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Assessment and Study of Six-Axis Robotic Arm with Sensor Controlled by Android Application

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ABSTRACT: Material, labor and other expenses plus different types of overhead expenses are incurred for manufacturing the product. For manufacturing the product workshop machinery, tools, instruments and other facilities are used. To create such facilities industry has to provide investment. It is necessary to produce good quality of products in sufficient quantity, by providing close supervision to the production activities. The services or use of instruments, laboratory equipments and inspectors for quality control work also demands investment and expenses. When different types of facilities and services are required for producing different parts of a product to be manufactured. Then capital investment and number of manpower required in an industry are increases. This gives rise to the overhead cost which in turn results into increased cost of production but produced product if available in market its price is lower or same as our product, we have to go for buy that product in place of producing it. The different advantages of purchasing readymade parts are as follows:

- No responsibility of rejection of part.
- Capital investment reduces.
- No problem of wastage of materials.
- No. of workers and labor problem are reduces.
- Parts of required quality can be obtained.
- Timely purchasing of parts can be done.
- It becomes easy to meet the production target.

KEYWORDS: 6-Axis Robot, Force and Tactile Sensing, Grasping, Industrial Robots.

I. INTRODUCTION

This framework shows a novel design for assessing the accomplishment of picking operations that are executed by modern robots. It is framed by a course of machine learning calculations (kNN and SVM) and utilizations data acquired by a 6 pivot drive/torque sensor and, if accessible, data from the inherent sensors of the mechanical gripper. Past measuring the achievement or disappointment of the whole operation, this design makes it conceivable to recognize progressively when a protest is slipping amid the picking. Along these lines, compel and torque marks are gathered amid the picking development of the robot which is deteriorated into five unique stages that permit describing unmistakable levels of accomplishment after some time. A few trials were performed utilizing a mechanical robot with two distinctive grippers for picking a long and adaptable protest.

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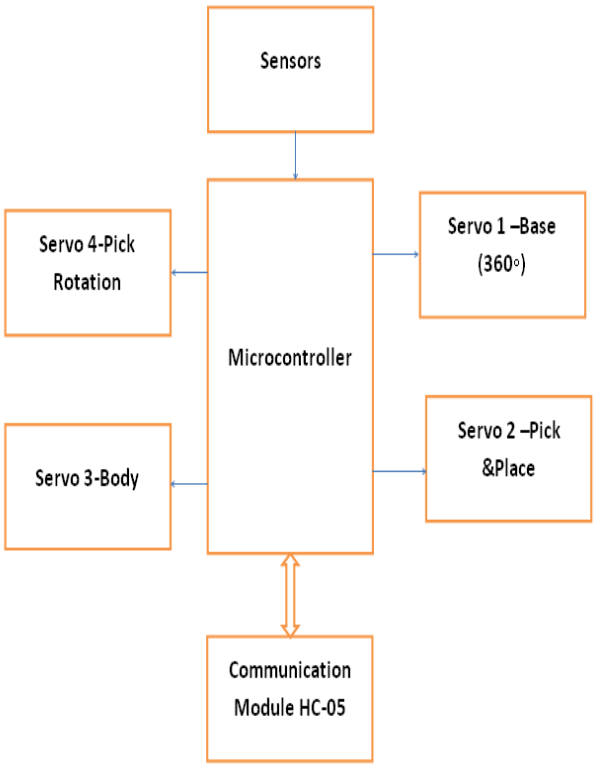

Fig.1. System Block Diagram

The investigations exhibit the unwavering quality of the proposed approach under various picking situations since, it got a testing execution (as far as precision) up to 99.5% of effective distinguishing proof of the consequence of the picking operations, considering a universe of 400 endeavors. Apply autonomy is the branch of building science and Technology identified with robots, and their plan, produce, application, and basic air.

Apply Robot is identified with gadgets, mechanics, and programming. Mechanical Robot investigate today is centered around creating frameworks that show seclusion, adaptability, excess, adaptation to non-critical failure, a general and extensible programming condition and consistent network to different machines, a few specialists concentrate on totally robotizing an assembling procedure or an errand, by giving sensor based insight to the robot arm, while others attempt to cement the explanatory establishments on which large portions of the essential ideas in apply Robot are constructed. In this exceedingly creating society time and labor are basic compels for finishing of errand in huge scales.

The computerization is assuming critical part to spare human endeavors in the vast majority of the consistent and regularly conveyed works. One of the major and most usually performed works is picking and setting of occupations from source to goal. Show day industry is progressively turning towards PC based robotization essentially because of the requirement for expanded profitability and conveyance of final results with uniform quality. The resoluteness and for the most part high cost of hard-robotization frameworks, which have been utilized for mechanized assembling assignments previously, have prompted a wide based enthusiasm for the utilization of robots equipped for playing out an assortment of assembling capacities in an adaptable situation and at lower costs.

