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Internet of Things (IoT): Smart Living and Lifestyle

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Abstract: *In our day-to-day life we can see that technology is evolving constantly. The internet of things (IoT) contains various applications and technologies that are available in smart homes, smart irrigation, and healthcare. The IoT acts as an expanded version of the internet, which provides us with the data we need to live our lives more efficiently. It is based on connecting up devices used daily. The main objective of this paper is to learn how to use IoT in Smart Homes, Healthcare, and Agriculture.*

Keywords: Internet of Things (IoT), IoT Architecture, Smart Home, Smart Healthcare, Smart Agriculture

I. INTRODUCTION

Internet of Things (IoT) is a network of any physical objects that can connect through the internet by using sensors, and actuators. These objects are called "things" that are embedded with software, and electronic devices. The sensors allow these objects to collect and exchange data. The goal of IoT is to extend internet connectivity from standard devices like computers, mobiles, and tablets to relatively dumb devices like a toaster.

IoT is intended to make a device smarter by implementing internet protocols and improving our life with the help of data collection, algorithms, and networks. The thing in IoT can also be a diabetes monitoring device that can be implanted in people, an animal with tracking devices, etc [3].

Figure (1): Internet of Things

In IoT, "Home automation" refers to the technology that automatically controls electronic appliances of household features and activities using software applications or via the internet. In simple terms, it means we can easily control our home appliances from anywhere and anytime via the Internet, and it makes life more effortless and secure and even spend less amount of money on household bills [a].

II. LITERATURE REVIEW

A connection between networks of networks made possible by a physical object is known as an Internet of Things (IoT). Millions of private, public, business, academic and governmental networks make up the Internet of Things. Electronic, wireless, and optical networking technologies connect these networks. The Internet of Things (IoT) can also be thought of as a global network that enables the communication between people, things, and other things by giving each one of them a distinct identity. It is a ground-breaking innovation that represents the direction of communications and computing

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[3]. Additionally, the advancement of this technology is dependent on cutting-edge technical advancements, which might range from nanotechnology to wireless sensors in several significant domains. Smart Homes, Smart Healthcare, Smart Agriculture, and other applications can all use IoT [6]. Smart home technologies are used to improve the living standards of elderly people. As the number of elderly citizens is increasing, the responsibilities also increased in healthcare. IoT helps us to monitor the health of an elderly person who leaves alone at home [11]. Smart agriculture can be defined as the application of supplementary technologies used in agricultural production techniques to minimize waste and boost productivity [2].

III. OBJECTIVES/ SCOPE

Internet of Things is a leading technology all over the world. It has earned a lot of popularity in less time. Also, the advancements in Artificial Intelligence and Machine Learning have made the automation of IoT devices very easy. Combining AI and ML programs with IoT devices gives us proper automation, and it has also expanded its area in various fields and applications. In this section, we will discuss the applications and the future scope of IoT in the Smart home automation, healthcare, and agriculture industries [8].

3.1 Smart Home

Smart Home technology refers to the setup of home appliances or devices that can be controlled remotely from anywhere with the help of the Internet Network. It makes our life easier and a better way to live it [a].

Figure (2): IoT in SmaHomeome Automation

3.2 Benefits of IoT for Smart Home

- **Monitoring and Control:** Smart home automation gives us the next level of control over our household appliances or devices. We can not only control remotely switch on or off our home appliances but also we can control the full functionality of our appliances via mobile or internet network[a].
- **Optimization of spending:** IoT and Smart home system enables or helps to utilize energy consumption and optimizes our spending. We can easily identify the usage and waste points, so we can adjust our usage or consumption accordingly. For example, Smart light turns on and off automatically accordingly to the data or value coming through the sensors or actuators.
- **Environmental impact:** This Smart home automation application gives benefits not only to the homeowners, the neighbors, and the country but to the whole planet. It reduces the optimization of resources and spending but also reduces the carbon footprint. This IoT or Smart grid technology allows everyone to go Green and it decreased the emission of carbon and helps to reduce pollution. The idea of smart home automation is growing constantly.
- **Enhance security:** Smart locks and surveillance cameras are not only the tools for our household security but also the smart monitoring system which helps to detect power surges, and leakages. Using water and gas sensors they will warn us about dangerous pollution gases and send us a time-to-time notification to prevent complications.

