Artificial Intelligence in Home Automation

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Abstract— **Artificial Intelligence is a technology that is already impacting how users interact with, and are affected by the Internet. In the near future, its impact is likely to only continue to grow. AI is a rapidly advancing technology, made possible by the internet that may soon have significant impacts on our everyday lives. AI traditionally refers to an artificial creation of human-like intelligence that can learn, reason, plan, perceive, or process natural language. These traits allow AI to bring immense socioeconomic opportunities, while also posing ethical and socio-economic challenges. As AI is an internet enabled technology, the internet society recognizes that understanding the opportunities and challenges associated with AI is critical to developing an internet that people can trust.**

Keywords— **Artificial Intelligence, Home Automation System, Advantages, Types, Applications.**

Fig.1. Artificial Intelligence

I. INTRODUCTION

Artificial intelligence (AI) has received increased attention in recent years. Artificial Intelligence is one of the most popular areas in computer science and engineering. AI deals with intelligent behaviour, learning, and adaptation in machines, robots and body-less computer programs. AI is everywhere: search engines use it to improve answers to queries, to recognize speech, to translate languages, email programs use it to filter spams, Banks use it to predict exchange rates and stock markets, Doctor use it to recognize tumour, robots use it to localize themselves and obstacles, autonomous cars use it to drive, video games use it to enhance the player's experience, Smartphones use it to recognize faces/ objects/ voices/gestures/ music, etc. Artificial Intelligence (AI) is the simulation of human intelligence processes by machine, especially computer system. These processes include learning, reasoning and self-correction. Particular applications of AI include expert systems, speech recognition and machine vision. Amongst the many expectations that we have from technology, the baseline of all requirements is the need for it to make our lives more comfortable, more manageable and free us from the time-consuming daily chores. And technology has managed to bring us this comfort through smartphones. Our personal requirements to our professional commitments are now being easily managed using our smartphone devices. Shopping, banking, directions, emails, food and entertainment are all saving us time, effort and energy.

The role of technology has now advanced into an intelligent play, wherein, it now effectively manages out all daily requirements, provide remote control access of all daily requirements, provide remote control access of all devices and appliances at home and act as a virtual assistant. And this is just the beginning of things with Artificial Intelligence with home automation, Technology will, soon, virtually control all aspects of our personal and professional lives with advanced features of IoE (Internet of Everything).

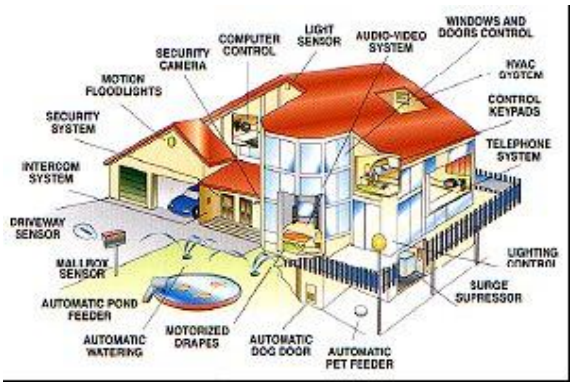

Fig.2. Artificial Intelligence with Home Automation.

A. Services Provided by the Home Automation System:

A home automation system provides a large number of services which can broadly classified into following three categories:

1) Remote controlling of appliances.
2) Efficient utilization of home resources.
3) Enhancing home security.

Comfortable management includes automatic adjustment of AC (air conditioning) settings, fan regulation settings etc. Remote controlling services include accessing devices from remote location and setting them ON/OFF. Efficient optimal setting (setting at which we get a required output at minimum cost). Last category of service includes all those services which are used for securing the home environment.

II. Types Of Artificial Intelligence

There are seven types of AI which are as follows:

A) Reactive Machine AI
The fundamental types of artificial intelligence system are quite reactive and they are not able to use previous experiences to advise current decisions and to configure memories. Example: - IBM chess program that beat Garry Kasparov in the 1990's.

B) Limited Memory AI
Limited memory AI is mostly used in self-driving cars. They will detect the movement of vehicles around them constantly. The static data such as lane marks. Traffic lights and any curves in the road will be added to the AI machine. This helps autonomous cars to avoid getting hit by nearby vehicles (Objects).

C) Theory of Mind AI
Theory of mind artificial intelligence is a very advanced technology. In terms of psychology. The theory of mind represents the understanding of people and things in the world that can have emotions which alter their own behaviour. Still this type of AI has not been developed completely in the society.

D) Self-aware AI
Self-aware AI is a supplement of the theory of mind AI. This type of AI is not developed yet. But when it happens, it can configure representations about themselves, it means particular devices are tuned into cues from human like attention spans, emotions and also to display self-driven reactions.

E) Artificial Narrow Intelligence (ANI)
ANI is the most common technology that can be found in many aspects of our daily life. We can find this in smartphones like Cortana and Siri that helps users to respond to their problems on request. This type of AI is referred to as "Weak AI" Because it is not strong enough as we need it to be.

