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IOT: THINK OUT OF THE BOX (HOME AUTOMATION SYSTEM)

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HISTORY OF SMART HOME AUTOMATION SYSTEM

The first smart homes were ideas, not actual structures. For decades, science fiction has explored the idea of home automation. Prolific writers, such as Ray Bradbury, imagined a future where homes were interactive, and seemingly ran themselves. In Bradbury's cautionary short story, "There Will Come Soft Rains" he describes an automated home that continues to function even after humans have died out. It's all well and frightening, until you consider the actual benefits of home automation, and then the idea becomes more comforting than chilling.

Although the idea of home automation has been around for some time, actual smart homes have only existed a short while. This timeline focuses on hardware; meaning actual inventions leading up to the smart homes we know today and can expect from the near future.

1901 - 1920- The invention of home appliances - Although home appliances aren't what we'd consider "smart," they were an incredible achievement in the early twentieth century. These achievements began with the first engine-powered vacuum cleaner in 1901. A more practical electricity-powered vacuum was invented in 1907. Throughout two decades refrigerators would be invented, as well as clothes dryers, washing machines, irons, toasters, and so much more. It was a fantastic time for anyone who was employed as a maid by a very affluent family.

1966 - 1967 - ECHO IV and the Kitchen Computer -Although it was never commercially sold, the ECHO IV was the first smart device. This clever device could compute shopping lists, control the home's temperature and turn appliances on and off. The Kitchen Computer, developed a year later, could store recipes, but had the unfortunate tagline, "If she can only cook as well as Honeywell can computer" and therefore sold no models.

1991 - Gerontechnology - Gerontechnology combines gerontology and technology and makes the lives of senior citizens easier. In the 1990s, there was a lot of new research and technology in this sector. Remember, "I've fallen and I can't get up?" Life Alert is one example of geron-technology.

1998 - Early 2000s - Smart Homes -Smart homes, or home automation, began to increase in popularity in the early 2000s. As such, different technology began to emerge. Smart homes suddenly became a more affordable option, and therefore a viable technology for consumers. Domestic technologies, home networking, and other gadgets began to appear on store shelves.

Today's Smart Homes - Today's smart homes are more about security and living greener. Our smart homes are sustainable, and they help to ensure that our homes aren't expending unnecessary energy. They also help alert us to intruders (whether we're home or not).

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Current trends in home automation include remote mobile control, automated lights, automated thermostat adjustment, scheduling appliances, mobile/email/text notifications, and remote video surveillance.

“Connectivity and interactivity are driving the way families live and manage their homes. So while we are expected to be in more places due to business travel, children’s school schedules and social activities, these new smart systems provide cutting edge connectivity to your household, even when you’re far away. And when the house is occupied, the high level of automation enables more convenience, control and safety from any part of your property. It all adds up to fewer worries and increased enjoyment of life, which is something we would all welcome,” writes ADT technologies, who some say have lower home security costs than other competitors. The Future of Home Automation - CNN prophesies that the smart home of the future will be a bit like what we’ve seen in the animated series, “The Jetsons.” Look forward to digital cutting boards (digital everything, really), molecular cooking devices, and so much more.

SOME COMMON PROBLEMS WHICH HOME AUTOMATION SYSTEM SOLVES SMARTLY

ENERGY MANAGEMENT

We usually forget to switch off our home appliances due to hectic schedule which results high energy bills. Home Automation is all about the management of your home and daily life. You can remotely control lights, turning off the appliances when not in use. This is a one-time investment and it can axe your energy bills smartly.

SECURITY

Nowadays, security is a major concern of all. As thieves are becoming smart and using modern technology to break-in, People have largely opted for cameras to secure their home assets. Using home automation system allows you to remotely view the recordings of your indoor cameras from a cloud-based app when you don't have time to go back to your home and check the recordings and integrated smart sensors gives alerts on your phone in case any door, windows or cabinets open unexpectedly.

SAFETY

Safety is what we all are concerned about to whom we love the most. Home automation system lets you take control over your home’s safety from cloud based mobile application. With our application, get notifications when motion or audio is detected. You can also use timeline feature to look back at events based on detections.