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3.3 Health Care

As earlier before IoT the interaction between doctor and patient was limited to visits and doctors or hospitals are not able to monitor a patient's health constantly. With the help of IoT devices, it can be easy to monitor patient health constantly from anywhere anytime [b].

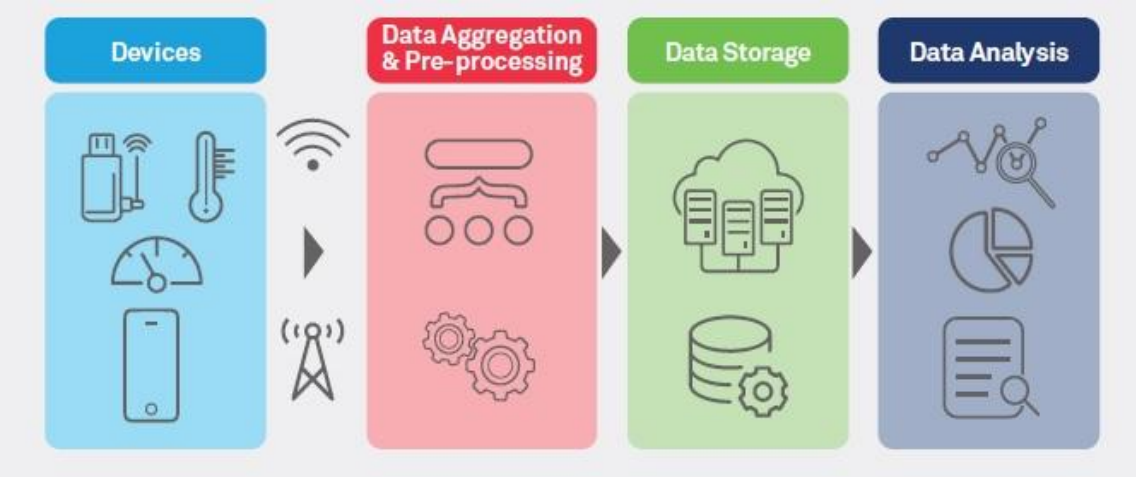

Figure (3): The 4 Stages of IoT Solution in Healthcare

In 1st step, we interconnect the devices which include the sensors, actuators, monitors, cameras, etc. These devices collect data from users or patients. In 2nd step, the data that are collected from devices are in analog form and we need to convert this data into digital form for the next process. 3rd step, in this step the digital data get pre-processed, standardized and then send this data to the cloud or data center. Finalthesethese data are managed and analyzed and these analytics help used for decision making.

3.4 Benefits of IoT in Healthcare

- **Simultaneous Reporting and Monitoring:** Remote Health Monitoring through the devices, sensors, actuator, and camera system help to save someone's life in a medical emergency like heart failure, asthma attack, etc [c].
- **Tracking and Alert:** IoT devices help us to give a live tracking of the patient while in a critical situation and it drops an alert notification to the doctor and the family members.
- **Faster Disease Diagnosis:** IoT Devices monitor the patient continuously and the real-time data. Analyzing or diagnosing this data helps us to identify the disease at the early stage[c].

3.5 Agriculture

As we know Food is our basic need. And Farming is important for living. And nowadays farming is not easier but with the help of IoT, we make it a little bit easy. In IoT, smart agriculture is the products, devices, or sensors that are used to monitor the farm and help to improve productivity and cost savings [1].

Figure (4): IoT in Agriculture

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IoT provides an automated system that can function automatically without any need for human supervision and can notify us to make proper decisions to deal with different kinds of problems they may face during farming.

3.6 Benefits of IoT in Agriculture

- **Weather/Climate Conditions:** As we know weather plays an important role in agriculture. IoT helps us to know the real-time weather conditions. The sensors are used to get the data from the environment which help grow the crop in a particular climate or weather [g].
- **Agriculture Drone:** On the ground and in the air, drones are utilized for field analysis, planting, crop spraying, crop monitoring, and agricultural health inspections. Drone technology has helped to transform and grow the agriculture sector, all thanks to smart planning and strategy based on real-time data [5].

