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A Review on Intelligent Home Using Internet of Things

Diksha Jizilwar, Abhishek Kommera, Ashwini Gaddalwar

Student, Dept. of CSE, Ballarpur Institute of Technology, Gondwana University, MS, India

Assistant Professor, Dept. of CSE, Ballarpur Institute of Technology, Gondwana University, MS, India.

Student, Dept. of CSE, Ballarpur Institute of Technology, Gondwana University, MS, India

ABSTRACT: The Internet of Thing's is a computing concept that describes a future where every day physical objects will be connected to the internet and be able to identify themselves to other devices. The IoT links smart objects to the internet. It can enable an exchange of data never available before, and bring user's information in a more secure way. By combining different types of sensors with various objects or home appliances IoT can create a network which can complete the task and communicate with each other without any user input. The combination of connected devices, home automation and IoT is done, we get a smart home.

KEYWORDS: Smart Home, Internet of Things, Cloud Computing.

I. INTRODUCTION

Smart Home is collaboration of technology and services through a network for better quality living. This Technology allows the entire home to be automated and provides ease and convenience to everyday activities inside the home. This technology is used to may call electronic devices to act smart. In the future almost all the electronic devices will take benefits of this technology through local networks and the internet. Many people think this technology as pure networking. Others think this technology will reduce their work load, but smart home technology is a combination of both and much more. Smart home technology is currently being implemented for entire house in particularly kitchen and living room. Basically, Smart home facilitates user with security, comfortable living and energy management features as well as added benefits for disabled individuals.

Internet of Things represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the internet where it can be processed and utilized for various interesting purpose. IoT is focus on enabling automation and monitoring of a wide variety of every day household items that have not traditionally been internet-enabled, like lighting, home security, door locks, HVAC systems. "Cloud" systems have a different focus, which is to reduce the costs associated with running traditional private data canters by individual businesses, via large scale, high-volume and low-cost centralization from providers with the technical and financial ability to stand up huge, geo-redundant, and dynamically scalable virtual systems capable of serving a large number of customer businesses simultaneously.

IoT is a system of reciprocally connected devices, persons, animals or things or vehicles that are provided with unique identifier i.e., numeric or alphanumeric strings. In this system data is transferable over a network without any interference of human or computer. Smart Home (SH) promises the potentials for the user to me sure home conditions (e.g., humidity, temperature, luminosity, etc.), manipulate home HVAC (heating, ventilation and air conditioning) appliances and control their status with minimum user's intervention. Researchers and practitioners have made a great deal of efforts in facilitating the concept. addition, using cloud computing allows the user to access (monitor and/or control) home devices anytime and anywhere.

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II. RELATED WORK

sensors to Cloud using some web services. Author [3] used Arduino which does not come with inbuilt Wi-Fi so in Smart Home using IOT has ability for the vendors to measure the home conditions (humidity, temperature, leakage, intruder detection) by manipulating home appliances and control their status with less involvement of user.consist of embedding intelligence into sensors and actuators using Arduino platform, networking smart things using ZigBee technology, facilitating interactions with smart things using Cloud services for easy access in different
locations, and improving data exchange efficiency using JSON notation. The main cons of Zigbee include short range, low data speed and low complexity. Due to their high cost GSM and GPRS are mainly used in concentrators to transmit data in high end multifunction meters. ZigBee is expensive to develop and difficult to update and maintain. Author [3] Sensor cloud architecture enables processing and storing of the sensor data in such a way to be cost effective, Easily accessible and timely available with SN and cloud architecture, not only are the benefits of handling and processing of sensor data achievable but also the integration of other online services and Apps with sensor cloud for further analysis, Processing and data sharing can take place. Therefore for connecting sensor with the cloud and provide services to the End users WiFi is essential part. But our favorite Arduino does not come with inbuilt Wi-Fi shield. If we want to add Wi-Fi shield it becomes more expensive .The other con is if we want to further develop the project, the structure become more complex and difficult to develop.
In order to address the above mentioned issues of flexibility and cost effective, we are going to design and implement a more flexible architecture for integrating order to solve this issue we are using ESP8266.The ESP8266 Wi-Fi module is a self contained system on chip with integrated TCP/IP protocol stack that can give any microcontroller access to
Your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-fi networking functions from another application processor.

III. EXISTING METHODOLOGY

In [1] Authors approach was to utilize microcontroller-enabled sensors for measuring home conditions and microcontroller-enabled actuators for monitoring home appliances in the front end and utilized PaaS (Platform as a Service) and SaaS (Software as a Service) in Cloud computing for processing data at the backend. In [2], Authors focused to build a low power and self-healing WSN by using ZigBee module. Authors design and implemented most flexible architecture for integrating WSN to cloud using REST based web services as an interoperable application layer which can be directly integrated into other application.
When looking at the overall architectures and the types of services provided by cloud service providers, there are three major types [15].