SECURITY FOR YOUR HOME & LOVED ONES

Now keep a track of your loved ones from anywhere, anytime from your mobile. Whether you are away for a long vacation or even watching a late night movie, the Smart Home Kit gives you the live view and peace of mind.

POWER TO CONTROL YOUR LIGHTS & APPLIANCES

Enjoy the power to control your appliances from anywhere. The Smart Kit enables you to preset ON & OFF timings of your daily use appliances like electric motor, coffee maker, water heater using our Mobile App.

MONITOR DOORS, WINDOWS, DRAWERS & MORE

- Get alerts on your phone in case any door, windows or cabinets open unexpectedly. You can also raise an audible alarm to notify your neighbors when you are away. Now Arm & Disarm security using our Mobile App or Remote Control.

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- For people with disabilities they can make lives easier by automatically detecting their presence and switching on the lights.
- Safety issues by allowing you to control home entry remotely.
- Power saving by ensuring devices are only on when needed.
- Senior or patient care remotely.
- Automate routine tasks.
- Monitoring kids.
- Monitoring house when on vacation.
- Leakage detection of holiday homes.
- Fore alarms and so on.
- When used with ifttt, you can define various actions like open the garage door when I am 100 m from my house.
- Start camera recording when everyone has left house and so on.

INTRODUCTION

Home automation is building automation for a home, called a smart home or smart house. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. When connected with the Internet, home devices are an important constituent of the Internet of Things.

A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface, that may also be accessible off-site through the Internet.

APPLICATIONS AND TECHNOLOGIES

- **Heating, ventilation and air conditioning (HVAC):** it is possible to have remote control of all home energy monitors over the internet incorporating a simple and friendly user interface.
- **Lighting control system:** a "smart" network that incorporates communication between various lighting system inputs and outputs, using one or more central computing devices.
- **Occupancy-aware control system:** it is possible to sense the occupancy of the home using smart meters and environmental sensors like CO2 sensors, which can be integrated into the building automation system to trigger automatic responses for energy efficiency and building comfort applications.
- **Home robots and security:** a household security system integrated with a home automation system can provide additional services such as remote surveillance of security cameras over the Internet, or access control and central locking of all perimeter doors and windows.
- Leak detection, smoke and CO detectors.
- Indoor positioning systems (IPS).
- Home automation for the elderly and disabled.
- **Pet And Baby Care**: for example tracking the pets and babies movements and controlling pet access rights.
- **Air quality control**: For example Air Quality Egg is used by people at home to monitor the air quality and pollution level in the city and create a pollution map.