The utilization of Industrial Robots describes some of contemporary patterns in computerization of the assembling procedure. In any case, show day modern robots likewise display a solid mechanical structure and shut framework programming design. They are focused on basic monotonous errands, which tend not to require high

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accuracy. The pick and place robot is a microcontroller based mechatronic framework that identifies the protest, picks that question from source area and spots at coveted area. For identification of protest, infrared sensors are utilized which distinguish nearness of question as the transmitter to beneficiary way for infrared sensor is hindered by set protest.

II. HISTORY OF ROBOTS

Robot is a word that is both a coinage by an individual person and a borrowing. It has been in English since 1923 when the Czech writer Karel Capek's play R.U.R. was translated into English and presented in London and New York. R.U.R., published in 1921, is an abbreviation of Rossum's Universal Robots, robot itself comes from Czech robota, "servitude, forced labor," from rab, "slave." The Slavic root behind robota is orb-, from the Indo-European root orbh, referring to separation from one's group or passing out of one sphere of ownership into another. Czech robota is also similar to another German derivative of this root, namely Arbeit, "work". Arbeit may be descended from a word that meant "slave labor," and later generalized to just "labor."

Law of Robotics

Isaac Asimov conceived the robots as humanoids, devoid of feelings, and used them in a number of stories. His robots were well-designed, fail-safe machines, whose brains were programmed by human beings. Anticipating the dangers and havoc such a device could cause, he postulated rules for their ethical conduct. Robots were required to perform according to three principles known as "Three laws of Robotics"' which are as valid for real robots as they were for Asimov's robots and they are:

a. A robot should not injure a human being or, through inaction, allow a human to be harmed.
b. A robot must obey orders given by humans except when that conflicts with the First Law.
c. A robot must protect its own existence unless that conflicts with the First or Second law.

These are very general laws and apply even to other machines and appliances. They are always taken care of in any robot design. 1.3

What is and what is not a Robot?

Automation as a technology is concerned with the use of mechanical, electrical, electronic and computer-based control systems to replace human beings with machines, not only for physical work but also for the intelligent information processing. Industrial automation, which started in the eighteenth century as fixed automation has transformed into flexible and programmable automation in the last 15 or 20 years. Computer numerically controlled machine tools, transfer and assembly lines are some examples in this category.

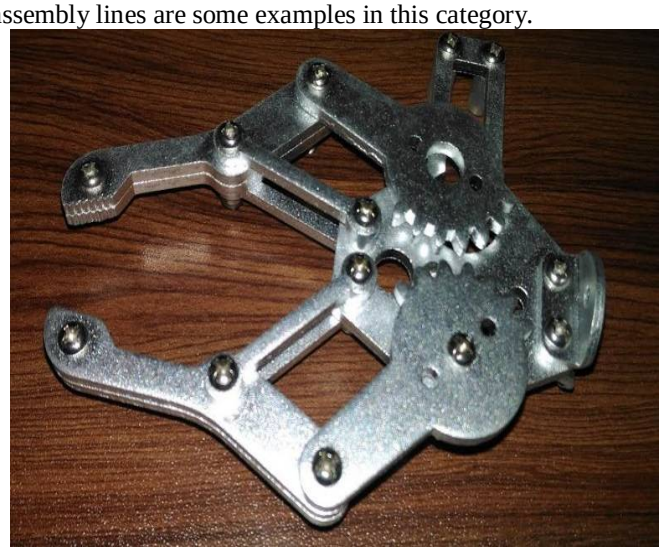

Fig.2. ARM Design – Fingers

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System Contributions

- The pick and place robot using 6 Axis Force/Torque ARM is proposed based on the following considerations and it is used commonly in various industrial operations. Some of the purposes are listed below:
- Using of Human labor for the loading and unloading of the Batteries and also for packing purpose will consume more time.
- Even though Number of laborers is required more, the loading and unloading time should include allowances if laborers are considered.

Fig.3. ARM Design – Jaw

- Moreover the work can be done easily using a single pick and place robot, which is used for both loading and unloading and pallezting purpose.
- The work station for this operation of pick & place and pallezting is been designed in such a way that:-
- The unpacked battery coming from the belt conveyor is been sensed by a sensor and the moment of the conveyor is been controlled by the sensor.
- As one by one the battery comes, the Robot picks one battery and moves towards the packing station, keeps the battery on the conveyor there.
- Then picks the Packed Battery from there and moves towards the Box-packing center and places the Battery for Box-packaging.
- Further Robot movement continuous towards the return journey takes a Battery from conveyor and again the above procedure is been carried out.

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III. ADVANTAGES

Accuracy and Pick and Place Robots:

Robots are outfitted with wide reaches and slim arms, steady repeatability and precise tooling - all of which allows them to be extremely accurate. This high precision capability makes them a good match for pick and place applications.