Infrastructure as a service (IaaS): Infrastructure as a service (IaaS) is one of the main category of cloud computing services which simulation computing resources on the internet. IaaS are the self-service models for accessing, storage, networking, networking services and surveillance etc. IaaS are responsible for managing the application, data and information and OSes. There are many IaaS are in market which provide databases messaging queues as well. IaaS is highly scalable and can be adjusted on demand which makes IaaS well-suited for workload.

Platform as a service (PaaS): Platform as a service (PaaS) is the second of category of cloud computing services which provides platform that allows customers to develop, run, and manage applications without any complexity of building and maintaining the system in a common manner which is associated with developing and launching the App. This model delivers application over the internet. In a PaaS, there is a cloud provider that delivers hardware and software tools to the user for application development. Cloud provider hosts the hardware and software on its own system.

Software as a service (SaaS): Software as a service (SaaS) is the third category of cloud computing services which is sometimes also known as “On-demand Software” in which software is officially authorized on a subscription basis and is hosted centrally. SaaS is commonly accessed by users using via a web browser. SaaS has become a frequent delivery model for DBMS software, CAD software, Development software, Anti-virus software. The applications are processed in the cloud and also used for wide range of tasks for both individuals and organization.

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IV. INTEGRATION LAYOUT OF ARDUINO AND CLOUD SERVICES

This section shows three common cloud-based services which are as follows
A. Thing Speak
B. Nimbits
C.Open.Sen.se
and integration layout with Arduino.

A. THING SPEAK:

It is an open source Internet of Things application and also an API that used to store and retrieve the information from any entity by using the HTTP protocol via the web or LAN. Thing Speak allows the invention of sensor logging applications, location tracking applications and social network of entity by updating the status.ThingSpeak permits consolidation of various devices and application which can upload the data over the internet.

B. NIMBITS:

Nimbits is an open source data logger. Nimbits server is a web portal and API designed to store and process time. It filters incoming data and trigger events based on rules. It stores data in such a way that makes it fast and easy to retrieve the data set using GPRS co-ordinates. It designed to run on small embedded devices like Raspberry pi, J2EE servers like apache tomcat and also on clouds like Amazon EC2. Nimbits is structured as a tree of entities. All entities have a name, unique id and parent.

C.OPEN.SEN.SE:

Open.Sen.se is the leading platform for connecting things and devices to the internet.Open.Sen.se is a web service with bright and colourful GUI, is Real-time and offers lots of flexibility with the way data is displayed. Sen.se believes that in an internet of everything where humans, nature, machines, objects, environments, information, physical and virtual spaces are all mix up, talk, intertwine, interact, enrich and empower each other in all sorts of ways[3].

V. INTEGRATION LAYOUT OF ZIGBEE AND CLOUD SERVICES

Devices can be co-directly connected to the internet via Wi-fi or Ethernet but gateway is needed. Cloud is not uncertain environment that works with everything. It is necessary to make some services that can be hosted in the cloud that provide storage and management support. Digi International's connect port X2e for smart energy. Is a gateway that works with any compatible ZigBee device. It connects these devices to iDigi cloud. Services that provide access management support for large collections of devices that might be spread across homes and businesses. The advantage about ZigBee is that multiple ZigBee networks can co-inside in the similar wireless space. Digi provides APIs and application development tools for creating applications that works with its cloud services. This includes remote monitoring and asset management. Data can be uploaded from ZigBee devices and stored in the cloud services database where it can access by applications. Data can be provided in the form of key performance indicators (KPI). The web based management tools provide personalized dashboards and reports.

The system architecture for Smart Home must fulfill the requirements of measuring home conditions, processing Instrumented data, and monitoring home appliances.

