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Robotics and Expert System

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Abstract: A mechanical device or system that can think and look, observe, hear, walk, speak and feel like a human can be developed using a knowledge-based technique known as the expert system. The expert system can be integrated with robotics to connect human intelligence to machines to perform intelligent work like that of humans by incorporating functions such as reasoning, knowledge/intelligence and problem-solving. The methods implemented in expert systems were examined in this article as well as the review of the literature of the different applications of expert systems in the field of robotics.
In this article, articles with a keyword index and articles from several literature reviews are discussed to explore the various applications of the expert system. Different types of expert systems are also presented in this article, P. B. Rules for expert systems based on knowledge and expert systems based on diffuse properties, properties and characteristics of the expert system and its advantages.
Keywords: Artificial Intelligence, Robotics, Expert Systems

I. INTRODUCTION

Robotics is an interdisciplinary research field at the interface of IT and engineering. Robotics Includes the design, construction, operation and use of robots. The goal of robotics is to develop intelligent machines that can help and support people in their daily lives and ensure the safety of everyone. Robotics is based on the implementation of information technology, computer technology, mechanical engineering, electronics and others. [2]

II. TYPES OF ROBOTS

Mechanical bots come in all shapes and sizes to proficiently do the assignment for which they are structured. From the 0.2 millimeter-long "RoboBee" to the 200 meter-long automated delivery vessel "Vindskip," robots are rising to complete errands that people just can't. By and large, there are four sorts of robots:

A. Pre-Programmed Robots

Pre-programmed robots work in a controlled domain where they do straightforward, dreary errands. A case of a pre-programmed robot would be a mechanical arm on a car sequential construction system. The arm serves one capacity- to weld an entryway on, to embed a specific part into the motor, and so forth and its main responsibility is to play out that task longer, quicker and more effectively than a human.

B. Humanoid Robots

Humanoid robots will be robots that resemble as well as copy human conduct. These robots ordinarily perform human-like exercises (like running, bouncing and conveying objects), and are at times intended to seem as though us, in any event, having human appearances and articulations. Two of the most conspicuous instances of humanoid robots are Hanson Robotics' Sophia and Boston Dynamics' Atlas.

C. Autonomous Robots

Autonomous robots work autonomously of human administrators. These robots are generally intended to do undertakings in open situations that don't require human oversight. A case of an independent robot would be the Roomba vacuum cleaner, which utilizes sensors to meander all through a home unreservedly.

D. Teleoperated Robots

Teleoperated robots are mechanical bots constrained by people. These robots as a rule work in outrageous land conditions, climate, conditions, and so on. Instances of teleoperated robots are the human-controlled submarines used to fix submerged channel spills during the BP oil spill or automatons used to identify landmines on a front line.

Expert Systems are computer applications developed to solve complex problems in a particular domain at the level of extraordinary Human Intelligence and expertise.

Expert systems are a subspecialty of artificial Intelligence (AI). The term is generally understood as "knowledge-based" or "knowledge-driven" system for representation and application of factual knowledge in certain areas.

What areas are proper for master framework work? Above all else, for the current situation with master frameworks innovation the difficult area must be of restricted extension. A dominant part of the individuals inside the application field must concur that genuine specialists do exist. The issue must be information, not information concentrated. An issue is information escalated if there is generous inconstancy in individuals' capacity to settle it. The issue must not require data from visual info. Different answers from a similar information can be taken care of yet with constrained achievement. Maybe the best trial of just for a potential contender for master framework work is the alleged "phone test." If you have an issue and you are sure that on the off chance that you called somewhere in the range of a known master in the field, the individual could tackle the issue for you in a short time or less via telephone, at that point the issue is probably going to be amiable to a specialist framework arrangement.

How do master frameworks contrast and human specialists? The mainstream press was incredibly hopeful about the present condition of advancement of master frameworks. Despite the fact that there are numerous helpful master frameworks accessible, they apply to restricted issue regions. In these zones, master frameworks can rapidly give predictable and target reactions.

Master frameworks can catch human encounters and make it perpetual, for the most part accessible and effectively convenient. Current master frameworks come up short on the inventiveness and versatility that is anticipated from them as human experts.[6]

How accomplish master frameworks work? Notwithstanding the subtleties of the execution, a specialist framework is a program driven by a deduction motor towards a particular objective. It is, in the cutoff, a strikingly straightforward procedure including a keenly requested arrangement of "if tests." A potential trouble is the point at which the issue gets enormous and thus the quantity of rule structures in the database builds, a specialist framework can get hard to change, hard to troubleshoot and ease back to execute.