F) Artificial General Intelligence (AGI)

This type of artificial intelligence systems work like humans and is called as "Strong AI". Most of the robots are ANI, but few are AGI or above. Pillo robot is an example of AGI which answers to all questions with respect to the health of the family. It can be distribute pills and give guidance about their

health. This is a powerful technology which is necessary for living with a full-time live-in doctor.

G) Artificial Superhuman Intelligence (ASI)

This type of AI has the ability to achieve everything that a human can do and more. Alpha 2 is the first humanoid robot developed for the family. This robot is capable of managing a smart home and can operate the things in your home. It will notify you of the weather conditions and tells you interesting stories too. It is really a high-powered robot which you feel like a member of our family.

III. Advantages of Home Automation system

There are the some advantages of Home Automation System which can be implement by using Artificial Intelligence are :

- Savings: Saving thermostats and smart lightbulbs save energy, cutting utility cost over time. Some home automation technologies monitor water usage, it helping to prevent exorbitant water bills. Certain devices even offer rebates.

- Safety: Many home automation technologies fall under the umbrella of home security. Consumers purchase these devices because they want to make their homes safer and more secure. Example: Security Cameras.

- Control: Consumers also choose smart home devices to better control functions within the home. With home automation technology, you can know what's happening inside your home at all times.

- Comfort: Some people use smart technology to record the history or play the music throughout the home. Connected devices can also help create a comfortable atmosphere – they provide intelligent and adaptive lightning, sound, and temperature, which can help to create an inviting environment.

IV. Why Automation using AI

1) Managing all of your home devices from one place. The convenient factor here is enormous. Being able to keep all the technologies in your home connected through one interface is a massive step forward for technology and home management.

2) Flexibility for new devices and appliances. Smart home systems tend to be wonderfully flexible when it comes to the accommodation of new devices and appliances and other technology.

3) Maximizing home security. For examples: home automation system can connect motion detectors, surveillance cameras, automated door locks etc.

V. Applications of artificial intelligence

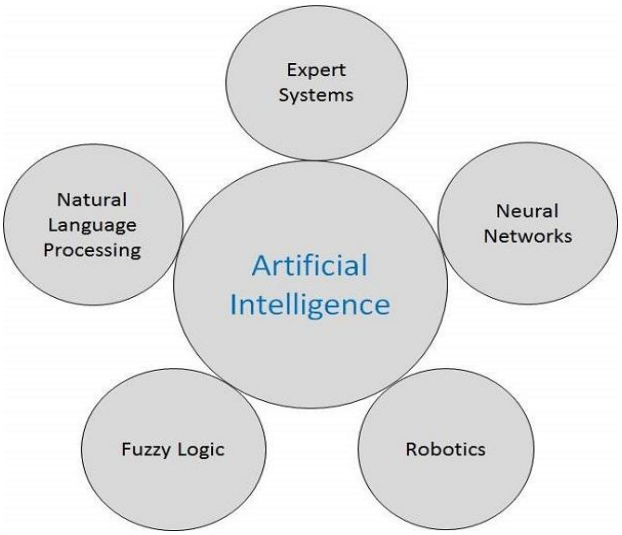

Fig.3. Applications of AI

- **Expert System:** In Artificial Intelligence, an expert system is a computer system that emulates the decision-making ability

of human expert. Expert systems are designed to solve complex problems. The first expert system were created in 1970's and the proliferated in the 1980's. Expert systems were among the firstly truly successful forms of artificial intelligence (AI) software.

- **Neural Network:** A neural network is a network or circuit of neurons, or in a modern sense, an artificial neural network, composed of artificial neurons or nodes. An artificial neural network, for solving artificial intelligence (AI) problems.

- **Robotics:** Robotics is an interdisciplinary branch of engineering and science that includes all types of engineering including computer science and others. Robotics deal with the design, construction, operation, and use of robots, as well as computer system for their control, sensory feedback, and information processing.

- **Fuzzy Logics:** Fuzzy Logics is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1 inclusive. It is employed to handle the concept of partial truth and completely false. By contrast, in Boolean logic, the truth values of variables may only be the integer values 0 or 1.

- **Natural Language Processing:** NPL is a subfield of computer science, information engineering, and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyse large amounts of natural language data. "Challenges in natural language processing frequently involve speech recognition, natural language understanding, and natural language generation.

VI. Pros and Cons

Pros:

- Error reduction.
- Difficult exploration.
- Daily application.
- Digital assistants.
- Repetitive jobs.
- Medical applications.
- No breaks.

Cons:

- High cost.
- No replicating humans.
- No original creativity.
- Unemployment.

VII. Conclusion

In short existence, Artificial Intelligence has increased understanding of the nature of intelligence and provided an immersive array of application in a wide range of areas. It has sharpened understanding of human reasoning, it has revealed the complexity of modelling human reasoning providing new areas and rich challenges for future.

AI is at the centre of a new enterprise to build computational models of intelligence.

The main assumption is that intelligence (human or otherwise) can be represented in terms of symbol structures and symbolic operations which can be programmed in a digital computer.

Home automation is undeniably a resource which can make a home environment automated. People can control their electrical devices via these Home Automation devices and set up controlling actions through mobiles. In future this technology will have high potential for marketing. Further it can be demonstrated from computer instead of mobile phone for controlling the appliances of any larger places.

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