

# **SMART HOME MOBILE APPLICATION**

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**Abstract:**

The growing use of internet and communication technologies has made a variety of smart gadgets approachable and controllable from anywhere in the world. Using the Internet of Things (IoT) technology, smart gadgets from smart homes and smart cities, can communicate with one another. Various applications of IoT have been implemented in business, healthcare, agriculture, government and education. The purpose of this study is to develop an IoT-based mobile smart home surveillance application that can be used to control smart homes with the objective of reducing human intervention, increasing security, privacy, and energy efficiency. A mobile application that utilizes technology is used to control smart sensors in this application. Data from the sensors in our smart home prototype can be stored in the database periodically, then interpreted by the mobile application and made available to users. The application is an example of monitoring smart homes to provide solutions to problems that arise with IoT applications and to provide insight into how smart homes will be used in the future.

## 1 INTRODUCTION

Throughout history, human development efforts have reflected the demands of the times in which we live. As a result of the invention of the steam engine, which could use coal for power, the industrial revolution continued by utilizing electric power to produce large quantities, and as a result of the introduction of cyber-physical systems and the Internet of things (IoT), the fourth industrial revolution was achieved [1]. We live in a world where the IoT technology is rapidly changing our life standards as a result of the digital world's innovations. Smart devices that are equipped with identity, networking, and processing capabilities can use IoT, networking, and communication technology to communicate with each other and accomplish different tasks regardless of their geographic location. These days, the Internet of Things (IoT) is highly popular since it makes it possible to access, manage, and control IoT things remotely for societal benefits. As a result, IoT technology offers developers the opportunity to develop profitable applications for a wide range of industries, including business, education, agriculture, manufacturing, healthcare, emergency services, first aid, government, transportation, smart home, smart factory, smart city, energy, tourism, and many others [4]. Additionally, IoT technology is particularly crucial for assuring data transmission between devices[5]. It is especially crucial in this data era to access, collect, harness, and analyze data collected from various IoT objects in order to take the right actions in the right time frame [6].

Additionally, people who live in smart homes benefit from convenience, comfort, security, and energy efficiency. Smart home systems can be controlled by residents remotely using a mobile application, for example, can be controlled by temperature sensors to activate/deactivate the heating system, motion sensors to turn on and off the lights when motion is detected, or even by turning on the lights when you get home from a busy day.

The objective of this study is to develop a mobile application that can control lighting, heating, humidity, and gas units of our smart home system from a mobile phone. In our mobile application, we control the light to turn on and off manually, also, when motion is

detected in a room for security purposes the lights turn on. using the smart home system. Data on gases, temperatures, and humidity can also be collected and stored periodically by the mobile app in order to gain insight and knowledge. When an abnormal or emergency situation occurs in the smart home system, our mobile application can notify users where ever they are by sending a push notification or via email.

## **2 REQUIREMENT ELICITATION**

Before implementation, we first made some requirement elicitation for our smart home application. The requirement elicitations are respectively;

- Establishing objective
- Organize knowledge

### **2.1 ESTABLISHING OBJECTIVES**

1. Goals: The goal of our smart home app is to track and help monitor house hold appliances more efficiently.
2. Problems to be solved: People who use our application will benefit from convenience, comfort, security, and energy efficiency.
3. Systems constraints: Memory, battery life, ability to adjust to different screen sizes, and network bandwidth.

### **2.2 ORGANIZE KNOWLEDGE**

Goal prioritizing: Ability to rescue human lives from highrisk disasters, ability to retrieve sensitive data for further investigation.

1. Stakeholders' identification: George Enekwa and Mmesoma Azogu.
2. Goal prioritizing: Ability to track, store, remotely control and send push notifications of household appliances to user,

## **3 SYSTEMS MODELLING**

The Internet of Things allows for the programming, management, and analysis of smart home and device control systems that require physical controls, such as water, electricity,

heating, cooling, and security. The smart home system uses wireless networks to enable the objects to communicate with each other, and these objects can be controlled remotely by mobile devices with ease. An example is the use of a mobile app to control the heating system of a house from a smart device for safety. Hence, IoT and emerging technologies change the social structure by ensuring security, making life easier, and increasing quality of life.