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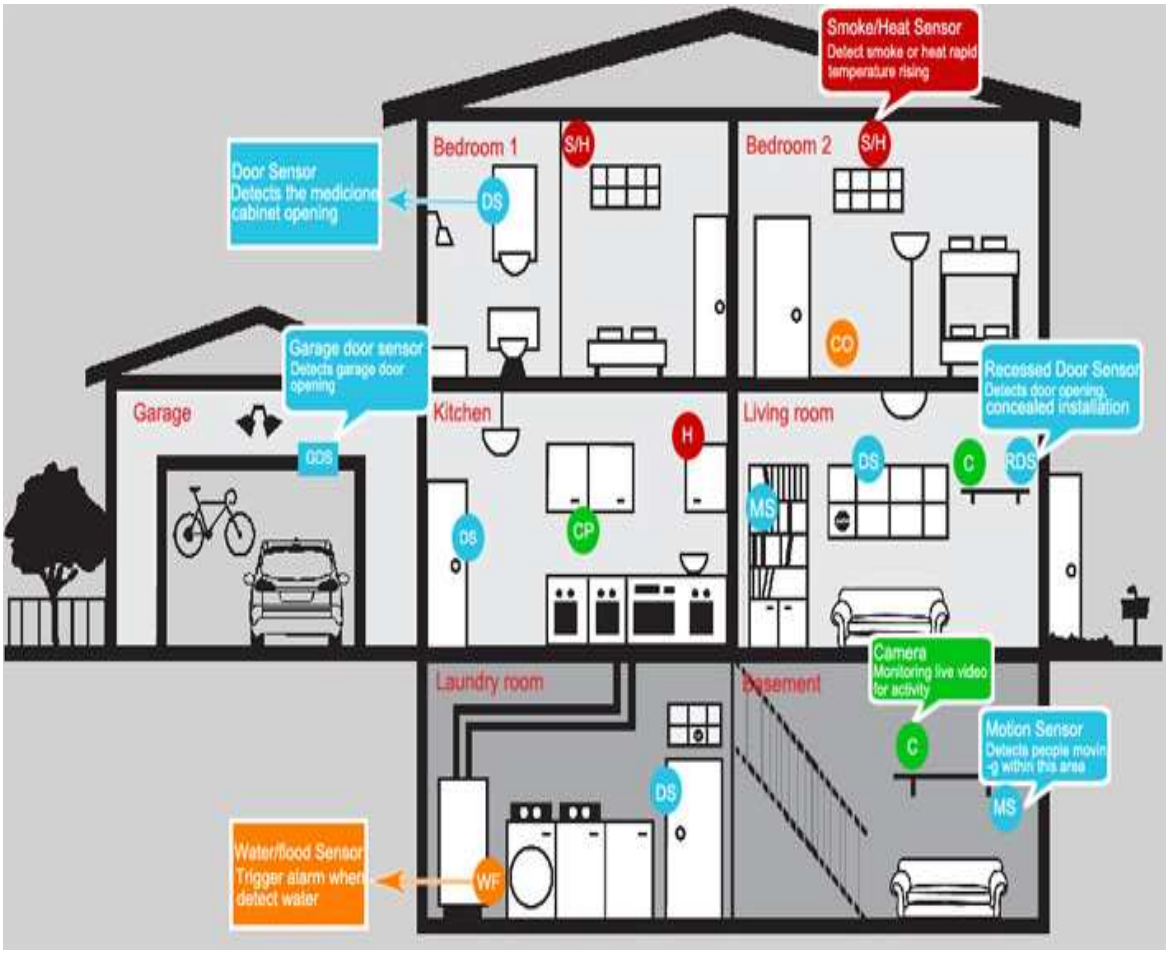

Figure 1.Home Automation System

ABOUT SMART HOME AUTOMATION SYSTEM

It is available in two different Channels

- **8 Channels**
  - Heavy Load
  - Fan Regulator with uniqueness of "Noiceless"
  - Dimmable Lights
  - Regular Loads
  - Smart switch board
- **4 Channels**
  - Heavy Load
  - Fan Regulator with uniqueness of "Noiceless"
  - Dimmable Light
  - Regular Load
  - Two way switch

FEATURES OF SMART HOME AUTOMATION SYSTEM

- Mobile Application in Android and iOS
- Switching On/Off From anywhere in the world
- Home / office controlling + monitoring
- Baby care / Security
- Family protection
- Door locking
- Scheduling for switch on / off
- Child-Lock
- Real-Time Notification

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Figure 2.Features of Home Automation System

BENEFITS OF SMART HOME AUTOMATION SYSTEM

- Easy to install
- Easy to maintain
- Easy to use
- Easy to understand
- Eliminate Two way Switch boards
- Simplification of complex task
- Centralized control system
- Enhancement of lifestyle
- Enhanced convince and control
- Save energy significantly ,thus saving electricity bills
- Enjoy complete security
- Compact in size compare of tradition boards
- Shock proof
- Access and use smart home automation from anywhere in the world
- Only verified user can access
- No chances to hack
- Verified IP based work
- Access your appliances from anywhere in the world
- Secure your Home

WORKING OF HOME AUTOMATION SYSTEM

REQUIRED COMPONENTS & MATERIALS

The essential components and materials for home automation using IOT project can be listed as a Wi-Fi module, Opto-coupler, TRIAC, resistors, capacitors, diode, regulator, loads (home appliances). There are various eCommerce websites that are providing facility to purchase all the required components online such as a project kit consisting of individual components essential to design a particular project from www.edgefxkits.com, Edgefx also offers ready-made kit-plug and play type project kits and (Do It Yourself) DIY project kits for engineering students and electronic hobbyists.

