

# “A Review on: Smart and Advanced Living Technology (SALT)”

Pratik Deshpande<sup>1</sup>, Sarthak Waghole<sup>2</sup>, Dnyanraj Shinde<sup>3</sup>, Prof. Bhushan Mahajan<sup>4</sup>

<sup>1,2,3</sup>Pursuing Bachelor of Computer Engineering Savitribai Phule Pune University

<sup>4</sup>Professor of Computer Engineering & Savitribai Phule Pune University

<sup>1,2,3,4</sup>Suman Ramesh Tulsiani Technical Campus Faculty of Engineering Kamshet, Pune, India

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**Abstract** – We all are aware of the phrase, “TECHNOLOGY CAN MOVE MOUNTAINS.” We are all living in the 21<sup>st</sup> century and are on the dawn of the future of technology. This century has been through Landline telephones to online conferencing, Keypad phones to Benchmark Smartphones, Film cameras to Digital SLRs, IDE hard drives to fabulous SSDs, Floppy to Chip Drives and what not. These are all just some percent of the all examples available.

The technology is rapidly growing and one needs to advance itself with the technology. It must be achieved and applied to daily life to increase efficiency, affordability and sustainability.

The principle behind ‘Smart and Advanced Living Technology’ is that technology should be used to advance the needs of human beings and to increase the quality of life by the power of human creativity while at the same time sustaining the environment for future generations.

The development of Smart and Advanced Living Technology is based on the concept of user driven innovations. Various labs and R&D centers are established around the globe to advance the developments in Internet of Things and Home Automation.

**Key Words:** Internet of Things (IoT), Smart Home, Home Automation, Machine Learning, Artificial Intelligence, Era of Technology, Information Communication Technology (ICT)

## 1. INTRODUCTION

In the previous decade internet has spread its network rapidly, which raised the numbers of users on different communities on the web. The Connectivity has been important to everyone out there as important as the Basic needs of Human Life viz. Food, Clothing, Shelter.

The Mobile phones in today’s world are having inbuilt cameras, microphones, Motion Sensors, Proximity Sensors, Location sensors, and other sensors and actuators.

SALT stands for SMART AND ADVANCED LIVING TECHNOLOGY. It is a System that maintains the smartness and automation system of an Infrastructure. It is the technology or the system that simplifies living of an individual. The IoT based device enables the user to use a Home or any Automation System based on Internet of Things (IoT).

The modern houses are automated through the internet and the home appliances and other devices are controlled. In an Automation system, considering a system based on Home Automation, it controls the light, climate, entertainment systems, home media, security and surveillance system, and other access controls.

SALT helps a user to control these systems efficiently and gain more access through it widely. It consists of system that are made up based on IoT.

The motto is to move in a progressive direction using Automation and not making the person lazy by providing unnecessary services to the person.

The available Automation systems available in the market are the system that make the life of an individual simple but not in progressive direction, these system makes a person lazy and inactive. But the SALT helps a person to move in a progressive direction by increasing the standard of living.

The features of SALT include, surveillance system, Virtual Telepresence (Using Artificial Intelligence Assistant), Voice Controlled Functions, Mini media server, Weather forecast system.

## 2. LITERATURE REVIEW

**[1] Bluetooth based home automation system using cell phones:**

- a. **Methodology:** In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances.
- b. **Findings and Application:** In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.
- c. **Remark (Future Scope and Conclusion):** In Bluetooth based automation system the devices and home appliances are being controlled by Bluetooth.

**[2] Zigbee based home automation system using cell phones:**

- a. **Methodology:** To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators. For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home.
- b. **Findings and Application:** Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm.
- c. **Remark (Future Scope and Conclusion):** To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.

**[3] GSM based home automation system using cell phones:**

- a. **Methodology:** Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM.
- b. **Findings and Application:** The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module.
- c. **Remark (Future Scope and Conclusion):** Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.

**[4] Wi-Fi based home automation system using cell phones:**

- a. **Methodology:** Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other.

The same technology uses to login to the server web based application.

- b. **Findings and Application:** The server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, then applies action to actuators and preprogramed in the server.
- c. **Remark (Future Scope and Conclusion):** Server application software is culpable of, maintain the whole home automation system, setup, configuration. Server use database to keep log of home automation system components, we choose to use XML files to save system log.

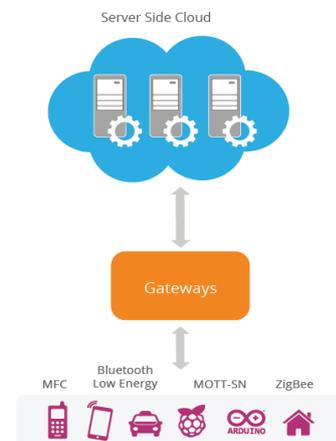
**3. SYSTEM INFORMATION AND ARCHITECTURE**

SALT is a device that is used to control the devices and appliances available in the home to automate the infrastructure.

The main foundation of SALT is Simplicity and Sustainability.

The idea behind this is to incorporate the idea of energy conservation with a carbon reduction emphasis. By expanding ICT and implementing lifelong learning concept, not only would it benefit the user but also gives a platform for demonstrating the potential of information technology to the world.

