Review on sensing techniques for object detection in Robotics

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Abstract: This paper aims to review on sensing techniques of smart gripper which integrates together with its robotic arm for industrial applications. This system incorporates a sensor by means to automatically detect and recognize the object that having different weight and shapes and send the information to the robot for next task.

I. INTRODUCTION

This research deals with a robot arm for real-time, fast and accurate industrial applications. The robotic arm consists of parts that are joined together and can be preprogrammed or controlled manually to perform a mechanical motion. The parts of the robotic arm have functions that are analogous to human arm features and are named as shoulder, elbow, base, etc. In order to control the robot, a specific Advance Control Language (ACL) controller is used. This controller is combined with software on PC through USB connection. So, with the help of this software, a control program can be written which is in turn sent to the controller for further manipulation of the robot. Initially, Scorbot-ER 9 Pro can be controlled only manually but this research and development were done in terms of addition of vision source that leads to automatic operation of the robot. For this purpose, software programs such as Matlab, Visual Basics, and Scorbase are used. There are several steps to be implemented before the robot can move and perform operations. The initial stage is an image processing of the objects which are carried out through Matlab coding with a camera connected to the PC. During this step, digital information about the positions of the objects is obtained. During the next sta

II. LITERATURE STUDY

Ferenc Alpek et.al : This paper introduced the observing of the end-effectors and grippers takes out the aggravations and to expand the unwavering quality of the robotized creation by utilizing multi-sensor system. The at the same time utilization of force/torque/weight sensors worked in the grippers or mounted in the last robot wrist give the best answer for observing of robot grippers. The power or torque estimations observing, help to expand the unwavering quality of robotized tasks and the nature of items. Applying power torque sensors in robot control the generation system will illuminate about mechanical unsettling influences amid innovative tasks. The entire checking of the robotized tasks can be acknowledged just by utilizing multi-sensor procedure. The multi tactile method implies the all the while utilization of various sensors in a similar time. Improvement of new, assignment situated sensors is entangled and costly movement, however it is the best way to acknowledge uncommon observing undertakings with high dependability.

Sheng-Jui Chen, et.al : This paper displays the improvement of a capacitive shear constrain equipped for detecting shear powers in two degrees of opportunity. The creation of the sensor depends on the PCB manufacture process and developed innovation. They embrace the capacitance detecting plan for its high affectability and simple execution. For sensor portrayal, They utilized a power check and an optical interferometer to quantify sensor's parameters including its affectability and goals. In this work, They have created and manufactured a shear compel sensor dependent on the PCB manufacture process and differential capacitive detecting method. The sensor is equipped for estimating shear powers in two degrees of opportunity. The sensor was described by a test stage which was gathered by a power check, a mechanized direct stage and an optical interferometer. In this work, they have developed and fabricated a shear force sensor based on the PCB fabrication process and differential capacitive sensing technique. The sensor is capable of determining shear forces in two degrees of freedom. The sensor was characterized by a test platform which was assembled by a force gauge, a motorized linear stage and an optical interferometer.

Chih-Chieh Chen and Chao-Chieh Lan: This creators exhibits a novel force regulation mechanism (FRM) to be introduced on pneumatic grippers. Without utilizing extra sensors and control, the FRM can inactively create a customizable contact drive between the gripper jaws and protests of different sizes. Together with pneumatic grippers that have a higher holding speed, bring down expense, and less difficult structure, this methodology offers a more appealing arrangement than the utilization of electric grippers. In this paper, the structure and investigation of the FRM are introduced. A model of the FRM is delineated to show the viability and precision of power direction. This tale component is required to fill in as a dependable option for delicate question control. The overall mechanism is compact and can be readily installed on small pneumatic grippers for industrial manipulation. The static and dynamic experiments showed the accuracy of gripping force regulation at a high jaw speed. Based on the demonstrated prototype, the gripping force can easily be adjusted from 0 to 10 N while the object size variation is 10 mm.

Kyungnam Han,er.al: An epic micro-gripper has been planned and created to control the little question like a cell. So as to holding the cell, it ought to be no limitation to utilize the micro-gripper in the water. Since the mechanical kind micro-gripper is minimal influenced by an encompassing to utilize unreservedly in any condition, contrasted and other sort micro-grippers, it is reasonable to treat the cell. Likewise, it can diminish the disfigurement of the cell and control the grasping power adaptably. A point to be considered to control the cell is the power taking a shot at the cell and the twisting of the cell as indicated by the connected power. On the gripper a piezo-resistive sensor is incorporated for detecting the grasping power. Utilizing the manufactured micro-gripper, micro-glass dabs can be effectively controlled in the water. The resistor of the piezoresistive sensor is effectively changed by the power on the micro-gripper. On the off chance that on-going criticism explores in the gripper system is done effectively, the proposed micro-gripper can be used for controlling the cell. In this paper the micro-gripper is designed and fabricated for the manipulation of a cell, which can measure the gripping force.

Lisheng Kuang, et.al : This examination portrays plan, creation, and portrayal of a novel pivoted joint cantilever shaft compel sensor. The connection between the outer power connected to the power sensor and the strain of the strain measure, and in addition the straight connection between the connected power and the yield voltage of the Wheatstone connect, are produced. The conventional straightforward cantilever bar structure displays seriously mutilated even inverse pressure when the heap constrain is connected to the bar structure with a horizontal counterbalance, while the proposed novel pivoted joint structure sensor with two flexure joints presents great autonomy of balance. Exploratory adjustment checks the linearity between the heap powers and the yield voltages.

III. CONCLUSIONS

This examination portrays the gripper with different sensors which are useful to gauge the grip forces of articles with different sizes in pick-and-place activity. The grasping extent and force detecting reaches can be changed in accordance for various requirements. Review on various experimental results show that the sensors can identify the object and grasping the object successively by using various sensing methods.

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