

Spiral Path Robotic Arm

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Abstract— The 6-axis robot system used in assembly line, spray painting, process automation, etc conventionally use the Cartesian or polar system of orientation, where in there is a single actuator for each motion and each motion is achieved as combination of individual motion of these actuators to get the net effect. This method proves to be more time consuming because cycle time of each actuator is added to form the total time required to reach the destination spot. So also cost of each actuator and complex control system is also very high and the system is high on space required, running cost and space occupancy. Thus in order to reduce the cycle time, cost space occupancy and running cost the humanoid wrist arm robot system is designed. The innovation in the wrist arm design to control three direction motion using a single motor makes the system very compact, cost effective, and easy to control and operate and low on running cost as only one actuator is needed instead of three. The project aims at design, development and analysis of this wrist arm and combining it with rotation about z-axis motion to effect a complete manipulator design.

Key words: Gripper, Indexing Plate, Self Locking, Worm Gear, Wrist arm

I. INTRODUCTION

Robotics is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics. The concept of creating machines that can operate autonomously dates back to classical times, but research into the functionality and potential uses of robots did not grow substantially until the 20th century. Throughout history, robotics has been often seen to mimic human behavior, and often manage tasks in a similar fashion. Today, robotics is a rapidly growing field, as technological advances continue, research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks

A. Robotic Aspects:

There are many types of robots; they are used in many different environments and for many different uses, although being very diverse in application and form they all share three basic similarities when it comes to their construction.

1) First:

Robots all have some kind of mechanical construction, a frame, form or shape that usually is the solution/result for a

set task or problem. For example, if you want a robot to travel across heavy dirt or mud, you might think to use tracker treads, so the form of your robot might be a box with tracker treads. The treads being the mechanical construction for traveling across the problem of heavy mud or dirt. This mechanical aspect usually deals with a real world application of an object or of itself, example lifting, moving, carrying, flying, swimming, running, walking...etc. The mechanical aspect is mostly the creator's solution to completing the assign task and dealing with the physics of the environment around it, example: gravity, friction, resistance...etc. Form follows function.

2) Second:

Robots have an electrical aspect to them in them, in the form of wires, sensors, circuits, batteries ...etc. Example: the tracker tread robot that was mentioned earlier will need some kind of power to actually move the tracker treads. That power comes in the form of electricity, which will have to travel through a wire and originate from a battery, a basic electrical circuit. Even gas powered machines that get their power mainly from gas still require an electrical current to start the gas using process which is why most gas powered machines like cars, have batteries. The electrical aspect of robots is used for movement: as in the control of motors which are used mostly where motion is needed. Sensing: electrical signals are used to determine things like heat, sound, position, and energy status. Operation: robots need some level of electrical energy supplied to their motors and/or sensors in order to be turned on, and do basic operations.

3) Third:

All robots contain some level of computer programming (code). A program is how a robot decides when or how to do something. For example: what if you wanted the tractor tread robot (from our previous examples) to move across a muddy road, even though it has the correct mechanical construction, and it receives the correct amount of power from its battery, it doesn't go anywhere. Why? What actually tells the robot to move? A program. Even if you had a remote control and you pushed a button telling it to move forward it will still need a program relating the button you pushed to the action of moving forward. Programs are the core essence of a robot, it could have excellent mechanical/electrical construction, but if its program is poorly constructed its performance will be very poor or it may not perform at all. There are three different types of robotic programs, RC, AI and hybrid. RC stands for Remote Control, a robot with this type of program has a preexisting set of commands that it will only do if and when it receives a signal from a control source, most of the time the control source is a human being with a remote control. AI stand for artificial Intelligence, robots with this kind of programming interact with their environment on their own without a control source. Robots with AI create solutions to objects/problems they encounter by using their preexisting programming to decide, understand, learn and/or create. Hybrid

is a form of program that incorporates both AI and RC functions, For example: your robot may work completely on its own, encounter a problem, come up with two solutions like an AI system, and then rely completely on you to decide what to do like a RC system. Robots have three aspect of construction mechanical, electrical and programing.