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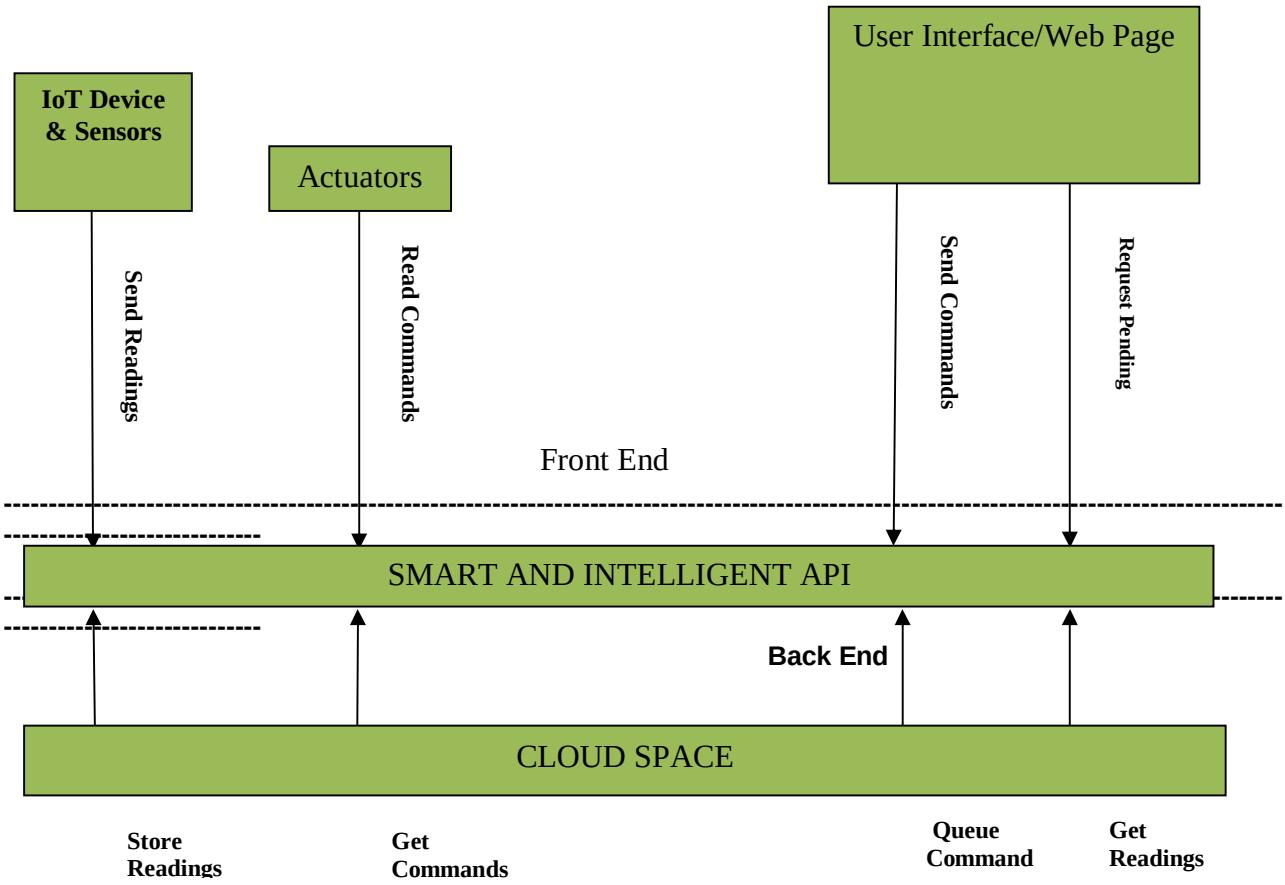

Fig: System Architecture for Smart Home

The figure shows system architecture for smart home which is consists of the above following major components:

- Actuator: An actuator is a component of a machine that is responsible for moving or controlling a mechanism or system. In this actuator is used to receive the commands from microcontroller and then performs some actions.
- Sensors: Sensor is an object whose purpose is to detect events or changes in its environment and sends the information to the computer which then tells the actuator to provide the corresponding output .A sensor is a device that converts real world data into that a computer can understand using ADC (Analog to Digital converter).
- Data Store: It stores the data from sensors and cloud services for data analysis.
- User Interface: User interface is a part of the machine that handles the human-machine interaction. The user interface is every think design into and information device with which a person may interact. This can include display screens, keyboards, a mouse and the appearance of a desktop. It is also the way through which a user interacts with an application or a website.

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V. PROPOSED METHOLOGY

The proposed intelligent home automation system has the capabilities to control the following components in users home and monitor the following alarms. There are three modules in our system which are as follow:

VI. MODULES

- Detection of leakage of domestic LPG gas:
  In this module we have used MQ-6 sensor for detecting LPG gas leakage. This sensor is used for avoiding any kind of fire accident in the home. We can remotely monitor the Gas leakage by getting an alert message.
- Detecting internal temperature of home:
  In this module we are using TMP-36 sensor which is used to sense the temperature in an environment, for detecting fires and generating alarm signals. TMP-36 sensor can be used to detect and react in emergency situation. By using this sensor we can easily monitor the temperature of home.
- Automatic irrigation:
  Avoiding irrigation at wrong time of day reduce runoff over watering saturated soil. We are using soil moisture sensor, which will monitor the moisture level in the soil. After sensing the moisture level of soil, will alert it to the user. By using soil moisture sensor irrigation becomes automatic.

VII. CONCLUSION

All the papers which we have studied and referred used different technologies and hardware to integrate sensors to the cloud. They have different benefits and features. In those papers they have used Arduino and ZigBee, but they are costly and not reliable in some situations. We are going to design and implement a more flexible architecture for integrating sensors to cloud using some web services. In our project we have used ESP8266 which is flexible and cost effective. ESP8266 has inbuilt Wi-Fi shield. ESP8266 is capable of either hosting and application or offloading all Wi-Fi networking functions from another application processor.

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BIOGRAPHY

Diksha Sanjay Jizilwar is a UG student of Computer Science and Engineering Department, Ballarpur Institute of Technology, Gondwana University. Her Research Interests is Cloud Computing.

Abhishek Sugnakar Kommera is an Assistant Professor in Computer Science and Engineering Department, Ballarpur Institute of Technology, Gondwana University. He Received Master of Technology(M.Tech) Degree in 2015 from JNTU, Hyderabad.

Ashwini Prakash Gaddalwar is a UG student of Computer Science and Engineering Department, Ballarpur Institute of Technology, Gondwana University. Her Research Interests is Cloud Computing.