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# Home Automation System Using IoT

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**ABSTRACT**

**Our project dives into the incredible world of Home Automation Systems, showcasing how the Internet of Things (IoT) is revolutionizing our homes. It's like weaving a web of smart devices, sensors, and cutting-edge technologies to create homes that are not just buildings, but intelligent entities that respond to our needs, conserve energy, ensure our safety, and much more. At the heart of our exploration are the marvels of smart lighting, a robust door security system, and vigilant gas leakage, fire detection mechanisms, water level detection. Each component of our project is a piece of a larger puzzle, designed to make our living spaces not just smarter, but more intuitive and kind to the planet. This report is more than just a documentation of what we've built; it's a glimpse into the future of living. By integrating these technologies, we're not just making homes smarter; we're redefining what it means to live in harmony with technology, ensuring that as our homes grow smarter, they also become safer, more efficient, and more in tune with our needs and the health of our planet.**

***Keywords*— Home automation, controlled, Voice Controlled, Wireless technology.**

## INTRODUCTION

Our home automation project, powered by the Internet of Things (IoT), is like bringing a touch of magic into our daily lives. Imagine walking into a home that not only knows you but also anticipates your needs—where lights adjust themselves to your mood, the temperature is always just right, and your security is taken care of without you having to lift a finger. This isn't just about gadgets and gizmos; it's about turning our homes into smart companions that make life smoother, more enjoyable, and yes, a bit like living in the future. At the heart of it all is the idea that, with a few tapson our smartphones, we can weave together a web of devices that talk to each other, making sure that whether we're at home or halfway across the world, we're always just a click away from home. This project isn't just about embracing technology; it's about enhancing our living spaces to make them more responsive to our needs, effortlessly.

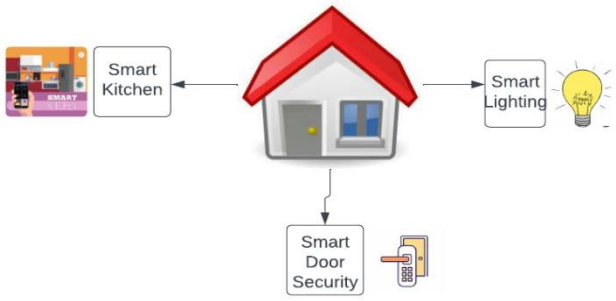


**Fig 1.1: home Automation system**

### *A. Need of Home automation system*

In today's swift-paced world, the allure of home automa- tion systems is skyrocketing for myriad compelling reasons, promising to transform homes into smart sanctuaries. They bring the ultimate convenience, allowing us to control lights, temperature, and security from anywhere with a smartphone, saving both time and energy. As energy costs rise and eco-awareness grows, these systems enable us to monitor and reduce energy usage, protecting the environment while easing our finances. They enhance home security through smart lock and surveillance, provide instant alerts to prevent potential disasters like fires or leaks, and offer independence to those with disabilities through easy voice commands or app controls.

Beyond convenience, they allow for a personalized living experience, ensuring our homes reflect our unique lifestyles. They also promise peace of mind, knowing our homes are secure and efficient, regardless of our location. Additionally, integrating smart technology can boost a home's value, ap- pealing to modern buyers. Home automation represents not just a trend but a shift towards homes that are more adaptive, safe, and aligned with our needs, heralding a future where our living spaces actively contribute to our well-being.

### *B. Challenges*

Creating a home automation system with IoT comes with lots of opportunities to improve our homes, but it also comes with its share of hurdles. These challenges can be technical, security, usability, and ethical aspects. For instance, ensuring different devices can work with each other seamlessly is tricky due to a variety of standards and protocols, while we have to protect users' privacy as these systems handle sensitive data. Balance between advance and ease of use is crucial, if things get complicated people can give up on them. Ensuring that devices work reliably, salable effectively, and maintain connectivity in different environments are additional challenges. Cost considerations, compliance with regulations, and minimizing environmental impact add further layers of complexity.

