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Smart Home: An Urge for Advanced Living

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Abstract: ***The aim of this research survey note is to provide a comprehensive overview of Smart Homes with a focus on their Advantages and disadvantages'. The main source of information was provided by past and existing research and development projects carried out in these areas, while the main result of our survey is a classification of Advantage and Disadvantage of Smart Homes, as revealed by this project. Smart home is emerging technology growing continuously now. It integrates of many new technologies through home networking for improving human's quality of living, so there are many projects researching in diverse technologies to apply to the smart home system. So, this paper reviews various issues on smart home technologies by surveying some smart home research projects. The topics depend on the meaning and the subtle elements of smart home. This paper additionally offers many intriguing undertakings summarily, so it can be thoughts for whoever needs to take in this innovation. Smart home provides the environment that attempt to encourage the life of the user in a wide range of ways and make it more agreeable by utilizing innovation. This paper manages the acknowledgment of such a situation. Also, it discusses why such a development is desirable.***

Keywords: Smart home, IOT, Smart home appliances, Smart Home Environment, Home Intelligence

I. INTRODUCTION OF SMART HOMES

A smart home is a concept applied to a room which is provided with the ability to get accustomed by itself to certain situations to make the occupants feel comfortable [9].

Ordinarily, when electrical equipment is plugged in and we don't use it, this is a clear example of wasting money and also the electricity for no reason. Moreover, that may invite many accidents such as the conflagration from electrical short circuit. Therefore, for careless people who always forget to unplug the electrical devices require to remind themselves every time they go out. On the other hand, if they go out forgetting to unplug, they need to rush back home to unplug, to avoid the catastrophe. In order to solve these problems, smart home technology is required. With the advances in innovation, many research about smart homes have been done encouraging human and enhancing their personal satisfaction. A home, which is smart, uses technology to make all electronic equipment around the home act "smart" or "intelligent" by automation, having highly advanced automatic systems such as for lighting, temperature control, security and many other functions. [1, 2]

Smart house is collaboration of technology and services through a network for higher quality lifestyle. So, a smart home permits gadget at home to be automated and provide ease and convenience to everyday activities. This technology is employed to create all electronic devices to act 'smart' through home networks and also the net. Many of us suppose this technology as pure networking. Others suppose this technology as reducer of one's work load; however, it is presently being enforced for entire house especially in rooms and lounge. Basically, sensible home facilitates users with security, snug living and energy management options furthermore as value-added utility for disabled people.

The idea of good Home Technology is to introduce networking devices and equipment's within the house. According to the Smart Homes Association, "The simplest definition of Smart home technology is: the mixing of technology and services through home networking for a higher quality of living."[3]

A smart device is a standard appliance with a sophisticated computer put in to provide it additional practicality which will monitor aspects of daily routines. A sensible house is useful for everybody and may enhance the everyday life reception. Sensible home consists of 3 components that are network, controlling devices and residential automation. The network is employed for connecting the automation to the controlling devices and it may be wired or wireless. The controlling devices are used for managing the systems.

II. AWARENESS ABOUT SMART HOMES

Smart homes are now slowly and steadily becoming a necessity for the common man. The security and automatic control features seem to have attracted many households. Initially smart homes were marketed for the advanced security features it provided but nowadays lightening, gas leakage detection, fire detection are some of the advanced features which have been incorporated, which has certainly fuelled up the demand of smart homes in India. It is estimated that smart homes are growing at a rate of 34 percent and

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the market revenue will double in the next 3 years. Due to the increase in working couples the demand of energy efficient and safe homes has accentuated lately in metro cities.

In India the middle-class home owners want to go for the smart home solutions, from the market analysis done by Schneider electric [12] it was found that only two features namely security and lightening control were popular among the Indian market. Other features of smart homes include Entertainment, Electrical control, Communication tools, Security. Hence the popularity of other features is quite low and hence maximum utilization of the smart home technology is not being done.

A survey was conducted in Indore in the last week of October 2017, and it was basically conducted to check the awareness about smart homes in different age groups and to collect their opinion about what they think about smart homes in the present situation, surprisingly the results obtained states a different perspective of people about smart homes.

For the purpose of survey four questions were taken into consideration that are:

Question 1- Do you know about Smart Homes?

Question 2- Did Smart Homes Made Life Easier?

Question 3- Made Home Smart When Moved Into It?

Question 4-Will You Recommend Smart Home?