### 3.1 UNIFIED MODELLING LANGUAGE (UML) diagrams

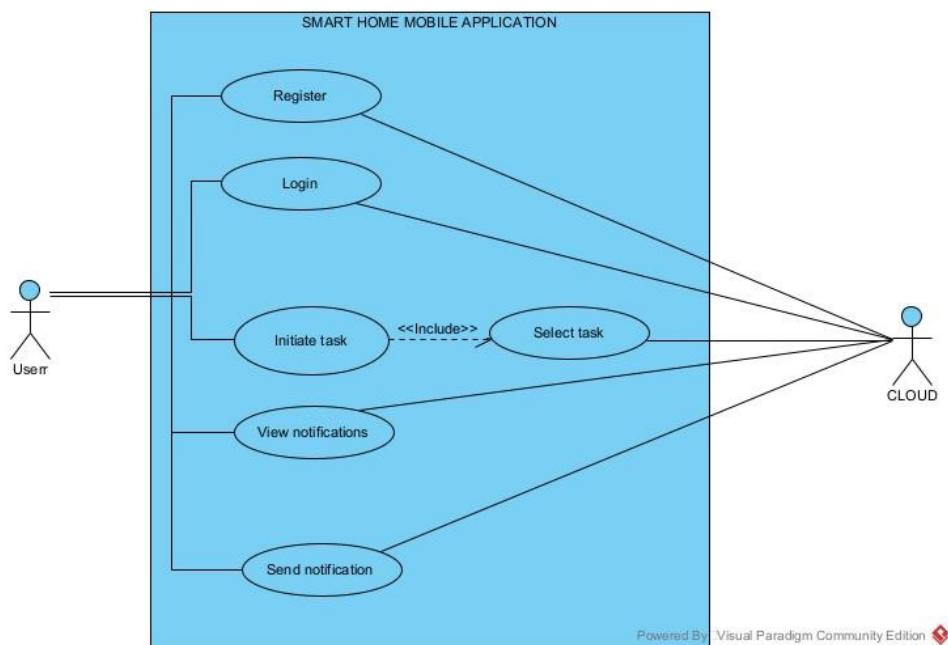


Fig. 1: Usecase diagrams.

The purpose of this section is to provide an example use case for our mobile application for managing smart homes prototype. The mobile application's logic is explained next. It receives data periodically from the sensors and stores it in a cloud database. As a result of checking the received data, a notification can be sent to the user to inform them of the house's current condition. Furthermore, users can display graphs based on the date range entered in this mobile application.

Figure 3 shows the User interface prototype of our mobile application. The mobile application provides a great deal of convenience to its users and has been designed to be highly cohesive and loosely coupled in order to enable it to add new features and respond to user requests efficiently. Using the application, users can easily learn about the house even when they're

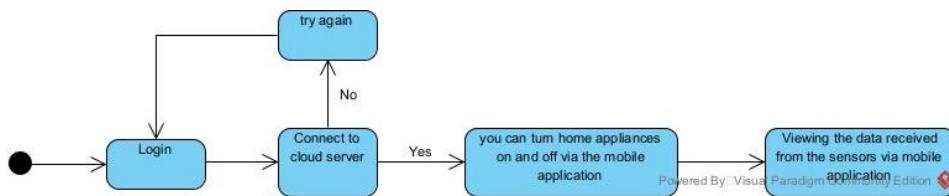


Fig. 2

not at home; the application ensures that the user is immediately notified in case of an abnormal situation such as a security breach, a fire, or another threat related to the data from the sensors.

The mobile application also allows residents to manually turn on and off the lights in different rooms while they are away from home for security purposes. Moreover, this mobile application can also be very useful for those who unintentionally forget to turn off their home electronics.



Fig. 3: User Interface Prototype.

## 4 SYSTEMS ANALYSIS

In this section, the tasks of our Smart Home Device Mobile Application (SHDA) are explained accordingly.