## LITERATURE SURVEY

Yekhande, et. al. [1], proposed the architecture for smart home control and monitoring systems using Arduino is proposed and implemented. It gives a basic idea of how to control different home appliances and provide security by using Arduino Uno controlled from a desktop application. In our project, we tried to implement an embedded system that meets the main functions of home automation for the management of lighting, habitat security, and temperature & humidity control. For these reasons, a desktop application was created to interact with an Arduino via the serial port.

KEeswari et. al. [2], the light sensor was properly configured to detect when the laser was broken, while not accidentally tripping due to different ambient light environments. In addition, the temperature and light control subsystem outputs are confirmed to be working. Specifically, the firmware has been tested and is confirmed to be outputting the appropriate signals to the subsystem BJT switches which control lighting and furnace operations. Overall, the project has been working to design specifications and has maintained a high-quality standard which can be integrated into modern homes.

Kausalya et. al. [3] suggest, we found out that in this era of computers, smart home technology has become imminent. It's a smart technology that gives us a different level of living standard. We are fully dependent on a system where everything is fully automatic. We are using sun tracking technology so we can get maximum efficiency of solar power. It has two different user functions; one is controlled manually and other automatically. Security is password and/or biometrically protected and sensing ability gives this home strength to protect itself.

Sahoo et. al. [4], in this paper present a Home Automation system (HAS) using Intel Galileo that employs the integration of cloud networking, wireless communication to provide the user with remote control of various lights, fans, and appliances within their home and storing the data in the cloud. With this internet of things project, 6 you can control 4 relays from Arduino IoT Cloud dashboard, Alexa, IR remote, and manual switches. You can also monitor the real-time room temperature in the Arduino cloud dashboard and Amazon Alexa app. If there is no internet available still, you can control the appliances from the IR remote and switches. I have used all the FREE tools and you do not need any Alexa devices or Amazon Echo Dot for this voice control smart home IoT project.

El-Hajj M. et. al. [5], proposed the system focuses on a near complete and up-to-date view of the IoT authentication field. It provides a summary of a large range of authentication protocols proposed in the literature. Using a multi-criteria classification previously introduced in our work, it compares and evaluates the proposed authentication protocols, showing their strengths and weaknesses, which constitutes a fundamental first step for researchers and developers addressing this domain.

Ahmed et. al. [6], introduce the system that will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled Such as, E-commerce, Coal Mine, Wearable device, Smart Grid, Laboratory Monitoring, Agriculture, and many other domains. The process of controlling or operating various equipment, machinery, industrial processes, and other applications using various control systems and with less or no human intervention is termed as automation. automation, autonomous.

## PROPOSED SYSTEM

The ”Home automation system” proposed system is de- signed to provide smart control over the home.this system provides users the most efficient services to handle the appliances in your home. In this system user get total efficiency, security and control of the smart devices and sensors.It give real-time alerts for hazards like leaks or intruders.With this system,you can effortlessly control everything from lighting,temperature,gas and water level detection to security and access, all from the convenience of your smartphone,web interfaces or with simple voice commands.

***A. Models used for home automation system***

- Smart lighting: In this model we designed a voiced control system.In this model we connected HC-05 Bluetooth component to the arduino-uno for wireless connection to mobile.
- Smart Door security: In this model we have connected arduino-uno to the display, key-pad, buzzer and servo- motor to enhance the traditional door lock system.
- Smart Kitchen: In this model we have connected DHT-11 and MQ-2 sensors to detect gas leakage,temperature and humidity in the kitchen.

## SYSTEM DESIGN

As shown in Fig 4.1 we have designed this project. Creating a home automation system is like assembling a high-tech symphony, where each piece must play perfectly in tune with the others. It's a journey through the realms of technology to craft a space that not only listens and responds to your needs but also anticipates them, ensuring comfort, security, convenience, and energy efficiency. Here's how you can orchestrate this masterpiece.