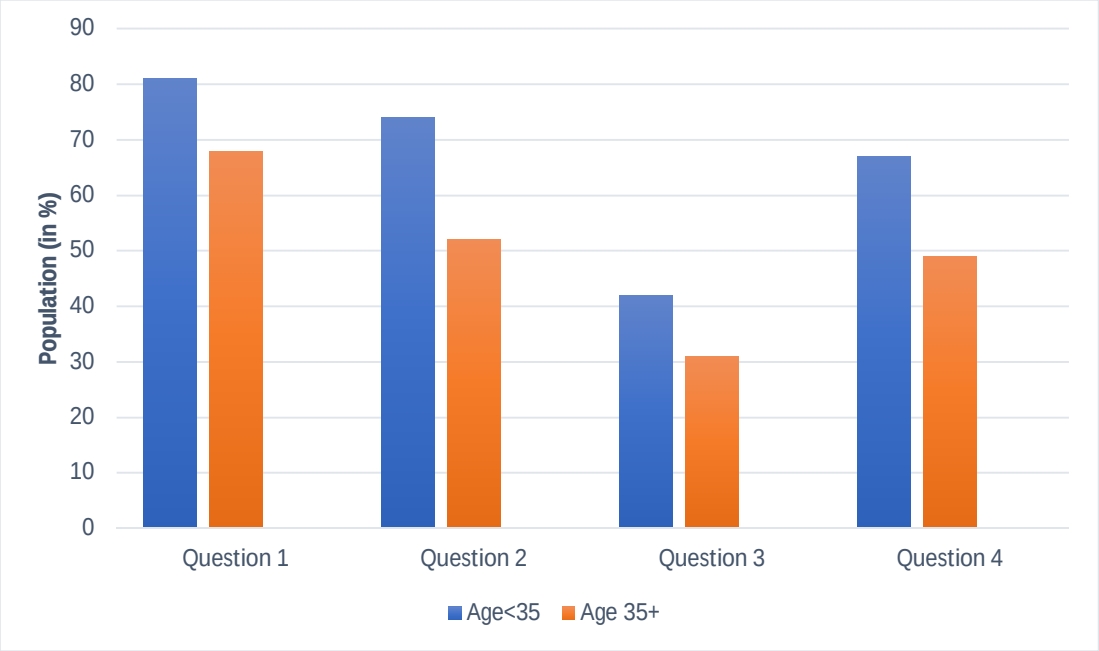


Fig. 1 Awareness of smart homes in different age groups

III. SMART HOME ENVIRONMENTS

A smart home can be characterized as a habitation prepared with processing and data innovation, reacts to the requirements of the inhabitants, working to advance their solace, comfort, security and excitement through the administration of innovation inside the home and associations with the world. Thus, Smart Home Environments are heterogeneous situations containing:

A. A Home Automation System

It contains a course of action of home machines that can be electric or electronic devices that fulfill a couple of limits in the house for the flourishing of the house holders, including: washing and cooking machines, fridges, warmers, thermometers, lighting structure, electrical fittings, smoke identifiers, TV's, diversion underpins, entertainment devices, windows, portal controllers, air circulation and cooling frameworks, camcorders, and sound locators. Their abilities can be for the most part segregated into sensors, actuators or both.

B. A control system

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It blends human with programming based administration by utilizing the information gave by the sensors and furthermore the headings sent to actuators in order to accomplish at least one of abnormal state objectives or elements of the Smart Home Environment, as required by home holders.

C. A home automation network

It ensures that all the Smart Home Environment portions, including the Home Automation Framework and the Control System, can exchange status and control information. There is large amount of research literature addressing Smart Home Environment during the last decade, as well as recent reviews of Smart Home Environment architectures, components, technologies and applications [4].

IV. BENEFITS OF SMART HOMES

A. Energy Management

One of the real benefit of smart home to purchasers is their capacity to incorporate energy management features through lighting, air conditioning and home machines.

1) *Lighting:* The lights in a savvy home can be turned on and off consequently in view of inhabitance sensor. As case, when a man goes into a room in the day time, the framework will open the curtains as opposed to turning on the lights, however around evening time it would ensure the lights are off when nobody is in the room thus misuse of vitality can be safeguarded.
2) *Air Conditioning:* A suitable arrangement of temperature sensors and the utilization of warming and cooling clocks can decrease the vitality utilized and subsequently house can set to off conditionings when nobody is in the room.
3) *Home Appliances:* Savvy homes can even assist in vitality administration, by monitoring the vitality utilization of every last machine in the house.