### Hierarchical Task Analysis.

0. Using the app
1. Download the app
  - 1.1 Open the device app store
  - 1.2 Search SHDA
  - 1.3 Click on SHDA and Install
2. Create an account with SHDA
  - 2.1 Open the app
  - 2.2 Click on register
  - 2.3 Link your phone account with the app
3. Login as guest
  - 3.1 Open the app
  - 3.2 Click on Guest
4. Creating 'Rooms'
  - 4.1 Open app
  - 4.2 On the top right of the home screen click on the '+' sign
  - 4.3 Fill in the name of the room in the prompt
5. Adding Devices
  - 5.1 Open app
  - 5.2 On the home screen click on a room the device is in
  - 5.3 Click on the '+' sign (If the device is connected to the same network as the user's phone, the user would see the device)
6. View monthly summary usage
  - 6.1 Open app
  - 6.2 Click on the usage icon

Fig. 4: TASK ANALYSIS.

## 5 Conclusion

We have designed the application so that it can be used on both iOS and Android devices. As part of our mobile application, we provide the following features: controlling the remote lamp, monitoring the temperature, humidity and gas value of the environment, providing a graph report according to a specific date range based on the data in our database and sending instant notifications to the user via drop down push notification in cases of fire or threats to the house. In this study, we present an example of a mobile application and a prototype for a smart home. Research and application developers of smart home monitoring systems can benefit from it.

## 6 Declaration of Originality

We, Izuchukwu George Enekwa and Mmesomachukwu Chukwunyere Azogu, herewith declare that we have composed the present paper and work by ourselves and without the use of any other than the cited sources and aids. Sentences or parts of sentences quoted literally are marked as such; other references with regard to the statement and scope are indicated by full details of the publications concerned. The paper and work in the same or similar form have not been submitted to any examination body and have not been published. This paper was not yet, even in part, used in another examination or as a course performance. I agree that my work may be checked by a plagiarism checker.

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## 7 APPENDIX



Fig. 5

Title 9

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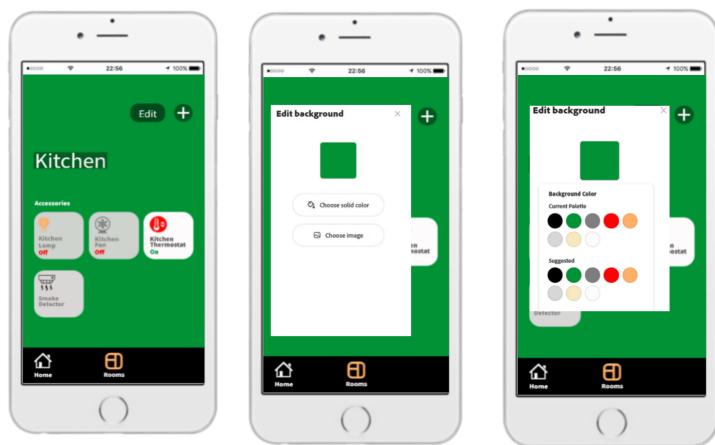


