

# ENHANCED AI-TECHNIQUES IN ROBOTIC MOTION

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## **ABSTRACT:**

This paper reviews the present development of AI (AI) techniques for the appliance area of robot communication. The study of the control and operation of multiple robots collaboratively toward a standard goal is fast growing. Communication between members of a robot team and from humans is becoming essential in many real-world applications. The study focuses on AI techniques for robot communication to strengthen the communication capabilities of the multi-robot team, and to perform complex functions, make commendable decisions, and integrate action, and performing their tasks efficiently.

## **KEYWORDS:**

AI , robot, multi-robot, robotics communication, internet of robotics things, internet of intelligent things, Ad-hoc network, wireless network, swarm robotics.

## I. INTRODUCTION

Artificial Intelligence (AI) is used to strengthen science and technology thanks to its amazing ability to handle large data, complexity, high accuracy and fast processing. Artificial neural network (ANN), symbolic logic, neuro-fuzzy interference system (ANFIS), genetic algorithm, pattern recognition, clustering, machine learning (ML), particle swarm optimization (PSO), etc., are the familiar tools of AI.

AI has been employed in various areas like engineering, science, medicine, computing, finance, economic then on. Furthermore, it's been wanted to make machines smarter. Smart machine means the power to form a machine perform intellectual tasks in an environment like or on the brink of a person's would do. Therefore, AI is a component of the pc science and also arguably the foremost existing field in robotics. With a view to use AI approaches and robotics became an emerging technology at a rapid pace, offering many possibilities for automation tasks in many application areas like domestic services, and space explorations, medical procedures, and military operations, collecting data about atmospheric pressure, temperature, climate, wind then on Therefore, we will

find functions of robots not only at work but also reception and industry, replacing many tasks that are dangerous and exhausting. Robots could also be classified into two major types which are the service robots and field robots Robotics has brought about tremendous changes in various socio-economic aspects of our society. Robotic and AI aim is to make and understand machines capable of thinking and acting like humans. in sight of this, robotics has the potential for self-learning self-organizing self-reproduce. Nowadays, robots are getting intelligent machines which use their AI, abilities, and cleverness to perform tasks quickly and smartly.

RECENT success of Deep Learning (DL) in image processing and game playing has prompted robotics research community to adapt the technology for his or her needs. a number of the issues in Robotics are perception, control and coordination. Perception in robots may be a problem almost like image recognition and hence easily addressed by DL. Artificial Neural Networks (ANNs) using Back-Propagation (BP) algorithm are applied to specific control problems in industrial robots. Capability of an ANN to unravel a selected problem depends on the structure wanted to implement the ANN, training set provided, suitability of the

network to deal with the particular sort of problem, etc.

Many path related problems robotics are known to belong to a class of NP-Hard problems generally called Pspace-hard. Recent developments in neural networks offers solutions to such problems.

During this paper we present details of a replacement type of neural networks which we call Auto-Resonance Networks(ARN) and their application to motion control in robotics. Some of these areas include

- (a) Automated path search,
  - (b) Path optimization (Lebesgue measure),
  - (c) Movers' Problem (collision detection),
  - (d) Joint activation (inverse kinematics),
- etc.

## II. ROBOTIC MOTION CONTROL USING ANN

A model of a robotic mechanism with multi segmented joints controlled by a neural network. The network works very almost like a toddler learning to manoeuvre. During training, the system will excite the joint angles to random values, which can take the top point to a computable point in  $\{x,y,z\}$  space covered by the mechanism. The network learns from these inputs and develops a network of neurons. During run time, the situation to which the top point has got to move is given to the neural network. Best matching node is identified as the node that