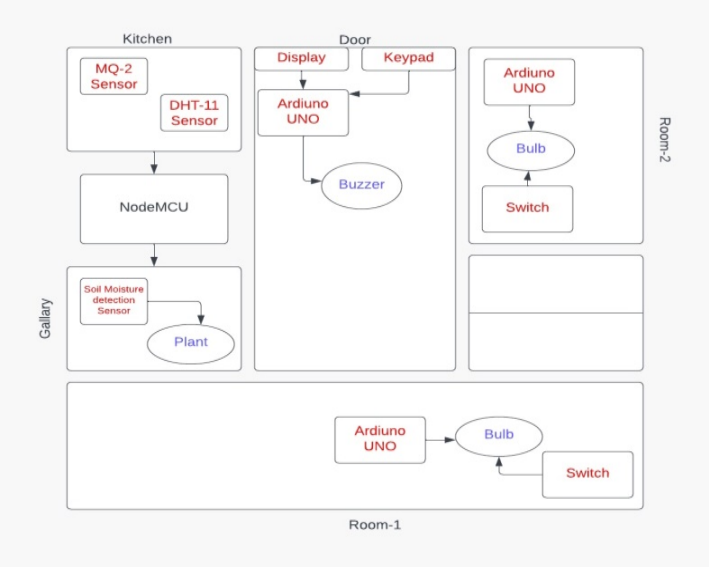


**Fig 4.1: Home automation System Design**

## 5.HARDWARE AND SOFTWARE

**Hardware:**

As shown in Fig 5.1 the Arduino Uno is a microcontroller board that is open-source and programmable.We used this in smart lighting system and smart door security system to store and execute the program.

**Fig 5.1:Arduino UNO**

As shown in Fig 5.2 The HC-12 is a half-duplex wireless serial communication module with 100 channels in the 433.4-

473.0 MHz range that is capable of transmitting up to 1 km. we used HC-05 Bluetooth model in smart lighting system to connect model with bluetooth.

**Fig 5.2:hc-05 bluetooth model**

AS shown in Fig 5.3 A relay module is a circuit board that contains one or more relays, which are simple switches with two internal metal contacts that usually don't touch.we used single relay module.

**Fig 5.3: Relay model**

AS shown in Fig 5.4 A keypad is a block of buttons arranged in a pad that contains digits, symbols, or alphabetical letters.We used keypad in smart door security system to take inputs from users.

**Fig 5.4: Keypad Model**

As shown in Fig.5 5 a 5V buzzer is an electronic component designed to produce sound or an audible alert when an electrical signal of 5 volts is applied to it. It typically consists of a piezoelectric element or a magnetic coil that vibrates at an audible frequency when powered.we have used the buzzer in door security system to alert the user.

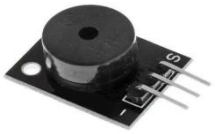

**Fig 5.5: Buzzer model**

As shown in Fig 5.6 A servo motor, also known as a servo, is a rotary or linear actuator that allows for precise control of velocity, acceleration, and position in a mechanical system.We used servo motor in door security system to close and open the door.

**Fig 5.6:Servo Motor**

As shown in Fig 5.7 the MQ-2 is a semiconductor gas sensor that detects smoke and flammable gases.We have used MQ-2 sensor in kitchen module to detect leakage of gas

**Fig 5.7: MQ-2 sensor**

As shown in Fig 5.8 The DHT11 is a digital sensor that measures the temperature and humidity of the surrounding air.We used DHT-11 sensor in kitchen model to detect humidity and air quality.


**Fig 5.8 DHT-11 sensor**

As shown in Fig 5.9 The ESP8266 NodeMCU is a low-cost, open-source development board and firmware based on the ESP8266 Wi-Fi module. We used ESP8266 NodeMCU in kitchen module.

**Fig 5.9 Nodemcu esp8266**

As shown in Fig 5.10 A soil moisture sensor (SMS) measures the amount of water in soil, and can be connected to an irrigation system controller.We used soil moisture sensor to detect whether the soil is moisturized or not.