III. DEVELOPMENT METHODS USING EXPERT SYSTEM AND ROBOTICS

A central theme in our research in recent years. Years was the analytical director's idea. Laboratory robots can easily operate repetitive tasks according to a set of immutable rules. But when a robot becomes a mechanical extension a control program that is logically capable the whole becomes greater than the sum of Coins. The Analytical Director project is an expert. Robot controlled by a system that combines knowledge in laboratory analytical chemistry Robotics The system is currently only limited to How to design analyzes, test procedures and modifying these methods and finally File of modified procedure for future reference. Flexible analytical library facilities Directors are made possible by "Smart Data" Skills inherent in logic programming. Languages the current implementation of the analytical director is a Zymark robot that operates under the control of ARTS software, an expert system robotic language piloted. The control computer is a simple pc Demonstration of an Analytics application. Director, development of complexometric titration The procedure is presented in the form of a flowchart in Figure.

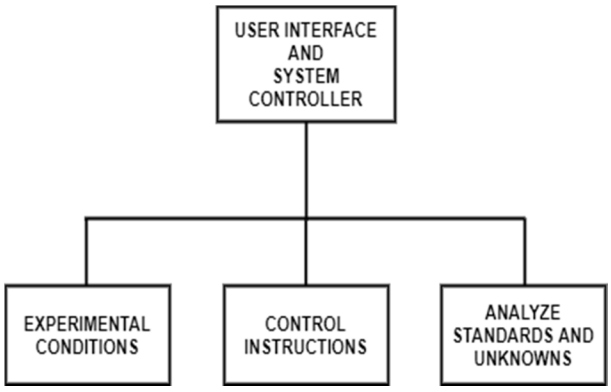

Figure1: Complexometric titrations under expert system control.

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A successful complexometric titration requires that the conditions are adjusted so that a constant conditional constant of about $1x10^5$. Decisions to make include pH, the titrant, masking agents or agents used and method of endpoint detection. There is abundant literature on complexometry. Degrees Some of this information is It is part of the knowledge base used by the ARTS system[2]. The system doesn't just start with knowledge Basic, but you can continually update this knowledge Base using the results of the experiments. The user receives the possibility of all or part of the Parameters you want. The system does Overwrite user input, although this may be incorrect. The system fills in the missing user input Knowledgebase The success or failure of a determination. it is saved by the system for future use.

Experimental results for triplicate determination Ni + 'by complexometric titration are presented in Table I and in relation to the results obtained with manual degrees.[3]

	Expert System	**Human**
Trial 1	0.1006	0.0981
Trial 2	0.1004	0.0981
Trial 3	0.1007	0.0983
Average	0.1005	0.0981
Standard Deviation	0.0001	0.0001
% Standard Deviation	0.15	0.12

Table-1. Comparison of expert system and human counterpart. Results for the titration of a Ni^{2+} solution using 0.1004M EDTA without an indicator. Absorbance data were collected at 480nm.

IV. CHEMICAL DATA TO EXPERT SYSTEM

One of the most difficult problems when working with an expert system is creating an effective knowledge base. When the knowledge base grows, it is important to create production rules that are as efficient as possible. The knowledge base used by an expert system can be structured more effectively as a set of rules that describe the minimal decision tree that includes the data. The root node of this tree is the data attribute that minimizes the number of branches of the root. Each branch of the root node contains a different value than the root attribute and creates second level nodes. These second level nodes can be branched further by using attributes that are different from the previous attributes that were used to share the data. The attributes and values of the class occupy the end nodes in the decision tree. If multiple attributes are used to describe the data, the decision tree is not unique. As the number of attributes required to describe the data increases, the number of possible decision trees increases in a combinatorial manner.

For this task, we implement the ID3 algorithm (iterative dichotomizer 3)[4-6], which was initially developed for the organization and optimization of chess game strategies.

The ID3 algorithm is based on information theory and uses the entropy of classification. The classification entropy is a measure of the entropy that results from the classification of an object in a certain class. The algorithm first determines the attribute to be used for the root node of the tree so that the number of branches of the root node is minimal. Each branch of the root node represents a unique value of the root attribute. The algorithm is applied recursively to all second level nodes and all subsequent nodes are generated by each of the second level nodes.

