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Artificial Intelligence in Robotics

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Abstract:-*The objective of this article is to give you an overview of world scope on two developing technologies that is, artificial intelligence (AI) and robotics. Robotics defines the term such as sensor and effectors. Robots are manufactured as hardware. The control of robot is software agent which takes data as input from the sensor decided sensors decides what to do next and this article is intends to introduce the basics of robotics in the perspective of artificial intelligence then the effectors to direct the work in the physical world. Every aspect of learning or any other functions of intelligence can precisely described that machines can be tested. An effort can to solve the issues of human by finding that how to use machine language from intellections and concepts and this will help them in their progress. It supports a broad conception of deliberation functions, future scope, and introduces some basic tasks found in modern robotics***.

Keywords:- *Artificial Intelligence, effectors, military use, Robotics challenges.*

1. Introduction

Artificial Intelligence (AI) is mainly defined to do the type of work from the computer which requires human intelligence.AI has progressed for developing limited, or simplified, domains. Since last five years the foundation of AI have brought very slow and less improvements, and early positivity concerning the achievements of human-level intelligence that has provided the means to an appreciation of the profound difficulty of the problem [1]. Artificial intelligence usually contain the computer science field, even they have many important bonds with other fields too which includes Mathematics, Psychology, Cognition and Biology. Our capability to combine the knowledge of all these fields that will definitely benefit our progress in the search of making a smart artificial being.

Artificial intelligence deals with two basic goals. First, it includes the study of processes or features of human beings. Second, it deals with representing the processes or implementing them via machines in an effective way [2]. An appropriate decision can be taken into consideration depending on the needs that how intelligent behavior appears. Artificial Intelligence addresses the crucial queries such as what information is needed in terms of thinking, how that information must be represented and how that information must be used. Thus, AI help in solving different problems and decision making that humans continuously face in dealing with life everyday [3]. However, robotics challenges the AI enabling it to work with the real world objects.

2. Challenges of AI

Right from software systems to robotic systems to biological systems, we find that our inventions are incredibly delicate by comparison [4]. It is easier to make progress and counts the success on small tasks, whereas it is difficult to build needful measures of general intelligence. We barely know where to start. Well computer will never be intelligent unless it can display a good command of common-sense. We don't even know how to represent the knowledge and information that is required for all of different tasks. Hardly any AI research groups are studying this question. Instead, they are focused on how to improve computer performance on narrow tasks [5]. Some challenges that are aimed at decreasing this distance. The challenges in nature usually do not solve particular problems, but the action of meeting those challenges will force the creation of modern techniques and equipment which will permit us to solve more specific and complex problems [4].

3. Perception

This report visualizes the advances in artificial intelligence and robotics in the upcoming years [6]. Robot perception is a prominent research field in AI and Robotics. Intelligent behavior is the key for perception. While the field of Artificial Intelligence has made impressive progress in replicating some aspects of intellect, such as planning and plan execution, machine perception remains frighteningly brittle and task-specific.

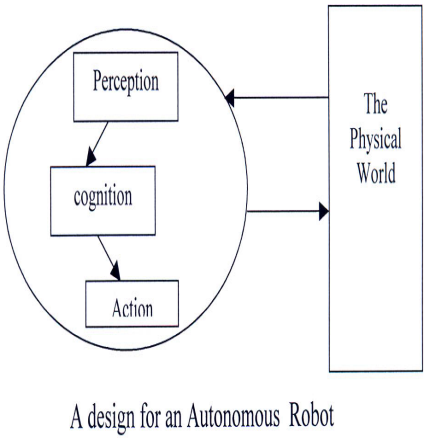

Figure 1- A design for an Autonomous Robot

This paper aims to focus on brittleness by supporting view through active, developmental, and interpersonal means. Machine perception is the ability to use input from sensors devices to detect aspects of the world. Computer vision is the ability to analyze visual input. A few sub problems can be speech recognition, facial recognition and object recognition [7]. Perception in Robotics develops and promotes novel concrete sensor technologies which give robots an integrated sense of touch and vision, like the hand-eye coordination of humans for carrying out some Task. [8]

In the past years, AI and robotics have been huge concepts, and they have been grown up with new techniques in order to solve different problems. One difference can be stated between AI programs and robots are that AI programs can operate in computer-oriented worlds whereas robots can operate in physical world. Perception implicates reading visions, sounds, smells and touch.

