

Trainable Intelligent Autonomous Vehicular System for Real Time Applications

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Abstract: In this project our main aim is to develop a system wherein an individual can train robots and teach them how to perform a task by showing them how it is done by actually performing the task once. This type of system would reflect on the human methods of teaching wherein a teacher teaches a student how to perform a task by showing them how it is done by actually performing it once himself. As a child observes and learns the teacher's methods and actions and tries to repeat the same when he tries it himself, our system will install the same characteristic into our robot as well. For the purpose of presentation of such a system, we will implement an algorithm or a procedure via which the robot will record and learn the actions when performed by the user or the trainer in the learning phase which is nothing but when the user is performing and teaching the action to the robot for the first time. We will derive a technique or a mechanism via which these actions can be stored, altered and replayed. Also, filters, acceleration, slow motion replays are also be included. We are going to create the dummy model of a vehicular robot to demonstrate the system. The user will guide or train the robot to run on certain track or paths by manually driving it once, after which the robot will record, learn and execute the task itself.

Keywords: Real-time control, Experience replay (ER), reinforcement learning (RL), Q-learning, robotics.

I. INTRODUCTION

At present, industrial automation generally requires a large number of machines for continuously and repeatedly done the same number of action. The main problem occurs in designing such a system is a complex and tough programming and constant operating speed. So this problem can be overcome by designing & develop a robot or a robotic bot based on experience learning technique or approaches which work on real time. In regular approach the system is developed and designed for dedicated task which has only the specific use and no other use, another problem is user need to have a deep knowledge of programming or must be an expert programmer to reprogram a robotic bot for specific task, so it can be conquered by installing wired modules. Algorithm can be designed and developed based on experience replay learning method to store and record action & convert each and every action into required motion signals/codes and vice-versa.

This kind of bot has number of application in daily industrial automation like cleaning of targeted or specific surface, pick and drop or place particular object, close and open bottle neck etc. To accomplish such task and to design such an intelligent robotic BOT, an algorithm can be designed and developed through which the bot will store and record the actions when performed by the user or the trainer in the learning point and it is like the user is teaching or performing the action for the robot to the first time. The prototype or a dummy model of a vehicular BOT can be used to provide the demo of a system to run a bot based on the sequence of motion codes or recorded instructions. To add extra effects additional filters can be installed.

II. OBJECTIVES

- Minimize human action according to the instructions and directions stored by the programmer during the learning phase of a robotic bot.
- The objective of the system is to perform same task repeatedly and autonomously and can be easy to reprogram for different task.
- Another feature of the system is multiple storage capability like pick and drop any object and cleaning particular surface.
- Filters used to add and alter the additional effects and filters during the replay; here filters can be used for modifying/editing the speed of robotic bot.
- Reprogramming of every new task.

III. DISCUSSION

RESEARCH METHODOLOGY TO BE EMPLOYED

1) PROPOSED SYSTEM ARCHITECTURE

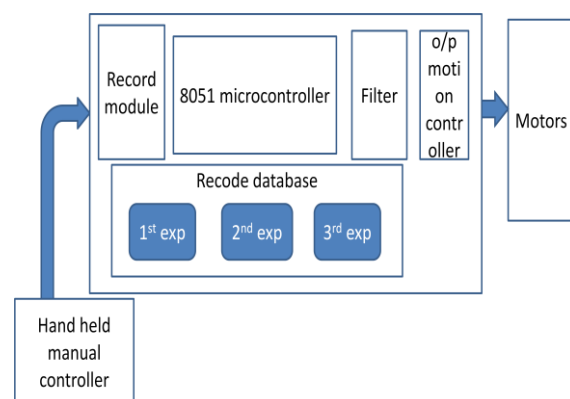


Fig.1:Basic system architecture

Wired hand held or wired remote controller will give experience in the form of motion. These signals and instructions of motions are stored into the database or in the record module. The recode database will record and store that motion into code make it ready for use. It will also store the information of which action is performed and how much time that action is performed. The main task of motion controller is to convert that recoded data into motion which is shown by motor.

Additional filters are applied on the recoded data to add extra effects.

IV. PROPOSED METHODOLOGY

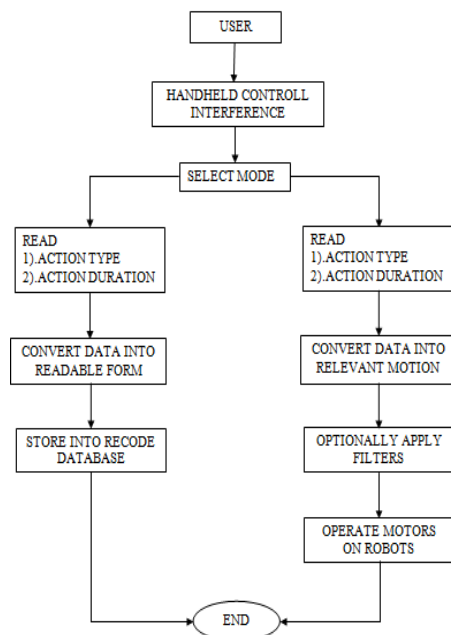


Fig. Process flow

IV. EXPECTED OUTCOME

- A learning algorithm and a system can be developed which is trainable industrial robotic bot based on experience replay learning method or algorithm.
- In the development of this project, a learning based algorithm is developed that can be used in various modular robots to bring out or achieve real time functionality and scalability.
- In this project will add and implement a wired module to enable and make use of wired control of the robotic bot via developed handheld controller to record and store action and convert those actions into sequence of motion codes and vice-versa.
- Additional filter section is there to add, modify or alter effects during the replay action.

V. CONCLUSIONS

We have developed and designed an algorithm based on experience learning method to record action and convert them into in a sequence of motion codes. The algorithm can be install and implement in any kind of robotic system.

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BIOGRAPHY

Pavan V. Gupta is a Post Graduate student in the Computer Science and Engineering Department, G. H. Raisoni college of Engineering, Nagpur. He received Bachelor of Engineering degree in 2012 from Rashtrasant Tukdoji Maharaj Nagpur University, MS, India. His research interests are Embedded Systems and Artificial Intelligence.