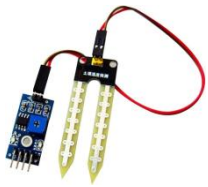

**Fig 5.10:Soil Moisture sensor**

As shown in Fig 5.11 A 5v DC water pump is a machine that moves water from one location to another. It uses mechanical energy to create pressure differences, which allows it to suck in water and expel it.

**Fig 5.11:Water pump**

As shown in Fig 5.12 Jumper wires, also known as jumper, DuPont, or wire jumpers, are electrical wires with connector pins at each end that connect two points without soldering.

**Fig 5.12:Jumper wires**

**Software:**

**Arduino cloud**
Arduino Cloud is a platform that allows users to create, control, and monitor their Internet of Things (IoT) devices remotely. We created a dashboard for human interference.

**Arduino ide**
The Arduino Integrated Development Environment (IDE) is a text editor that allows users to write code, compile it, and upload it to an Arduino board.We have done coding of models.

**Blynk iot**
Blynk is a cloud-based platform for building and managing connected hardware using the Internet of Things (IoT). WE used this to get notification.

## RESULT AND DISCUSSION

**I) Smart Light Control:**
As shown in Fig 6.1 the result of the model Smart lightning system. The bulb is glowing on the voice command using bluetooth connection.

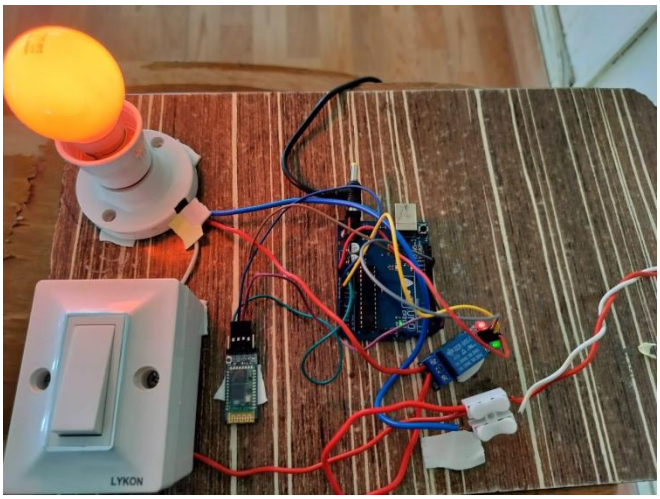


**Fig 6.1:Smart Lighting system**

**II) Smart Door Security:**
As shown in Fig 6.2 the result of model smart door security system.The display is showing the notifications and the keypad is taking inputs.

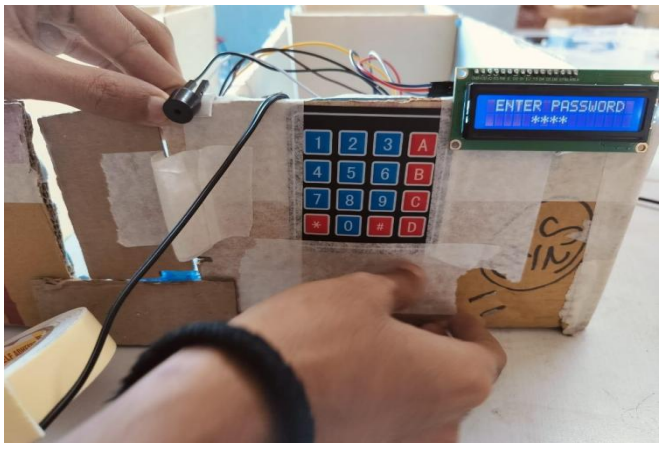


**Fig 6.2: Smart Door Security system**

As shown in  Fig 6.3 the second output of the smart door security system. User entered the correct password so the door is opened.