V. CONCLUSION

Thus concluding we can be sure of the fact that when robotics are interrelated with the expert systems then they can be very much beneficial for mankind. By implementing the technology on the robots, manual or autonomous, a large no of jobs can be done by them, thus revolutionising the industries and reducing manual labour. The work on expert systems has been extensively studied in the various research labs in order to make the robots as intelligent as humans with the help of AI. A lot many types of research have said that expert systems, presently, lack the creativity and the adaptability with the robotics industry but once this is achieved there would be a remarkable breakthrough in the history of mankind.

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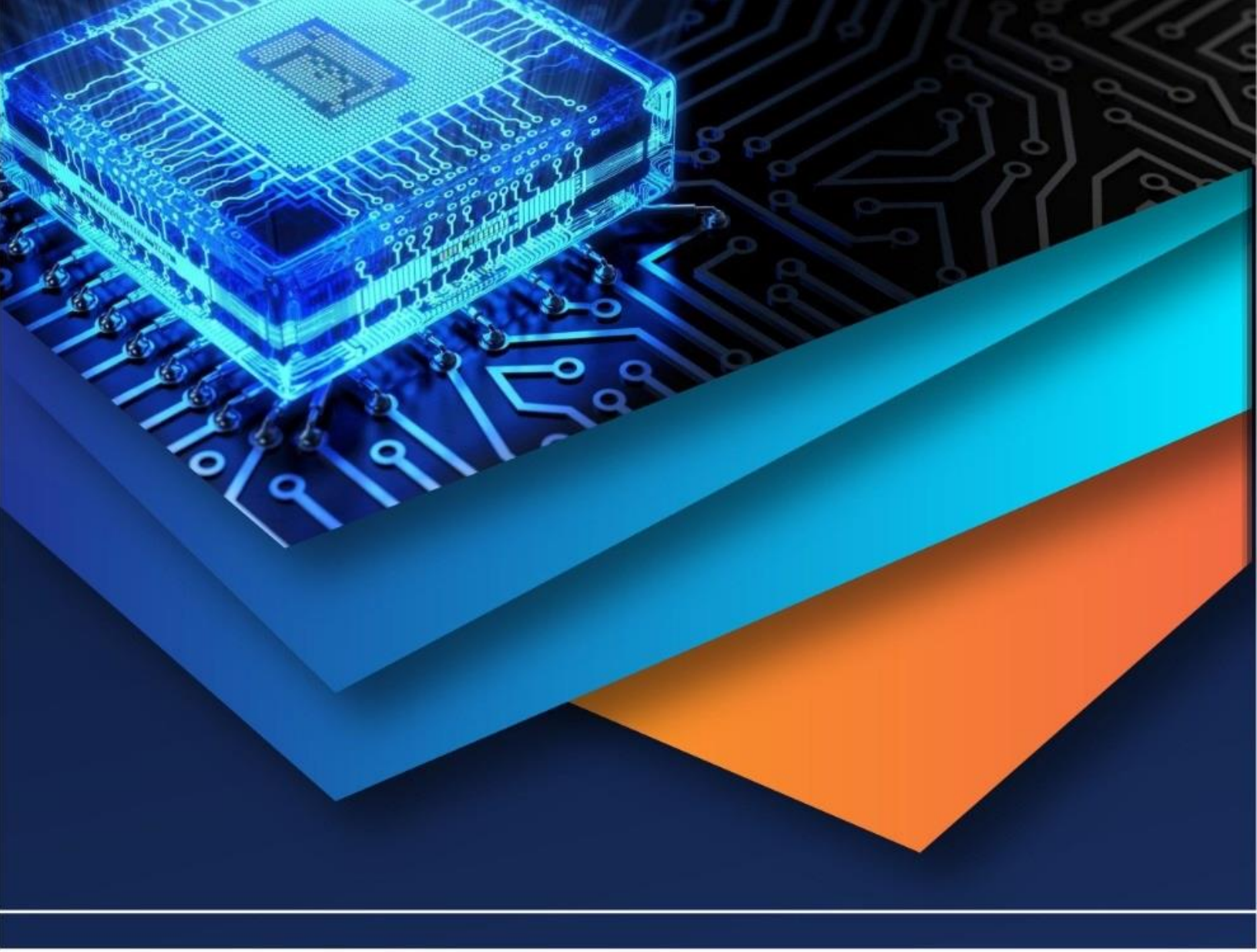

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