B. Home Intelligence

The Home Intelligence offers vital increased value, of the wise conduct of the savvy home condition. Rather than gathering of complex machines and gadgets, the Home Intelligence makes an incorporated domain in which the Artificial Intelligence component can appropriately respond as indicated by changing conditions and occasions. By recognizing unusual or sudden occasions it can alarm the home's inhabitants, the Home Intelligence module can give a prompt programmed reaction if wanted Events depict and characterize the conduct of the smart home. Occasions may be identified with security, wellbeing, comfort or whatever other viable issue. The Home Intelligence module will empower brought together administration and checking of all occasions, utilizing principle cautions and getting contribution from a few gadgets in the meantime. For instance, a caution could be started if, when the front entryway is bolted and the house is probably void, a window is all of a sudden opened. The occasions are actualized as programming modules either by pre-programming or by the Home Intelligence Module's Artificial Intelligence learning and thinking capacities.

An event can be defined as a set of properties and functions:

1) *Event Name:* A portrayal of the occasion
2) *Input Devices*: Gadgets inside the e-Home that trigger an occasion by a blend of their present status and measured esteems
3) *Event Triggers*: Works that arrival TRUE when a trigger is summoned
4) *Output Operation*: A capacity with the coveted yield operation
5) *Output Alert:* If an occasion requires a ready, Output Alert depicts the alarm.

C. Internet of Things (IoT)

The Internet of Things or Objects, refers to a wireless network between objects usually the network is wireless and self-configuring, in household appliances. Enhancing the current Internet and providing connection, communication, and inter-networking between devices and physical objects, or Things, is a growing trend. The Internet of Things (IoT), or Internet of Objects, will change the present scenario and life style. IoT represents the next evolution of the Internet, taking a huge leap in its ability to gather, analyse, and distribute data that we can turn into information, knowledge and ultimately, wisdom [10]. Thus, Internet of Things (IoTs) is connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet together enabling new forms of communication between things and people, and between things themselves [11].

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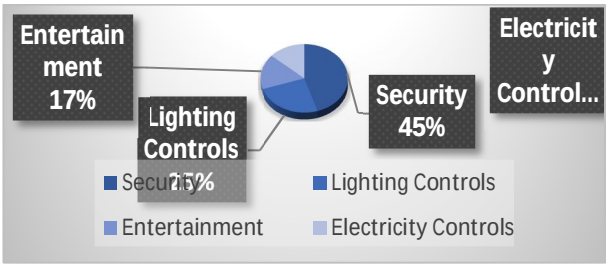


Fig. 1 Awareness of Smart Homes Features

V. APPLICATION AREA'S

Smart Home Environment's application is open-ended, being limited only by the human imagination. Based on our literature survey, identified four major application areas of Smart Home Environment is: Home care for elderly population, Energy efficiency, Comfort / Entertainment, Safety / Security. These areas are not necessarily disjoint. Moreover, functions belonging to one or more different application types can be found within the same Smart Home Environment. Finally, these applications can share computational approaches. For example, applications related to elders and safety very often use computational methods for video surveillance [6].

A. Home Care for Elderly population

This application area occurred to address the pressing requirements caused by the phenomenon of population aging that is available in many created nations of Europe and everywhere throughout the world. Actually, this application trend is part of a more general interest for the development of new smart technologies for addressing the problems of the elders related to health, loneliness, disability, cognitive limitation. Two primary sub-territories distinguished inside this application region are:

1) *Pervasive help:* Which spotlights on assignment part level for helping older folks amid their day by day exercises, too as by tending to their handicaps and intellectual confinements
2) *Omnipresent care:* Which tends to older folks' social confinement by furnishing them with administrations and offices for social incorporation to decrease their feeling of depression?

B. Energy Efficiency

Lessening of vitality utilization turned into an essential desiderate with regards to the dangerous mechanical improvement of the current society with a noteworthy effect on the future advancement of the humanity. From one perspective, the innovative advance requires the utilization of more vitality, while then again vitality turned into a restricted asset. It is valued that inEurope 25-30% of aggregate vitality utilization happens in structures and the inhabitants' conduct firmly impacts vitality squandering, in this way having a huge potential for diminishing vitality utilization.

Today, the power grid is evolving into a new smarter network known as Smart Grid[5]. It enhances the traditional electricity delivery system with advances in information and communication technologies [7] for balancing the demand and supply of electricity consumption, as well as for exploiting renewable energy sources. This situation clarifies the quick development of the enthusiasm of established researchers for investigating new techniques, advances, frameworks and accomplishments in the territory of smart homes, for vitality preservation. In our literature review we identified two major application areas related to energy efficiency:

1) *Energy saving:* Using sensors and actuators from Smart Home Environment for controlling energy savings by switching off or to low-power mode the consumer appliances currently not in use or according to the user preference settings. [8].
2) *Smart Grid:* Integration that tends to the mix of vitality, mindful Smart Home Environment into the Smart Grid.

