DADABHOY INSTITUTE OF HIGHER EDUCATION
DIHE

Registration Number	BSTech(M)/1-18/M01006
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Title of Exam	Mid Term
Title of Course	Final Year Project – I (Mechanical)
Name of Faculty Member	Sir Waqar Hayder
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Assignment Questions:

Q1: State the objectives of your project?

The main objective of our proposed work is Design and fabricate a pneumatic arm to pick and place objects from lower plane to higher plane by using Steel frame, Al cylinders, C-45 Pistons, manual operated pilot valve and grippers. this project aims to Design and fabricate pneumatic arm for pick and place of cylindrical objects. The handling of materials and mechanisms to pick and place of objects from lower plane to higher plane and are widely found in factories and industrial manufacturing. There are number of pneumatic arms are available which consists of so many mechanisms hence becomes expensive. The designed pneumatic arm consists of four cylinders, a shaft works with lead screw mechanism capable of converting motion of piston to rotational motion of arm with help of using compressed air. The designed processes are carried out based on integrated information of kinematics dynamics and structural analysis of the desired robot configuration as whole. The highly dynamic pneumatic arm model can be easily set at intermediate positions by regulating the pressure using the flow control valve. It can be used in loading and unloading of goods in a shipping harbor as the movement of goods is done from lower plane to higher plane.

Q2: What outcomes you are expecting to achieve at the end of your project?

No-one even has done project like this in our institute and it will be proud moment for us. It will help other students to take more interest with more creativity and it will may be best project of our institute will take Award and will win expo exhibition. This will help us in our professional career.

Q3: Write in brief about the methodology you will adopt in accomplishing your project?

In this step we observed the existing material handling system in the market. We observed the mechanism of the holding the material, lifting and placing it on plane. For instance, the working we observed was run by a couple of 3-4 pneumatic cylinders which was very expensive.

Preparation of project plan;

In this stage we started preparing the machine design and the concept. The way our Arm would look was decided and studied thoroughly. The first conceptual plan is as shown and various changes were made to improve the performance and to make cost effective.

Selection of appropriate materials;

Selection of appropriate material is necessary to build an efficient system where both performance and cost were accountable. The materials were selected such that it would withstand vibrations and varying load acting on it. Materials used to build the system were almost mild steel.

Fabrication and Assembly of the Machine;

After preparing the 3D model of the machine using CREO 2.0 operations like Arc Welding, Drilling, Boring, Step turning, Threading, Grinding, Sheet metal cutting, and mounting of bearings were carried out. The full arm was assembled using permanent fastening like welding and temporary fastenings like bolt and nuts.

CONCLUSION;

The design and fabrication of pneumatic arm for pick and place is completed with economic and effective considerations. It is controlled by manually flow control and direction control valves. Pneumatic arm movement and rotation are done by pneumatic cylinder using a helical slot mechanism. The gripper is also a pneumatic actuator which holds objects which are rectangular in shape. The maximum pay load is yet to be calculated and total weight of arm is almost nearly 25kgs or less but higher than 25kgs. The model is expected to lift objects of at least 2 kgs weights.

Q4: Do you think you need an external supervisor for your project?

Is that a thing to ask? Yes, absolute we need both internal and external supervisors so that they can help us in the most important thing that is “designing”. Some little help in other stuff too.

Q5: Can your project be advantageous for DIHE?

If it isn’t advantageous and beneficiary for us or our institute, we don’t select it and doesn’t give it importunacy it will make institute high pride, it can be also be stand in Expo for projects exhibition and can be selected for award winning list, institute management will of us and this project will give new comers interest in studies and participate in projects and other activities.

Q6: Are you developing any mechanism for your project?

Selection of mechanism for threshing action;

By observing the existing material handling machines about how they displace the metal/material we came to a conclusion of adopting a helical slot on shaft which will convert linear motion of lifting cylinder into rotational motion of arm.

Q7: How have you divided your project in to your group members?

Our group have 5 members. In which 1st member is the researcher, 2nd member is market guy which has to done all purchasing and do all visits for needy equipment and tools, 3rd is the designer of project, 4th member is the fabricator and assembler guy and 5th member the last but not the least this guy have most important work to do that is "Planner" he plans all the strategies all related to research, purchasing, designing, assembling and other stuffs too, that last guy is me (Qazi Zubair).

Q8: What research have been done by other experts in the field in which you have decided to do your project?

LITERATURE SURVEY;

Ted hesselrod,kakali sarkar ,P. Patric van der smagt .klaus Schulten: The neural map algorithm has been employed to control a five joint pneumatic arm and gripper through feedback from two video cameras. The pneumatically driven robot arm (soft arm) employed in this investigation shares essential mechanical characteristics with the skeletal muscle systems.to control the arm 200 neurons formed a network representing a 3D workspace embedded in a 4D system of coordinates form two cameras for interpolating between positions. This was achieved through employment of a linear correction algorithm using the Jacobian matrices mentioned above.

Jose A. Riofrio and Eric J. Barth: The design of a free piston compressor (FPC) intended as a pneumatic power supply for pneumatically actuated autonomous robots is presented in this paper. The FPC is a proposed device that utilizes combustion to compress air into a high-pressure supply tank by using the kinetic energy of a free piston. The device is configured such that the transduction from thermal energy to stored energy, in the form of compressed gas, is efficient relative to other small-scale portable power supply systems.

Emanuel Todorov1, Chunyan Hui, Alex Simpkins1 and Javier Movellan: Pneumatic actuators have a number of advantages over electric motors, including strength-to-weight ratio, tunable compliance at the mechanism level, robustness, as well as price. Their properties are in many ways similar to muscle properties, which further makes them a good choice for bio-inspired robotic designs. Contrary to popular belief, we

found it surprisingly easy to work with these pneumatically actuated robots and obtained high tracking performance.

Tudor Deaconescu, Member, IAENG and Andrea Deaconescu, Member: The paper addresses the theoretical and experimental study of the operational behavior of a fluidic driving system based on pneumatic muscles. A concrete application of pneumatic muscles is presented, namely two original non-anthropomorphic gripping systems with two jaws and integrated control system, developed by the authors. The presented solutions were selected upon analysis of several possible constructive variants, described in the paper, and represent an optimum as to both overall dimensions and performance.

Ashraf Elfasakhany, Eduardo Yanez, Karen Baylo, Ricardo Salgado: The main focus of this work was to design, develop and implementation of competitively robot arm with enhanced control and stumpy cost. The robot arms were designed with four degrees of freedom and talented to accomplish accurately simple tasks, such as light material handling, which will be integrated into a mobile platform that serves as an assistant for industrial workforce. The robot arms are equipped with several servo motors which do links between arms and perform arm movements.

Q9: What change are you expecting to bring in this project in comparison to objectives achieved by past researchers?

It will be compact in size, less in weight, new methodology, new design and can be practically use.