II. HEADING

- 1) Introduction
- 2) Figures and Tables
- 3) Conclusion
- 4) Acknowledgement

III. FIGURES AND TABLES

A. Problem Statement:

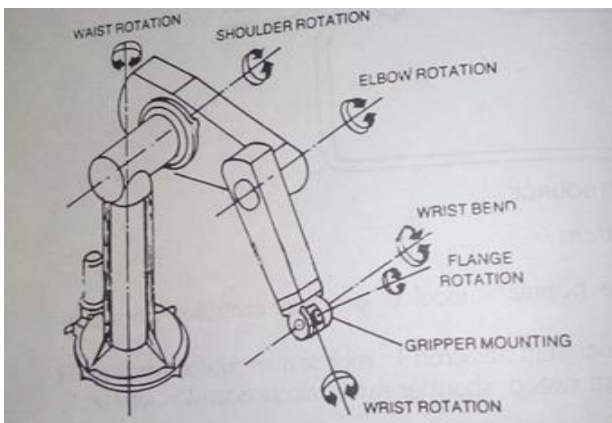


Fig. 1:

B. Comparison of Conventional and Desired Path

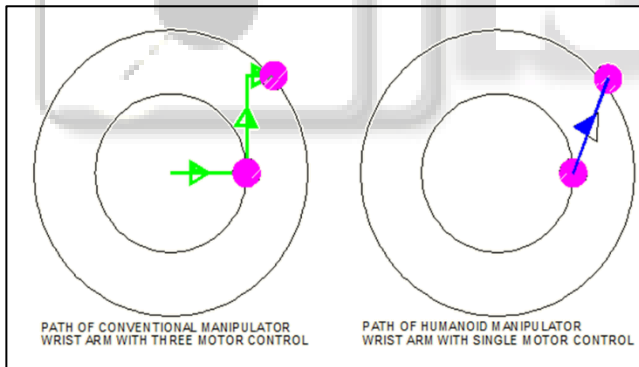


Fig. 2:

C. Mechanical Gripper:



Fig. 3:

D. Wrist Portion Mechanism:

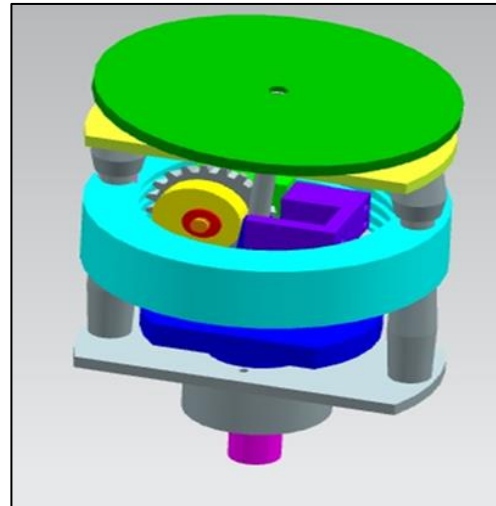


Fig. 4:

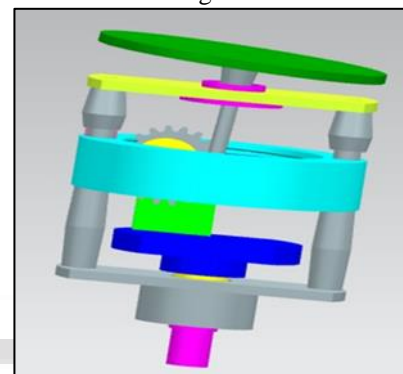


Fig. 5:

E. Actual gear:



Fig. 6:

IV. CONCLUSION

A. Scope of the Project:

Now a days the world is turning towards the automation fastly, mainly automation means the replacement of the worker with the machine simply. Automation is preffered in industry as it require less cost than cost required for workers and also the working efficiency and also the the profit and per capita income of the respective industry also increases. So our project is also one of the kind of automotive project which also eliminates the human interference in the lots of industrial activities. We are going to design a product that can be used

as pick and place device which can be used for material handling process, segregating of finished products from the process. Hence the scope of our project is very much great now a days because it takes less time for achieving the transportation motion in industries. Hence our project is very much industry demand satisfying.

Advantages:

- 1) High speed of device makes Job placement faster
- 2) Low cost automation as it uses only one motor instead of three
- 3) As angle of tilt is 30 degree, it is possible to cover a larger domain
- 4) No high cost electronics needed

Applications:

- 1) Main Application of the system is in assembly robots for the assemblage of the component
- 2) The Robotic arm mainly used in the manufacturing of pick and place robots for the material handling in any type of mechanical industry.
- 3) The system may be employed in spray painting robots for the painting of vehicles
- 4) System may also be employed in machine loading and unloading system.

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