C. Comfort / Entertainment

A special class of functions of Smart Home Environment addresses user comfort and entertainment. Such as ambience control, advanced user interfaces, enhancing the level of automation of everyday activities.

D. Safety / Security

Safety refers to the detection of abnormal situations inside Smart Home Environment, like for example fires, floods, accidents (e.g. Falls of disabled or elders). Security refers to the detection of malicious behaviours with respect to Smart Home Environment, like

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for example burglars, unauthorized access. For the detection, signalling and response to such safety or security violation situations, Smart Home Environment are equipped with sub-systems for video surveillance, remote monitoring, alarming, and emergency response.

VI. ADVANTAGES'

A. Convenience

One of the significant offering purposes of home robotization is the comfort that accompanies it. When we convert our home into a smart home, we'll have all of our products programmed to our required needs. Additionally, being able to control our home, by no matter where we are. Depending on which smart appliances we have, we are able to preheat oven while we are on our way to home, or have coffee brewed as our morning alarm goes off. Smart locks allow us to enter our home by using phone, rather than having to fumble for your keys. Smart fridges can even analyse the contents of our fridge and send you a grocery list on what you need. We definitely know how much accommodation and effectiveness have been brought into our lives by Personal digital assistant.

B. Customization

There are several good merchandises on the market such as home security system. In homes that are well-connected, we can have our house tuned into our daily schedule and mood. Some programs on our devices allow home to set the tone for bed time. Such as playing relaxing music for mood lifts and diminishing the lights. The same goes for our morning routine. our blinds can be programmed to open slowly at a certain time, while our coffee brews and your AI assistant outlines our daily schedule.

C. Security

Smart home security systems allow us to view our home no matter where we are. We can have cameras installed, motion detectors, locks, and we will be notified immediately if something is out of the ordinary. Many of these systems can even allow you to understand of any surprising temperature changes in order that you're alerted if there's a doable fireplace.

D. Save Money and the Environment

Smart homes feature merchandise like thermostats, air conditioners, and lighting. Having the ability of a timer, to turn them on/ off when we are away from home will help you save money on our electricity bills.

VII. FLAWS

A. Cost

We purchase good home merchandise; however, that doesn't mean it won't affect our billfold. But the privileges we get creates a trade-off to buy.

B. Slight Learning Curve

Almost all sensible home systems are literally very straightforward to use, however at an equivalent time there's still somewhat of a learning curve for many folks. For anyone already immersed in technology, changing your sensible home are a breeze, except for anyone not just tech savvy, it's going to bring heaps of your time spent reading manuals of use.

C. Reliability

Smart home is going to be extraordinarily dependent on your net affiliation. If your affiliation drops you'll be left with heaps of good product that won't work in addition, wireless signals will be probably be interrupted by different natural philosophy in your home and cause a number of your good products to perform slowly or not in the least.

Table 1
Smart Home Environment Applications and Examples

Applications	Examples
Alert and Sensors	Heat/smoke, sensors, temperature sensors

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Monitoring	Regular feed of sensor data i.e. CCTV monitoring
Control	Switching on/off appliances i.e. sprinklers, lightings
Intelligence and logic	Movement tracking

VIII. CONCLUSION

Since a decade ago we have been hearing modern sounding expectations about smart homes, however now they have turned into an achievable reality. Smart home technologies are currently affordable by rich only, but in near future we will have it as affordable with standard features in every house. At exhibit these advancements are seller subordinate yet soon open guidelines will be accessible which will make it substantially simpler for architects and producers to plan a framework, which will be financially savvy, solid and adaptable. For now, the maintenance charges are very high because all equipment's are not largely available and not many companies manufacturing it so less services available.

This paper in view of the significance of savvy home and the subtle elements of brilliant home components. What's more, the fundamental goal of this paper is to give a study for these brilliant home looks into and summarily depict the insights about them. As the improvement of innovations develops, many research ventures have additionally been produced. Presently shrewd home is more than just a home controlled by the focal assessment unit like PC. With keen homes, the way individuals live will clearly progress toward becoming more proficient and affordable. Constantly, our home can be spared from home robotization, so we will have much time to take a shot at different interests. In any case, savvy home innovation is a great decision for individuals who think about security and solace in any case, vitality sparing also. Savvy homes will turn out to be more omnipresent on the grounds that new advancements will be investigated to an ever-increasing extent.