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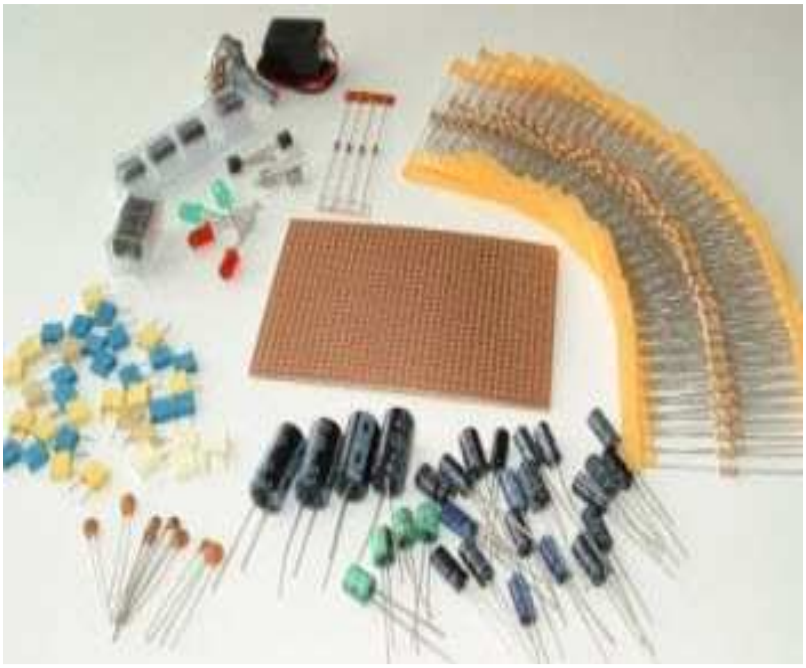

Figure 3.Electrical and Electronic Components

BLOCK DIAGRAM OF HOME AUTOMATION SYSTEM

There various modules and blocks used for designing home automation using IOT project such as WiFi module, voltage regulator, Optocoupler, TRIAC and so on.

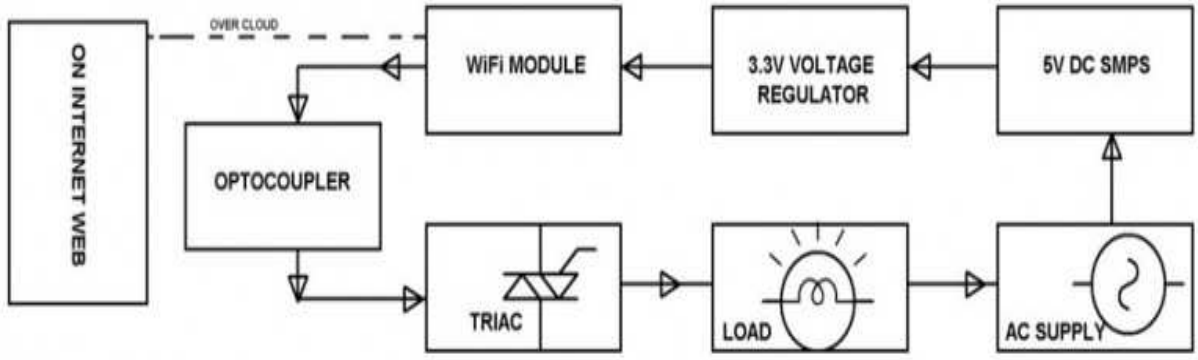

Figure 4.Block Diagram of Home Automation System

- **WI-FI MODULE**

Wi-Fi (Wireless Fidelity) is a wireless networking technology used for exchanging the information between two or more devices without using cables or wires. There are various Wi-Fi technologies like Wi-Fi 802.11a, 802.11b, 802.11g and 802.11n. Here, in this project Wi-Fi module is used to receive commands from the internet and activate loads through TRIAC & Optocoupler by executing a program written within the Wi-Fi module. Hence, no microcontroller is used in this project to drive loads.

- **VOLTAGE REGULATOR**

Voltage regulator is an electronic device used for regulating voltage in a power system. There are various types of voltage regulators such as variable voltage & fixed voltage regulators which are again subdivided into several types like electro-mechanical, automatic voltage, linear, hybrid regulators, etc.,. Here, in this project 3.3V voltage regulator is used to provide required power supply to a Wi-Fi module from 5V SMPS power supply.