Fig. 6

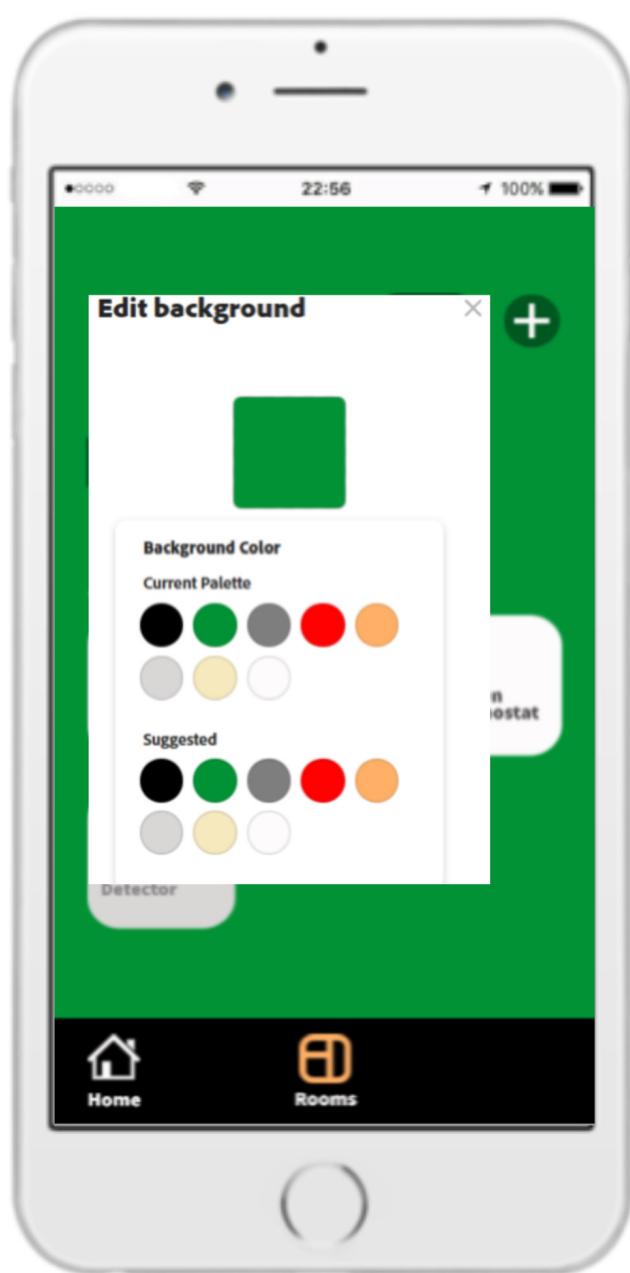


Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11

Title 15

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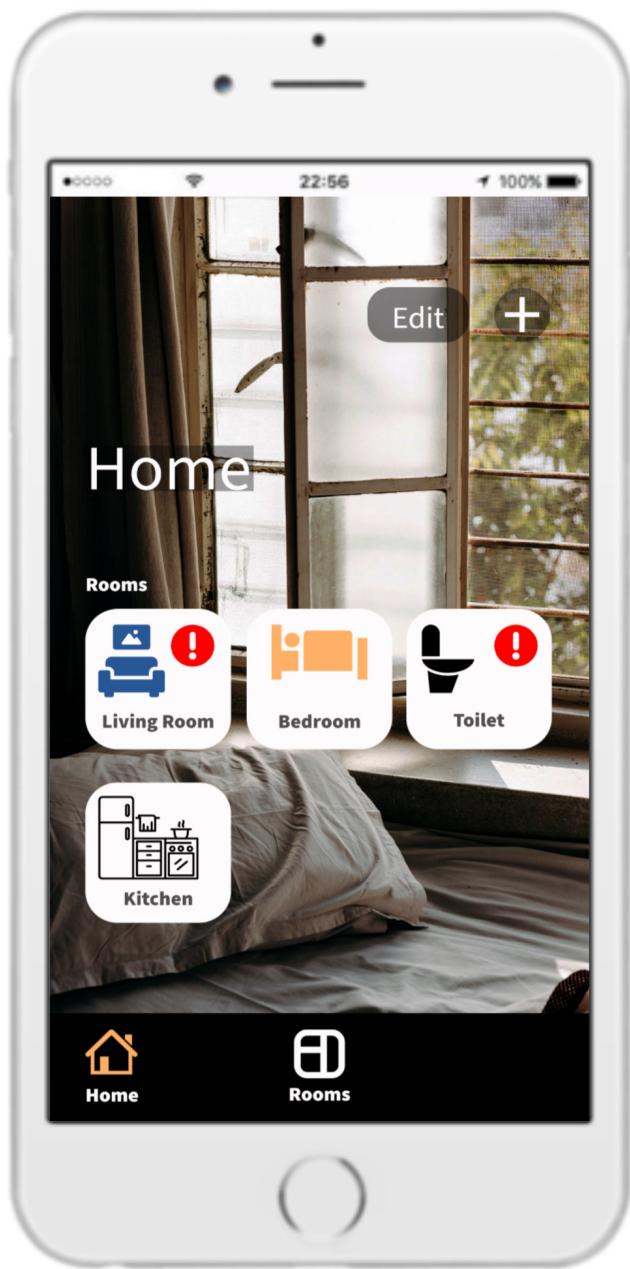


Fig. 12