

Implementation of pic and place robot in industrial application to increase the production efficiency

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Abstract

Mankind has always strived to give life like qualities to its artifacts in an attempt to find substitutes for himself to carry out his or-ders and also to work in a hostile environment. The popular concept of a robot is of a machine that looks and works like a human being. The industry is moving from current state of automation to Robotization, to increase productivity and to deliver uniform quality. The industrial robots of today may not look the least bit like a human being although all the research is directed to provide more and more anthropomorphic and humanlike features and super-human capabilities in these. Here how a pick and place robot can be designed for a workstation where loading and packing of lead batteries is been presented. All the

various problems and obstructions for the loading process has been deeply analyzed and been taken into consideration while designing the pick and place robot.

Key Words:Bluetooth; sensors; mechanics; robotics; wireless communication.

1 INTRODUCTION

Due to high precision in performing different tasks and can perform multitasking work in same time, robot has been widely used in industry, medical and military operations. The robot construction technology has grown exponential every year and some competition is held in selecting the best robot design to perform specific task within period of time. The pick and place robot is the one which is used to pick up an object and place it in the desired location. The pick and place mechanical arm is a human controlled based system that detects the object, picks that object from source location and places at desired location. For detection of object, human detect presence of object and move machine accordingly. The Robotic arm kit is made of two section. The bottom driving unit takes the robot to left, right, forward and backward motion. The top gripper unit is to pick and place any object. The driving unit has two motors and also the gripper unit has two motors. The robot is strong enough to handle a task like bomb diffusing, transporting, rescue operation etc. The aim of this project is design an autonomous robot with complete system allow the robot wander about its environment and to interact with certain object that its encounter. Here how a pick and place robot can be designed for a work-station where loading and packing of lead batteries is been pre-sented. All the various problems and obstructions for the load-ing process has been deeply analyzed and been taken into con-sideration while designing the pick and place robot.

2 Literature Review

For our project, we decided to create a pick and place robot. Through our literature search, we found that the basic principles of pick and

place robots have been thoroughly explored, and many of the associated fundamental equations have effectively been solved. The main specifications of a pick and place robot are speed of operation, precision, maximum load, range of motion or workspace, and cost. This internet search include the motor, power supply, and controller details. By looking at how this build is made, we can modify and expand on the work they have already done.

3 Working

For performing pick and place operation smoothly, planning must be made before creating suitable program. First, all possible route for movement of robot and major movement probability of robot arm and gripper for lifting, gripping and release must be determined. Then, the program being made using the short subroutine that perform the task quickly and smoothly. Selecting a suitable DC motor is also important as each DC motor has different rate of speed, torque, input voltage, power and dimension. DC motor requires either high torque or high speed where high torque equal to slow speed but strong when stopping or holding meanwhile high speed is faster but not strong when stopping.

Normally, DC motor that high torque being used for heavy task such lifting, starting movement for heavy robot and holding item where DC motor with high speed being use for easy task that need quick and easy task such as pick small and light weight item.

The aim for this project is to make the arm robot to move upward and downward using sensor at left and right gripper. The planning of the behavior is starts by configuring the size of object that need to be picked up using sensor at the gripper. Then, the sensor at the main structure indicates the movement of arm robot in term of height. After that, object will be picked and be held before arm robot being raised upward until certain height as indicated by the sensor at the main structure. Finally, the arm robot will place the object back in it position after being held few seconds and arm robot will be back to its initial position.

4 System Design

4.1 Controls

The mechanical structure of a mechanical arm must be controlled to perform tasks. The control of a mechanical arm involves three distinct phases - perception, processing, and action.

4.2 Factors to be considered

The various factors to be considered while designing of pick and place mechanical arm are been discussed as follows. The factors are all important while designing procedure of the mechanical arm.

4.3 Autonomy level control systems

The classification that takes into account about the interaction between human control and the machine motions: Teleportation: - A human controls each movement; each machine actuator change is specified by the operator, supervisory: - A human specifies general moves or position changes and the machine decides specific movements of its actuators, task-level autonomy: - The operator specifies only the task and the mechanical arm manages itself to complete it, full autonomy: - The machine will create and complete all its tasks without human interaction.

4.4 Safety requirements

The various safety requirements which were considered while designing the mechanical arm are decided as follows: The mechanical arm should not be programmed such that it should damage the Battery while holding it in its gripper. Correct holding position should be set as if it not set then while movement of the mechanical arm it may drop the Lead Batteries which can arise a hazardous situation in the industry. The mechanical arm should be interfaced properly with the sensors been placed near the Belt conveyor so as to know when the belt conveyor is to be stopped or to be started to move the batteries ahead. Load carrying capacity should be maintained as it should be always more than the default load which is to be shifted.

4.5 Future enhancements

There are many unsolved problems and fundamental challenges for robotics at a very high level. Manipulation and physical interaction with the real world: We need concerted modelling and control efforts together with the development of good hardware to make arms and hands that can perform anything but the simplest of pick-and-place operations that are prevalent in industry. The pick and place robot is having the very vast area of applications. As we are using android based control the applications broadens to both the domestic and industrial use. The future scope applications of this project are: Bomb diffusion: After few modifications of the pick and place mechanism we can improve the robot for the bomb diffusion purpose. Using the web cam we can train the robot to diffuse the bomb hence without putting human life in danger we can fight against the terrorism, laboratory: Our robot can handle dangerous chemicals in chemical lab our in nuclear reactor labs which are hazardous to human body. Having an android control facility and webcam this robot can perform many tasks that human cannot or dangerous for human to handle. With some modifications this robot can be used for helping the physically challenged people.

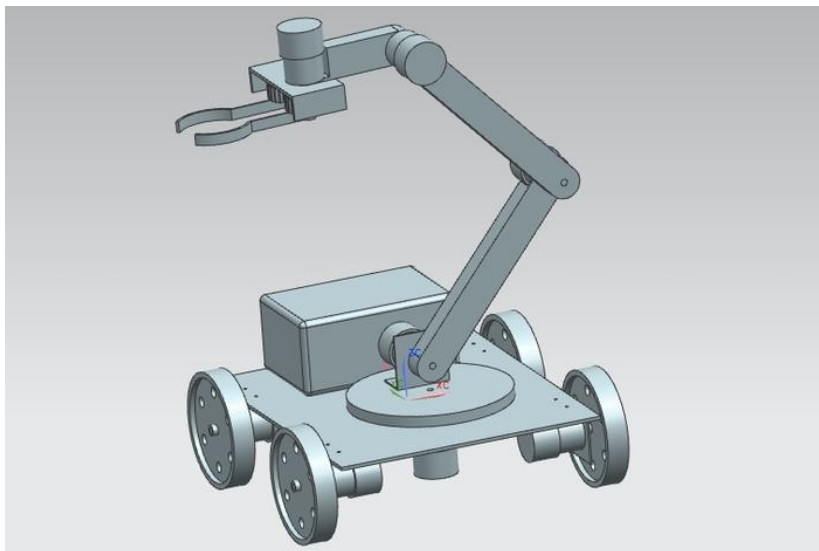


Fig.1. A schematic diagram of pick and place robot. With a tong type holding arm

5 Conclusion

The design of a Pick and Place Robotic Vehicle has been completed. A prototype was built and confirmed functional. This system would make it easier for man to unrivalled the risk of handling suspicious objects which could be hazardous in its present environment and workplace. Complex and complicated duties would be achieved faster and more accurately with this design.

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