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Figure 5.Voltage Regulator

- **OPTO-COUPLER**

The package of light emitting device and light sensitive device without any electrical connection is called as an Optocoupler or Optoisolator. There will be a beam of light used as a connection between these light emitting & light sensitive devices. The light emitting device is an LED and light sensitive device in this project is a TRIAC. Thus, Optocoupler and TRIAC are used to drive loads based on the signal received from the Wi-Fi module.

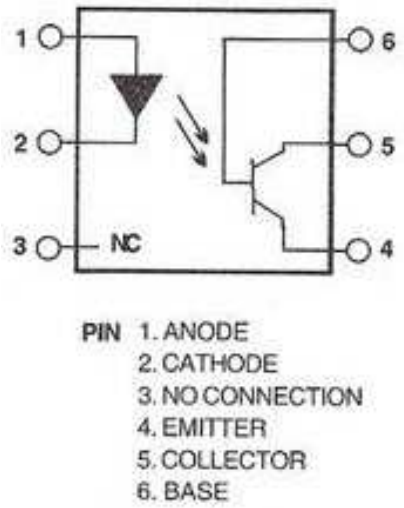

Figure 6.Opto-Coupler

Figure 7.Home Automation Using IOT Circuits

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The home automation using IOT project circuit can be connected using various electrical and electronic components, modules, blocks & connecting wires as shown in the above figure 7.

