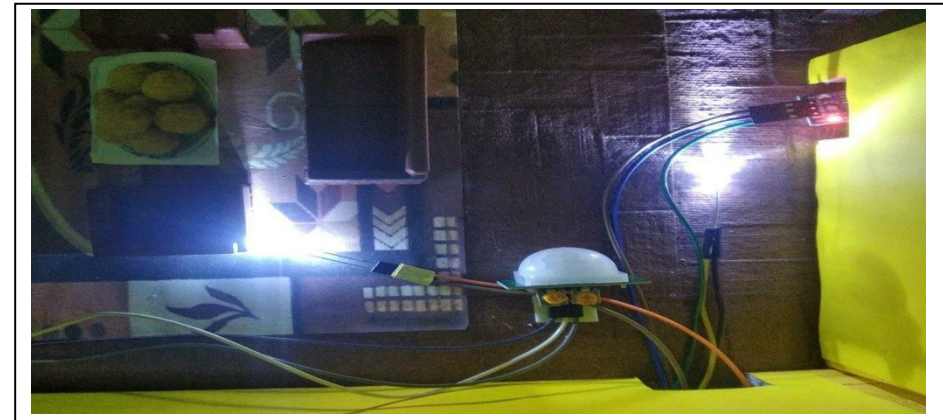
IR Sensor With Servo Motor (Before and After):



Flame Sensor With Buzzer:



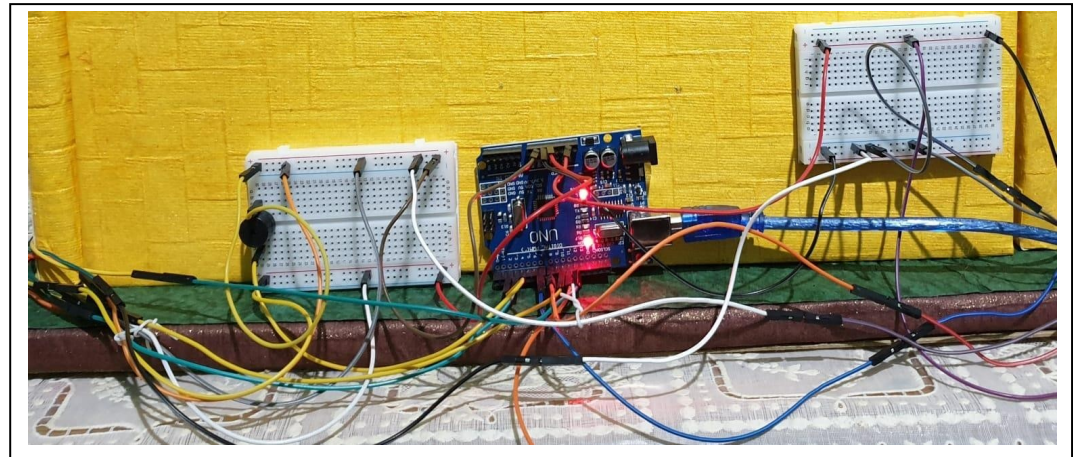
PIR Sensor With LEDs:



HOME Front View:



HOME Back View:



HOME Top View:



CONCLUSION

IoT based “**Home Automation System – Optimization through Modules and other Electronic Components (HOME)”** has been proposed using Arduino UNO. The IoT device market has undergone radical changes in only a few short years and is undeniably a resource which can make a home environment automated. The experimental results show the communication between Human actions and respond of sensors which are correct and acceptable to implement. As we are slowly moving towards digitalization, home automation is a step closer to the fast moving world of ever-changing technologies that we are currently experiencing, we are likely to see increased competition spur on further innovation in the field.

Future Scope:

In the future, below mentioned features can be added to further improvise the “**HOME**”.

- Home Security (Laser Security)
- Door – Two Way Opening
- Lighting Control – Music Reactive LEDs
- Fire Alarm – GSM Module
- Soil Moisture – Watering The Plants

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THANK YOU

ANY QUERIES...???