4. What is Robotics

Robot is a device that is capable of doing the most of the difficult task faster and even with the accuracy, which can be programmed by the computer system.Whereas Simply, Robotics can be defined as "The study of Robots." The tendency to think that robots having a human like appearance may stem from the origins of robots. In real world robots act as artificial agents. Robots are designed to manipulate the things by perceiving, selecting, moving, modifying the physical properties of object, destroying it, in order to do repetitive work without getting bored, diverted, or tired. Robotics is a field of AI, which consists of various different departments such as Computer Science, Electrical Engineering, and Mechanical Engineering for the purpose of building, designing and in many applications of robots [9].

Table 1 - Robot primitives defined in terms

ROBOT PRIMITIVES	INPUT	OUTPUT
SENSE	Sensor data	Sensed information
PLAN	Information sensed and/or cognitive	Directives
ACT	Sensed information or directives	Actuator commands

4.1 Sensors

The message to the robots brain can be provided by sensors which can be used in various different ways so that can perform its own task.

The information send by a sensor is in the form of electronic signal back to controller. Sensors help the robots controller by giving them the information about its surrounding and let them know their current position of the arm or the information about the world around [10].

Sensors can be mainly categorized into two different types that is, internal sensors and External sensors. Internal sensors are those which are used for basic internal function of the system e.g. position, velocity, acceleration. External sensors are used for the interaction with the environment such as vision, force, touch, proximity [11].

4.2 Effectors

The term effectors effectively help the robots to take an action. Effectors are the means by which robots can communicate with the surroundings, move and modify their structure. Robots control their effectors, which are called as end effectors which include arms, fingers, wheels, fins, legs [10]. End effector is a tool that helps to connect the end arm of the robot. The structure of an end effector depends on what the task the robot will be performing. The robot's hand is called gripper which is the most functional part of an end effector which helps the robots to pick up the things. End effectors can be used in wide range of applications such as of manufacturing cutting tool, magnets, anti-collision sensors and grippers [12].

6. Robotics in Different Fields

6.1 Industrial Robots:

The most effective application of industrial robot is that it can work as a manipulator which can be modified for the locomotion of materials, parts and equipments to perform different types of programmed tasks in manufacturing and production settings [13].

6.2 Military Robots:

With the advanced technology scientists and researchers have come up with a new creation called military robots. These robots have made the life of human beings simpler and easier. The robots which are utilized in this field are usually constructed with integrated system which consists of video screens, sensors, grippers and cameras. The military robots also have different types of structures according to the needs and the use of each robot [14].

6.3 Medical Robots:

Science that comprises of number of operations that require wide utilization of telepresence comes under the application of Medical Robots. Robots are used in the field of medical science with a view point to perform various operations that require the execution by human beings manually. [15]. The example of robotics used for surgery purpose is the da Vinci robot surgery system.

6.4 Domestic Robots:

The robots which are used at home are Domestic Robots. There are different types of robots for domestic purposes such as robotic pool cleaners, robotic sweepers, vacuum cleaners, robotic sewer cleaners which can do various household tasks. So, Robots may not yet be a common sight in our world, but we already come across them in any places. Nowadays, they have started to come to us as toys or household helpers. The era of robots has just begun.

7. Future of AI in Robotics

The fields of artificial intelligence (AI) and robotics are tremendously growing with exhilarating inventions for creating the automated world for us. In recent years the emerging power, functionality and presence of computers everywhere worldwide have surpassed the early forecasts about technology's rate of advancement [16]. Although most of people expect a drastic development in AI and robotics in the coming years, whereas certain expect more tremendous developments at a faster rate [6]. It seems as though not even a week passes where another AI system does not overcome an unmatched obstacle or outperforms human beings. But how AI will pan out for humans in future remains yet unseen. AI could either contribute to humanity or it may destroy it. There will be several path-breaking failures and so many indirect impacts as well [6].

Whereas AI will help us in facing the threats as well as for taking care of growing population and have a prolonged freedom from many complex problems[17]. Many expert surveys have predicted that ill, retired and disabled will be benefited the most in a very prolific way with the help of robotics. [6]. Clever interactive virtual human agents will be a new source of life in modern world and will be able to care and help the people whenever and wherever they require any help [6]. Robotics/AI has a firm hold in the field of medical science [6].This will improve the superiority of own and care for others as well as this will improve cohesion with fitness routine in future [6].

8. Conclusion

This article gives an overview about the mechanisms of artificial intelligence, its applications and its future.

The future ultimately says that "It will change the qualities of our life, our intelligence, our creativity and our interaction." We will have robotic support to help us in recollecting facts, and access to ideas that will give our minds enlarged abilities. It appears that emerging technology is now ready for early applications which will definately lead to countless creation. We trust that the AI–Robotics collaboration is becoming more composite and comfortable, and it remains today as fruitful for both fields as it used to be in their early beginning.

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