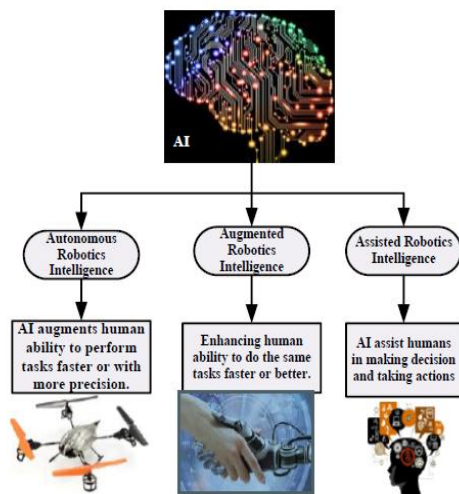
maximally matches the input. Any difference between the specified location and site reached by the top point is employed to update the weights of the neural network. If the difference between the input and therefore the stored value is larger than a threshold, a replacement node is added to the network at a topologically negotiated location. Further, it'll spawn neighbors within the output space with parameters distributed statistically around the new node. This process of spawning nodes is sustained throughout the training. The hierarchical data structure of the neural network. Lower layers show how ARN and SOM networks are integrated.

## Artificial Intelligence and Robotic Communication Overview

Development of nano-antenna provides us with a replacement version of wireless communication called nano-wireless communication. Nano-wireless communication is extremely important for communication between small things. One among the applications of nano-communication is for communication between micro-robots. Always the communication between robotics uses ad-hoc network technologies due to independent nodes. Robot communication protocols are used to ensure wireless connectivity between robots.

AI is difficult to define precisely. However, John McCarthy, referred to as

the daddy of AI, defined AI as” the science and engineering making intelligent machines.”. Therefore, AI refers to the power of robotics systems to process information and produces outcome during a similar manner as humans neutralize learning, deciding , and solving problems. Furthermore, AI is growing continuously to form machines smarter and smarter. AI is employed to form machines more intelligent, and machine intelligence is that the ability of a machine to perform any intellectual task in any environment



AI for Robotic Intelligence

When a path is to be traversed, the cells in third layer trigger the neighboring cell to affect motion of the top point. Parameters necessary to shift the joint angles are provided by the connections between neighboring cells. a better layer of the neural network memorizes the paths traversed to succeed in an end point, almost like an ARN network. Top layer of cells can then select among various

available paths and optimize them. The network is best described as a hierarchy of cellular automata: Each cell during a layer performs identical function but varies only by the weights like the input. However, cells differ from layer to layer in their functionality. Cells within the higher layers are generic in their function while those at lower layers are highly specialized. during this way, the network are often seen as a posh neural network with specialized layers of cells which will control a given multi segment joint . Following sections describe the network in additional detail.

### THE CONTROL NETWORK

A new ANN structure combining ARN and SOM features to control robotic motion using multiple joints with large DoFis proposed during this paper. The network learns by moving the joints arbitrarily and recording the effective end point location and the excitation values applied to every of the joint control inputs. Suitability of such network for motion control in various sorts of joint configurations has been presented.

First layer of the neural network consists of a recognition layer of ARN cells. A cell like the input and effective end point location is added first. Its weights are computed such the cell resonates (generates maximum output value) when an equivalent input is applied again.

Therefore, the cell acts sort of a future memory which will not change over period of your time. The layer adds cells as more training data is applied. When a replacement location is identified, a set of latest cells are added to the network.

## CONCLUSION

A new sort of multi-layered Auto Resonance Network for path planning of mobile robotic locomotion is proposed during this paper. It's proved that the complex inverse kinematic expressions are often completely avoided by the proposed ANN built using Adaptive Resonance Network and Self Organizing Maps. The network can find the multiple paths round the obstacles within the work space and choose the simplest path suitable for robotic motion. This text reviewed the intelligence techniques, which are currently getting used to reinforce robotic communication and making robots performance adaptive. Therefore, AI may be a key technology to assist humans both on the world and in space, making exploration feasible. AI includes many approaches like ANN, ANFIS, PSO, symbolic logic, machine learning, and large data. The many advantage of using AI in robot communication is to coordinate individual robots' duties, protect the collision, and enhance the team performance, faster process and easier work. The intelligence added to the robot's

communication makes the robots better and makes the tasks more efficient and effective. Furthermore, using AI as a way for communication among robots and with humans via the web, cause a replacement phase which is named IoRT. IoRT may be a promising technology that creates intelligent things communicates with one another and with a person's.

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