This paper identified a set of features for the comprehensive classification of smart home environment research projects and systems proposed in the literature. Based on this classification, we reviewed some research projects with the goal to provide the reader with a more complete understanding of the research problems, challenges and results in the domain of engineering smart home environments. Although our review is not and cannot be exhaustive, we identified a number of essential issues that must be considered for successful Smart Home Environment research in terms of employed technologies, standards, and computational methods, as well as useful Smart Home Environment applications.

IX. FUTURE WORK

The improvements of comfort, security, economy and so on are worth for further research. But not only the lifestyle is affected by this technology. It's additionally ready to help individuals with a physical impede or more established individuals to deal with their everyday routine simpler and considerably more agreeable and along these lines we can anticipate new developments in this piece of innovation. Future work can be done in the areas of Health, Networking, Interfacing, Pervasive Computing, environment, energy and Robotics.

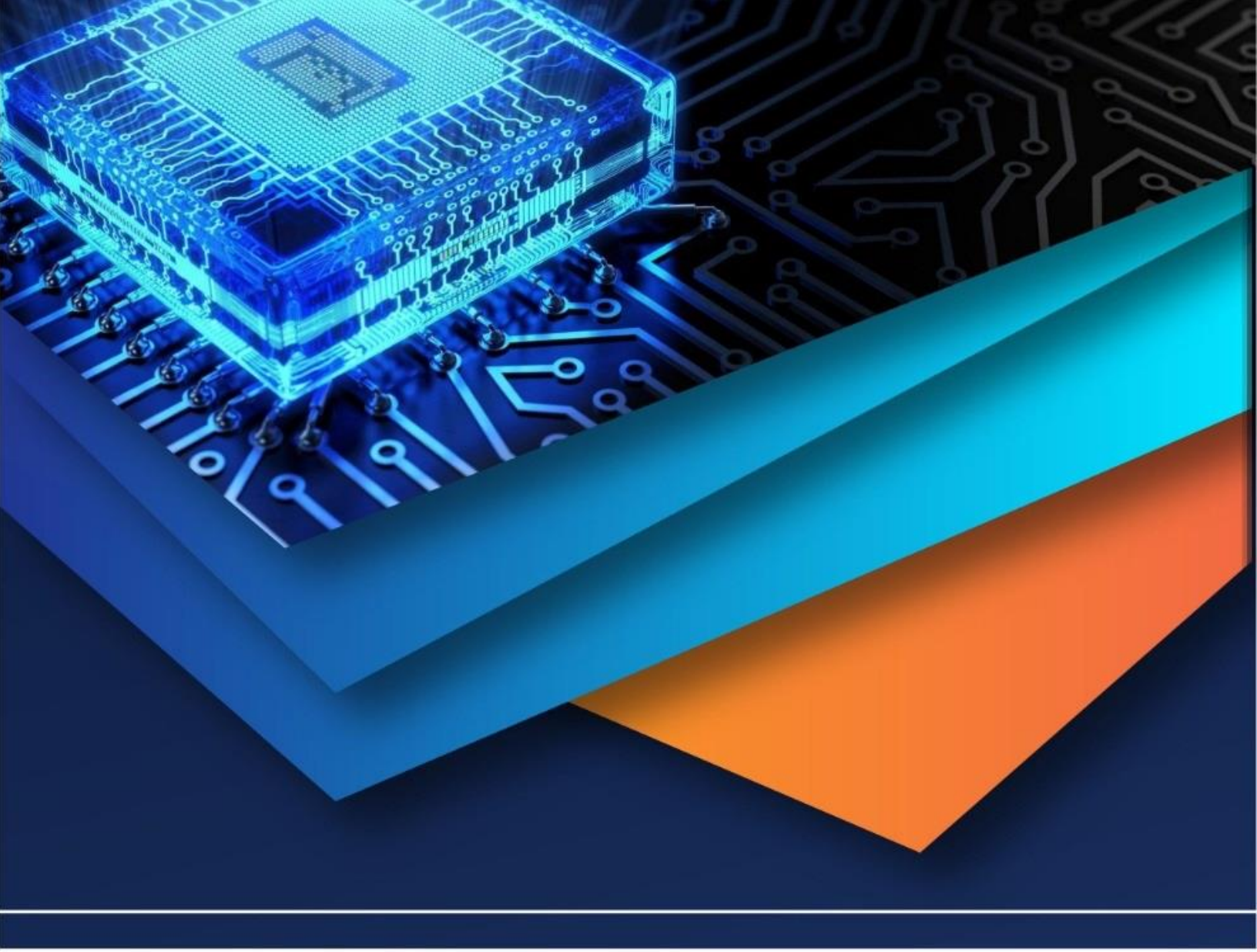
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