IV. RESEARCH METHODOLOGY

The main goal of this review is to convey the current knowledge regarding the usage of IoT for smart living. IoT has been implemented in numerous fields to increase productivity. Technology is always changing, as we can observe in our daily lives. Smart homes, smart irrigation systems, and smart healthcare all make use of various IoT applications and technology. We can get the information we need to live more effectively thanks to the IoT, which functions as an enlarged version of the internet. It is predicated on tying together frequently used gadgets. This paper's major goal is to teach readers how to use IoT in smart homes, healthcare, and agriculture.

4.1 The Architecture of IoT

There are many uses for the Internet of Things (IoT) technology, and its use is accelerating quickly. The Internet of Things functions as it was intended or developed by the various application areas for which it has been used. However, it lacks a universally adhered-to standard defining the architecture of working. The functioning and application of IoT in various domains determine its architecture. However, there is a fundamental process flow upon which IoT is founded. So, in this article, we will talk about the 4 Stage IoT Architecture, which is the basic, fundamental IoT architecture.

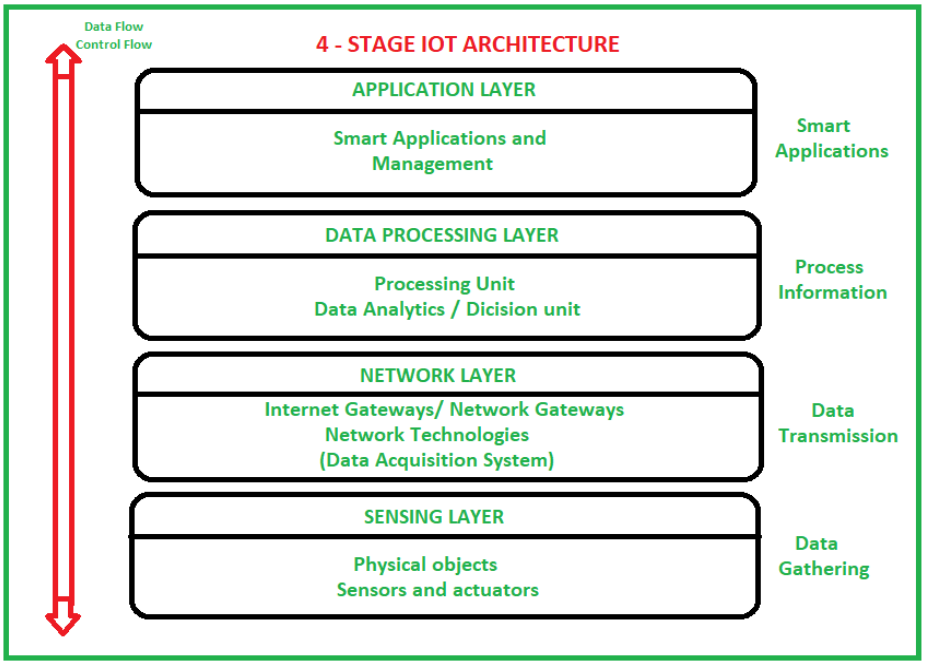

Figure (5): 4 Stage of IoT Architecture

1. **Sensing Layer:** In this layer sensors, actuators, and other devices are present in it.
2. **Network Layer:** In this layer Internet gateways and Data Acquisition System (DAS) are present. DAS collects data and performs aggregation and converts the analog data into digital data.

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3. **Data Processing Layer:** This layer is the processing layer of the IoT ecosystem. In this layer, data is analyzed and pre-processed the data before sending it to the data center. And from this data center, we accessed the data through a software application.
4. **Application Layer:** This is the final layer of the IoT architecture's four tiers. Data centers or the cloud are places where data is maintained and used by end-user applications like those for agriculture, healthcare, aerospace, farming, and defense, among others.

V. CONCLUSION

The focus of this paper is to know how we can make our life and living style easier with the help of IoT. We can implement IoT devices or applications in various fields like smart homes, healthcare, and agriculture. In a very short amount of time, the IoT industry has seen significant changes. The industry has expanded to include enterprise players who are cooperating to establish ecosystems that are customized for mobile technology, allowing IoT devices to become interconnected. Initially, there were a variety of devices and no ecosystems at all.

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