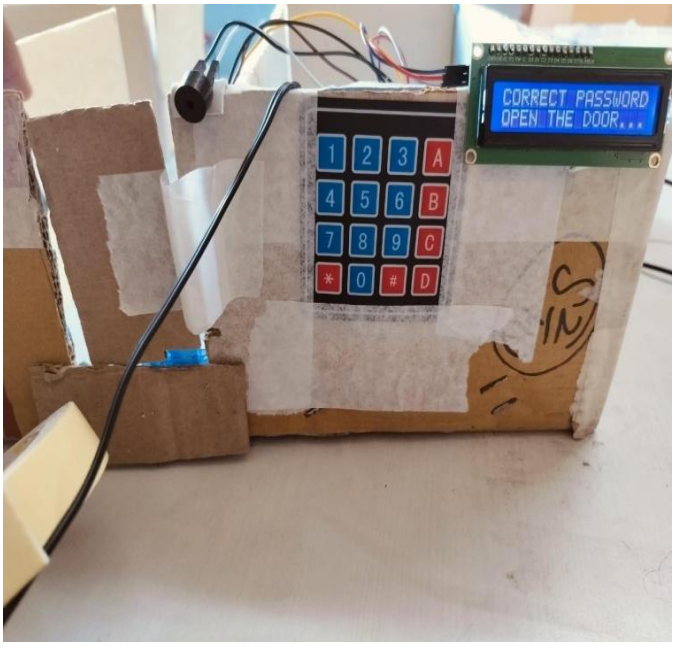


**Fig 6.3: Smart Door Security system**

**III) Temperature And humidity :**
As shown in Fig 6.4 the result of model smart Kitchen system. The display is showing the graphs of humidity, gas level.

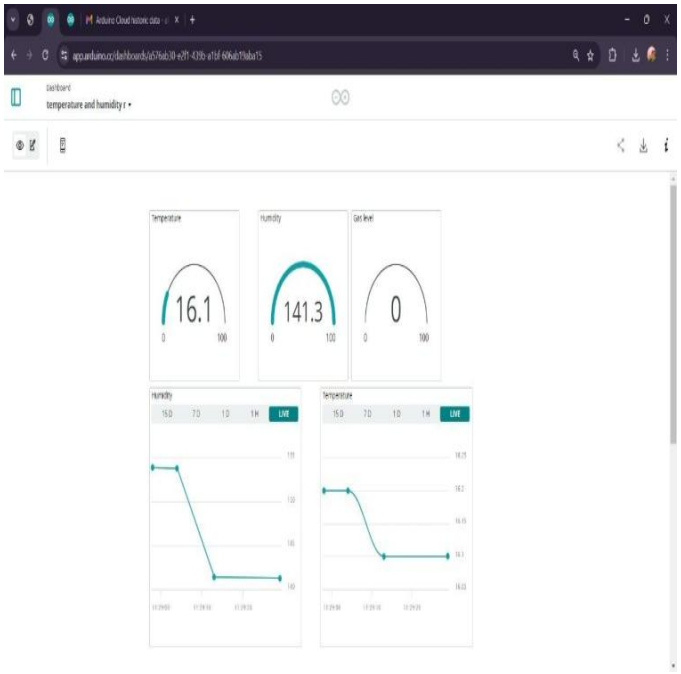


**Fig 6.4: Smart Kitchen system**

As shown in Fig 6.5 the result of Smart Kitchen system.this shows the notifications of the gas leakage detection.