MOBILE APPLICATION VIEW OF HOME AUTOMATION SYSTEM

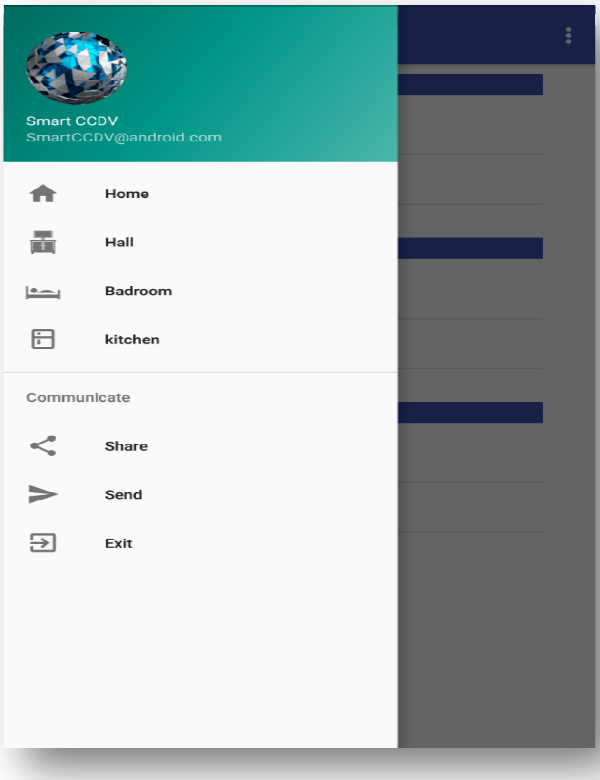

Figure 8.Mobile Application

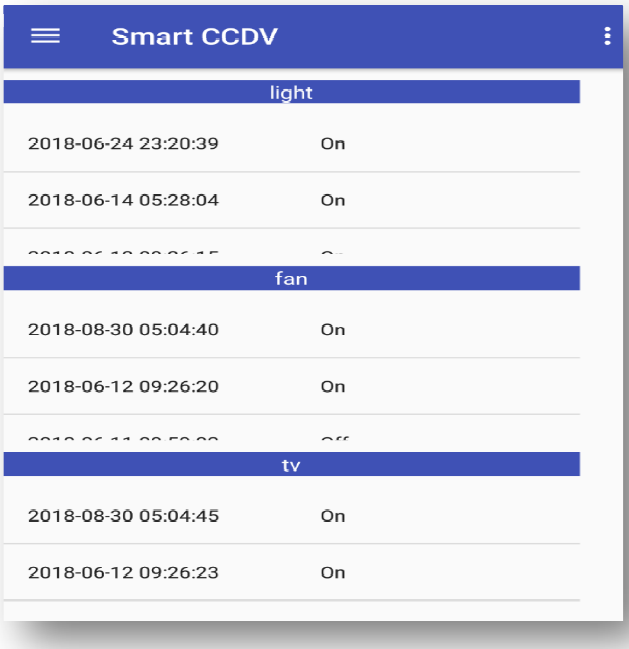

Figure 9.Centralized System

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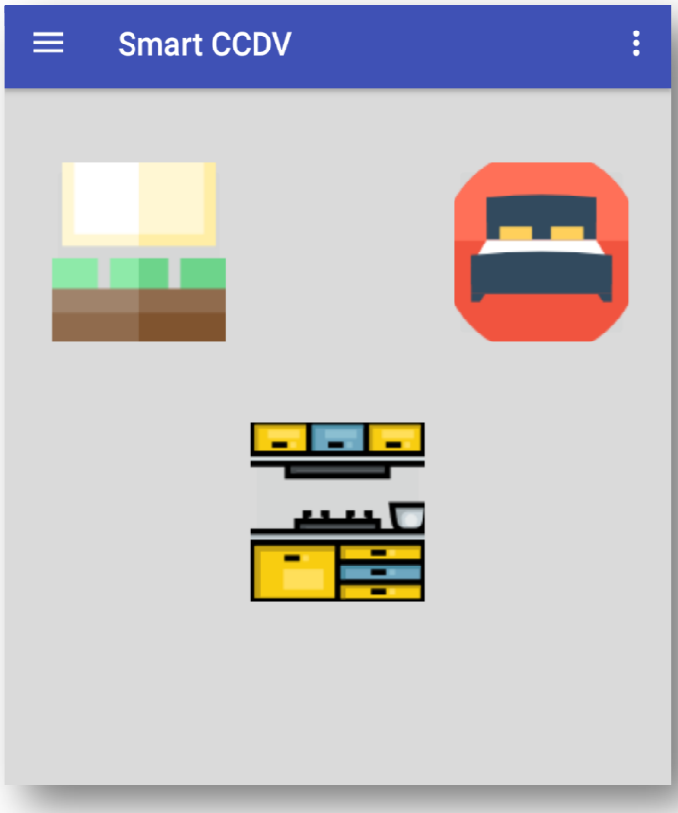

Figure 10.Home Page

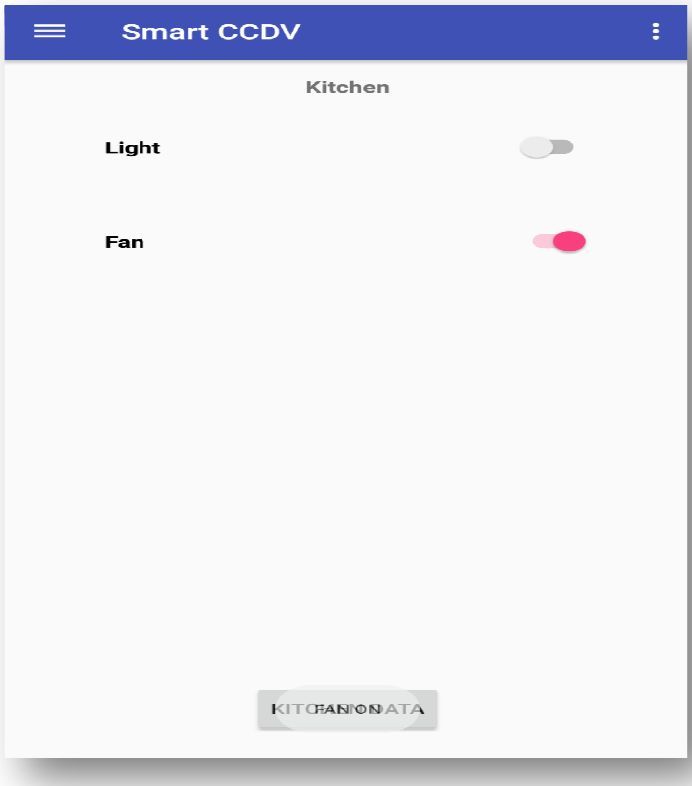

Figure 11.Kitchen Room

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