Flexible Pick and Place:

One of the main advantages of robotics is flexibility. Pick and place robots are easily programmable. They are able to accommodate multiple changes in product shape and type. In addition, robots provide a high level of movement flexibility.

Increase Consistency with Pick and Place:

Pick and place robot systems have the ability to improve product quality and cycle time. Robotic movements are regulated, so the results are always the same. Quality is improved because of this regularity. Furthermore, this consistency allows the processes to take place.

Robots are Space-Efficient:

Because they are designed with compact bases, pick and place robots are ideal if you are looking to conserve floor space. Robots can be programmed to move within strict work envelope limits - leading to even better use of space.

Robots Maximize Safety:

Pick and place applications can be physically demanding. They are labor-intensive, repetitive, and monotonous. Depending on the weight and size of a part, moving it from one place to another can be very demanding work. Pick and place robots are unaffected by the stresses of the application. They are able to work without taking breaks or making mistakes.

Save with Pick and Place Robots:

Incorporating pick and place robots can effectively cut your costs. Robotic precision and reliability allow for less wasted material and more efficient use of time. Plus, the initial investment in robots is quickly recouped - making pick and place robots an extremely cost-effective solution.

IV. APPLICATIONS

- Material handling
- Packaging
- Wrapping
- As a welder/ curter and many more application

Work Plan of this Project

Material, labor and other expenses plus different types of overhead expenses are incurred for manufacturing the product. For manufacturing the product workshop machinery, tools, instruments and other facilities are used. To create such facilities industry has to provide investment. It is necessary to produce good quality of products in sufficient quantity, by providing close supervision to the production activities. The services or use of instruments, laboratory equipments and inspectors for quality control work also demands investment and expenses.

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Work Description

After making all component of project, the basic inspection of all component and its specification or parameters is tested as per drawing. We assemble all components and make the assembly of project. To test this project working we connected project with ARM operations by use of Servo Motor connecter. When we started this system, we just become so eager to see our project working.

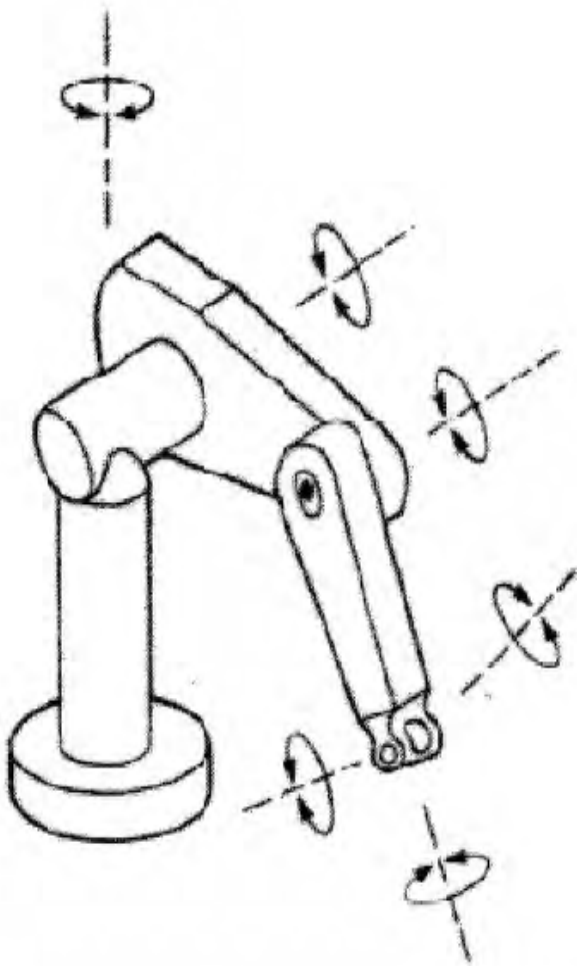

Fig.4 Prototype ARM Model

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We switch on the system and operating the robot by means of Android application. By means of android application and UART communication, our project works successfully without any issues and also it is so fast and powerful. Doing above works our project works smoothly. It can pick bottles, brick and box which weight is not greater than the specified weight level, because in this project we use low RPM motor to give rotation motion project. It is only a prototype and to take load and project assembly weight. To test and inspect our project we find our hard works in great satisfaction and we are so happy to see working of project.

V. CONCLUSION AND FUTURE SCOPE

After completing this project Pick and Place by using Robotic Arm by Android Control, we know that our project can pick object like bottle, brick and box with some specified weight level, because we use low RPM motor to give rotation motion project. It has the capacity to take load and project assembly weight within 0.5 to 1 kilograms, because this is a prototype model. Working on this project, right from the point of the selection to testing of the project is real fun and great expiration. The exercise provided as a lot of insight into the various automation systems, the selection of the appropriate material for different components and make or buy decision, especially for designing this project. We studied how to use and control automation systems in various industries. Seeing the project in working successfully we are very happy and satisfied.

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