**FLUID POWER CONTROLS LABORATORY**

### 1. Introduction

<table>
<thead>
<tr>
<th><strong>Introduction</strong></th>
<th>The Fluid Power Controls Laboratory provides necessary practical exposure to supplement the theory of Fluid Power Systems taught in the IIIrd year of B. Tech program. The laboratory has equipments such as Pneumatic and Electro pneumatic kits, PLC units from FESTO, Germany. The lab has Automation Studio and FluidSIM software to design and simulate Pneumatic and Electro pneumatic circuits. A hydraulic trainer kit is also available to train the fluid power systems runs with oil hydraulics.</th>
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<tr>
<td><strong>Objective:</strong></td>
<td>To introduce the design of Pneumatic and Hydraulic circuits and their practical applications in industrial automation.</td>
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<td><strong>Date of Establishment</strong></td>
<td>28-08-2003</td>
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<td><strong>Location</strong></td>
<td>Near Workshop</td>
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<td><strong>Lab area:</strong></td>
<td>1000 Sq. Feet.</td>
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| **Course offered to** | Students who are pursuing the following in Karunya University  
- III B.Tech. (Mechanical Engineering)  
- III B.Tech. (Free Elective–Common to all Engineering Branches –ECE, EIE,EE E)  
- M.Tech.  
- Post Graduate Diploma in Advanced Manufacturing Technology (PGDAT)  
- Post Graduate Diploma in Petroleum and Natural Gas Flow Measurements and Instrumentation (PGDPNGFMI)  
- Add on programs to students and industry personnel |
| **Cost of Lab:** | Rs/- 28.3 Lakhs |
2. Laboratory Personnel

<table>
<thead>
<tr>
<th>G Babu Rao M. E. (PhD)</th>
<th>K. Sivasankaran, B. E.</th>
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<tbody>
<tr>
<td>Assistant Professor(SG) Lab In charge</td>
<td>Engineering Technician</td>
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3. Major Equipments/ Software

- Hydraulic trainer kit
- Fluid SIM/Automation studio software
4. Research and Projects in the Lab

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<tr>
<td></td>
<td>Research Scholar: Mr.G Babu Rao</td>
</tr>
<tr>
<td></td>
<td>Supervisor: Dr. Darius Gnanaraj.</td>
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<tr>
<td>Prototype of experimental set up with Ambu Manikin with feedback system.</td>
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<thead>
<tr>
<th>Project Activities with photos details like details guide name, Student name, Academic Year, Title of the Project</th>
<th>1. Pneumatically powered hybrid robot for CPR</th>
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<tbody>
<tr>
<td>Project done by: Mr. Nitish Kumar</td>
<td>Project done by: Mr. Nitish Kumar</td>
</tr>
<tr>
<td>Academi Year : 2010-11</td>
<td>Academi Year : 2010-11</td>
</tr>
<tr>
<td>Guide : Mr.G Babu Rao , Assistant Professor</td>
<td>Guide : Mr.G Babu Rao , Assistant Professor</td>
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**Brief Description:**

In the CPR process the end effector touches the human chest at the sternum location for chest compressions to give resuscitation to the cardiac arrest patient before medical treatment to avoid the brain death. The continuous chest compressions can be achieved by three pneumatic cylinders arranged in parallel.

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<th>2. Air Motor with rotating Drum</th>
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<tr>
<td>By: Mr. Sivasankaran, Lab Technician</td>
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<tr>
<td>Year: 2010-11</td>
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### Brief Description:

Air motors have higher power density than electric motors, so they can transmit more power from the same envelope or the same power from a smaller envelope. This is especially true when loads must be driven at less than the nominal speed of the electric motor — which necessitates using an electric gear motor or electric motor with separate gearbox. Air motors generate much less heat, if any. This is especially important in applications with frequent starts and stops, because electric motors must be greatly oversized to dissipate heat generated from high starting torque. Applications where the motor must operate in high heat, high dust, wet, or potentially explosive conditions.

### 3. Pneumatic Four Jaw Chuck for Engine Lathe

Project Done by Students: Premanand  
Academic Year: 2011-12  
Guide: Mr. Mahesh Prabhu, Assistant Professor

![Image of a pneumatic four jaw chuck]

**Brief Description:**

A 4-jaw pneumatic chuck is procured. A study on the functioning of the chuck were carried out. The force required for each jaw to hold the workpiece at high rpm’s are calculated. Calculation reveals that pressure of 7 bar is essential to hold the workpiece. Comparison with the pneumatic components to withstand and supply the required pressure on each jaw resulted in purchase of “Double acting...
Dissembling the chuck and fixed the double acting cylinder behind each jaw through proper clamping methodology, vibration of pneumatic cylinder is minimised. A suitable “Non – return valve” is fixed at the inlet port of the cylinder to retain the air pressure inside the cylinder after discontinuing the air supply. From the cylinder highly compressed air is supplied to the “Double acting cylinder” via “Non-return valve”. It is observed that the jaw could firmly hold the workpiece. At high rpm’s, it is observed that the cylinder is not influenced by vibration parameters.

4. Design And Fabrication Of Multipurpose Pneumatic Arm For Various Assembly
Project Done by Students: Jithu Philip (09FH097), Jery Jose K (09FH098), Fijo Raphy (09FH114) And Libin Levy (09FH124).
Academic Year: 2012-13
Guide: Mr. Balasubramanian, Assistant Professor

**Figure. Pneumatic Robotic Arm**

**Brief Description:**

The Aim is to design and develop a “multi-purpose pneumatic arm” to perform various tasks for operations involving assembly, material handling, and other workshop operation like bolting etc, similar to a bi-directional torque wrench. The pneumatic arm is similar to a robotic arm. Pneumatic arm can perform various operations similar to the robotic arm. Pneumatic cylinders act as the muscle of the arm the working fluid is compressed air. The cost of a pneumatic arm is comparatively low when compared with a
robotic arm and it can perform heavy duty operations by attaching more number of links the degree of freedom of the pneumatic arm can be increased.

5. **Automatic Conveyor running process controlled by Programmable Logic Controller for Coal transportation process in Power Plant.**

Project Done by Student: Soumojit Mukhopadhyay, PR13ME3005
Academic Year: 2013-14
Guide: Mr. G. Babu Rao, Assistant Professor (SG)

![Figure. Hardware Prototype of the Automatic Conveyor](image)

**Brief Description:**

Conveyor running process is a traditional system to transport different Industry materials from one part of plant to another part. In power plant (mainly Thermal power plants) coal is transported through conveyors in most of the cases. Here a PLC program (using Delta DVP28SV) has been created by which it is possible to control three conveyors by certain condition placed in a stair case structure by automatic control rather than using the old manual control process. A practical prototype has been created also to demonstrate the idea. Here hopper dumps coal in the top most conveyor which then gets start by the instruction of the automatic signal. The first conveyor dumps coal to the middle conveyor and
middle conveyor dumps it to the lower conveyor following the pre-instructed condition. The last conveyor dumps coal to the coal bunker. All operation is done under safety concept. An HMI system (using Delta DOP-B07EO415) has been included also.