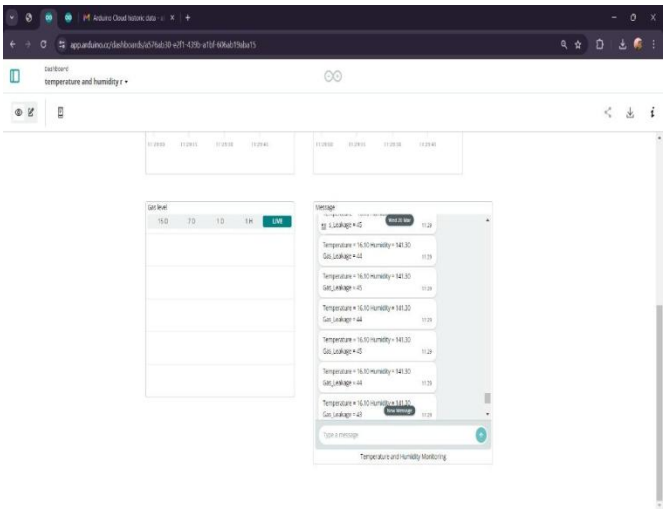

**Fig 6.5 Smart Kitchen system**

**IV) Smart plant Monitoring:**

As shown in Fig 6.6 the result of model Smart plant Monitoring system. The display is showing the notifications .

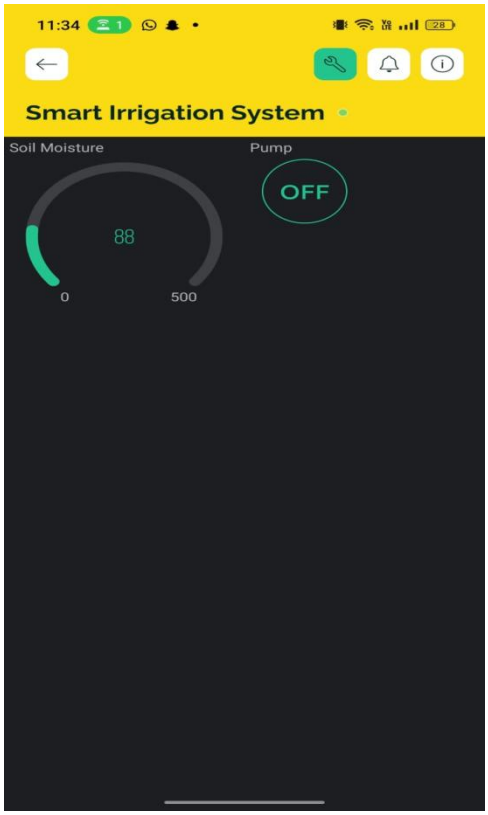


**Fig 6.6: Smart plant Monitoring**

## CONCLUSION

Our main goal with this project is to make home appliance Pavithra, IoT based Monitoring and Control System for Home Au- tomation, Proceedings of 2015 Global Conference on Communication Technologies(GCCT 2015 )control easy and

accessible using a smartphone. We're using switch modes to control the appliances, and the Android app allows users to stream video feedback from an IP camera. With our system, users can conveniently interact with their home appliances through their Android phones . They can send commands through the mobile app, giving them full control over various devices from security door to bulb and even the fans system, all the way to the entire house lighting system. What's great is that the required components are minimal and affordable, easily fitting into a discreet container. We've rigorously tested our home automation system, ensuring it effectively controls different appliances like lights, and entertainment systems. This system is not only cost-effective but also scalable and adaptable to various needs, making it a practical solution for modern households.

## ACKNOWLEDGEMENT

We would like to thank our Principal 'Dr. Manjusha Deshmukh', HOD 'Prof. Shraddha Subhedar' and our Project guide 'Prof. Snehal Gavale' who helped us learn a lot about this project. Their ideas and comments aided in the completion of this project. we're am grateful to the college administration for providing us with such a significant chance.

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[5]. [5]Gas Leakage Detection System Using IoT And cloud Technology : A Review Dr Raman Dugyala2 , Dr V Padmavathi3 , Vijendar Reddy Gurram E3S Web of Conferences 391, 01073 This paper conducts a systematic literature review on current state of gas leakage detection using Internet of Things (IOT) and Cloud technology.
[6]. [6]Home Automation Using Internet of Things Vinay sagar K N1, Kusuma S M2 International Research Journal of Engineering and Technology (IRJET) In this paper we present a Home Automation system(HAS) using Intel Galileo that employs the integration of cloud networking, wireless communication, to provide the user with remote control of various lights, fans, and appliances within their home and storing the data in the cloud