The system of SALT includes components like the devices itself, Raspberry Pi and Arduino, Sensors and Actuators, An AI enabled Assistant framework, Ethernet Connection, Gateway for the information, Wi-Fi Router, ADSL, Surveillance Devices and other appliances.



**Fig -1:** Reference Architecture for IoT system

The Above Fig-1 represents the Reference Architecture of an IoT system. The System requires Server Side Cloud, Ethernet Connection obeying TCP/UDP protocols, Gateways, And the component devices giving inputs to the system.

As we know IoT is a network of interconnected devices/components which are embedded with, sensors, softwares, network connectivity and other required electronics that enables the exchange of data.

These all components are connected to each other through the Server which is tunneled through Gateways.

The server processes all the input data depending upon the structure of the Software Requirement Specification and provides the information to the working devices or components to process the further operations.

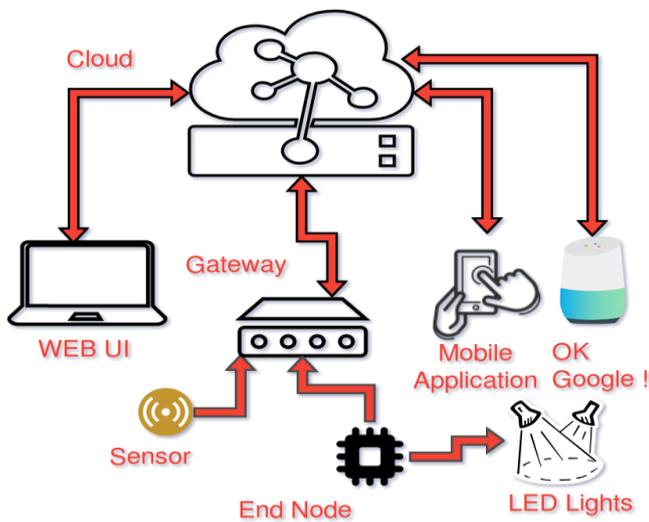


Fig - 2: Workflow diagram for Home Automation System

The adjacent Fig-2 represents the Workflow diagram of an IoT based Home Automation System. In which Cloud Consists of all the data collected from Smart Home appliances and system software on the cloud processes the data collected.

The data is often collected from Physical Sensors, Actuators and other sources, and is sent through a Gateway.

The dedicated software application deploys the operation on the IoT network.

Following are the available list of appliances for the Home automation in today's trends-

1. Burglar alarm. Major providers offer multidevice systems that you can monitor from afar.
2. Generator. Let's you know whether the generator is working and can e-mail or text you and a service technician if there's a problem.

3. Thermostat. Senses patterns in human presence and controls equipment accordingly.

4. Lighting. Let's you control lights from an app and set vacation schedules.

5. Smoke/CO detector. Can notify you and prompt the same-brand thermostat to shut off fuel-burning appliances.

6. Refrigerator. Alerts you if power is out and even if a door is left ajar.

7. Range. Let's you preheat the oven, set the timer, and check cooking status without being in the room.

8. Electronic door locks. Let you remotely lock or unlock and change who's authorized to enter.

9. Water alarm or shutoff. Can text you when water is spilling from a pipe or an appliance; shutoffs can cut off your water main to minimize flooding.

10. Washer and dryer. Let's you start cycles and monitor progress, and alerts you if your dryer duct is clogged.

#### 4. CONCLUSIONS AND FUTURE SCOPE

At this stage the SALT will be able to automate the House and the average level houses in INDIA. The future scope of SALT focuses on improving the quality of life with cutting edge technology to strengthen the innovation, And also to enhance the international competitiveness.

This present Home based Automation system can be further used in Enterprise Automation, Large Scale Warehouse Automation, Industrial Smart Systems, and also implementation in government systems.

The integration of Smart home devices and appliances will be focused in the near future.

Increasing the efficiency, control and customization is required to revolutionize the Future of Smart and Advanced Living (SALT).

Project/ Sponsor	Location	Start Year	Key Focus
T-City/ eutsche Telekom	Friedrichshafen, Germany (Europe)	2007	Learning and research, Mobility and transport, Tourism and culture, Citizens, city and the state, Business and work, Health and medical care
Panasonic EU House/ Panasonic	Tokyo, Japan (Asia)	--	Saving energy, Creating energy, Storing energy, Link for greener lifestyle. Panasonic presents a lifestyle with virtually zero CO <sub>2</sub> emissions throughout the entire home
Aware Home	Atlanta, Georgia (North America)	1998	Chronic care management in the home, Future tools for the home, Digital entertainment and media
i236 Project/ Taiwan government	Taiwan (Asia)	2010	Safety & disaster prevention, Health care, Energy sustainability, Intelligent traffic management, Comfort & convenience, Farming & leisure.

Fig - 3: Successful International Projects

Fig-3 Represents the table of information that contains the information about some of the successful International Projects that were built and deployed through the course of time in different domains of livelihood.

These projects are developed and deployed by some large companies like Panasonic, Aware, Taiwan Government and etc. through the various parts of globe.

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