Information Brochure

Post Graduate Program
Master of Technology (Industrial Design)
Year 2018-2019

Centre of Excellence
In
Industrial and Product Design

PUNJAB ENGINEERING COLLEGE
(Deemed to be University)
Chandigarh, India
About CoE

Centre of Excellence in Industrial and Product Design has been set up in 2013 by NPIU, under Technical Education Quality Improvement Programme (TEQIP Phase –II), a World Bank Assisted Project in Technical Education with initial funding of Rs 5 Crores.

The Centre has the mission to encourage, facilitate interdisciplinary and collaborative research in an environment that enables a ‘love for science, technology and discovery’ so that it can develop high quality research leading to products & solutions to address the needs of industry and healthcare providers. The Centre’s aspiration to create relevant research that addresses current challenges, resulting in innovative solutions which can be implemented, is underpinned by partnering with leading organisations for its research activities such as PGIMER Chandigarh, INTEL Technologies Bangalore. Real time studies are being carried out to collect data, conduct surveys, which contribute towards understanding of the problems and issues affecting stakeholders.

The Centre is developing as a resource centre so as to become a preferred destination for industry, healthcare providers to carry out sponsored research, train & develop professional talent, proficient in the areas of ergonomics and design. The Centre runs educational and training programmes, performs outreach activities in collaboration with other academic institutions organizations such as PGIMER Chandigarh, IIT Mumbai, NITIE Mumbai
## Faculty Members

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name</th>
<th>Designation</th>
<th>Field of Specialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Parveen Kalra</td>
<td>Professor &amp; Coordinator</td>
<td>CAD/CAM &amp; Robotics, FEM, Human Engineering, Additive</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
<td></td>
<td>Manufacturing</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Neelam R. Prakash</td>
<td>Professor &amp; Co-coordinator</td>
<td>Digital System Design, VLSI Design, Healthcare Technologies</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dr. Sanjeev Kumar</td>
<td>Professor &amp; Co-coordinator</td>
<td>Manufacturing, Mechanical Metallurgy, Material Science</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dr. Jagjit Singh Randhawa</td>
<td>Assistant Professor</td>
<td>Human Engineering, Rapid Prototyping, Welding Engineering</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dr. Rakesh Sharma</td>
<td>Adjunct Faculty</td>
<td>Innovation and Ventures</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Chetan Mittal</td>
<td>Adjunct Faculty</td>
<td>Biomedical instrumentation and Design of medical devices</td>
</tr>
<tr>
<td>7</td>
<td>Dr. Rakesh Kumar Sen</td>
<td>Adjunct Faculty</td>
<td>Health Care &amp; Design Applications</td>
</tr>
<tr>
<td>8</td>
<td>Sh. Mandeep Chhatwal</td>
<td>Adjunct Faculty</td>
<td>Industrial Engineering, Healthcare with focus on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercialization, Technology Transfer, Promotion of Start-ups</td>
</tr>
</tbody>
</table>


**Vision**

CoE I&PD (Centre of Excellence in Industrial and Product Design) will establish itself as a global resource centre in the areas of Industrial and Product design.

**Mission**

CoE I&PD will be offering quality solutions in the areas of ergonomics and design to address the needs of industry and medical organizations.

CoE I&PD will be a preferred destination for industry, research and medical organizations to locate the best professional talent, proficient in the areas of ergonomics and design.

**Thematic Area(s)**

- Ergonomics
- Design Applications in Medical Sciences and Industry

**Laboratories**

**Human Engineering Laboratory**

The Human Engineering laboratory is well-equipped to carry out experimentation and research work in the areas of whole body and hand arm vibration exposure, anthropometry, seat design, ergonomic evaluation of industrial systems and consumer products. The main equipment in the laboratory includes the following:

- Portable EMG system
- Biopac MP-45 system for EDA, PPG measurement
- Portable physiological monitoring system
- Kinect V2 IR, Intel Real sense Cameras
- Whole body and Hand arm vibrations analysis kit, Electronic dynamometer, Electronic pinchmeter
- Pressure mapping system (seat and back)
- Delmia Human software
- Anthropometric kit
- Oxygen analyser
- EEG-EMG system
Prototyping Laboratory

The prototyping laboratory has equipments for additive manufacturing based on extrusion and polyjet technologies. It also has facilities for conversion of CT scan images to 3D models, measurement of physiological parameter monitoring and design and fabrication of PCBs. The facilities in this laboratory are being used for development of products for medical applications, assembly tools and workplace organisational aids. Equipment in the laboratory includes the following:-

- 3D scanners and software
- MIMICS Innovation suite (Mimics, 3-matic and Magics RP software)
- Fused Deposition Modeling (FDM) : Fortus 400 MC (Small)
- Polyjet Prototyping Machine : EDEN 260V
- Haptic Freeform Device
- NI Simulator, NI DAQ cards and Data logger cards
- Lab VIEW
- Controllers, sensors and actuators
- Altium software
- PCB prototyping machine

PEC-Intel Embedded System Laboratory

This embedded system laboratory has equipments for development of embedded systems based on Intel atom boards. The facilities in this laboratory are being used for development of products for medical applications and workplace organisational aids. Equipment in the laboratory includes the following:-

- Intel Galileo Board
- Intel Atom Boards
- E- Health kit
- Sensors
About the Program

Centre of Excellence runs a Master’s program in Industrial Design as a self-supporting interdisciplinary programme. This Master’s programme provides in depth knowledge of human engineering, design processes and latest design tools like 3D scanning, rapid product development, high performance visualization etc. Availability of well-trained graduates in industrial design would result in upgradation of quality of engineering design, design materials and also result in environmentally sound and socially & culturally relevant designs. The duration of this programme for regular students is two years.

Master of Technology (Industrial Design) Structure

<table>
<thead>
<tr>
<th>Semester - I</th>
<th>Semester - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet of Things</td>
<td>Design of Experiments &amp; Research Methodology</td>
</tr>
<tr>
<td>Machine Learning</td>
<td>Product Design and Development</td>
</tr>
<tr>
<td>Communication Skills</td>
<td>Applied Ergonomics</td>
</tr>
<tr>
<td>Management Entrepreneurship and IPR</td>
<td>Elective-III (E3)</td>
</tr>
<tr>
<td>Professional Ethics</td>
<td>Elective-IV (E4)</td>
</tr>
<tr>
<td>Creative Engineering Design</td>
<td>Open Elective</td>
</tr>
<tr>
<td>Product Form and Design</td>
<td>Mini Project/Pre Dissertation</td>
</tr>
<tr>
<td>Elective-I(E1)</td>
<td></td>
</tr>
<tr>
<td>Elective-II(E2)</td>
<td></td>
</tr>
<tr>
<td>Engineering Mathematics (EM)</td>
<td></td>
</tr>
</tbody>
</table>

Summer Term

Student Exchange Programme
Industrial Visit (one or two week of Visit, Submission and presentation of visit report)

<table>
<thead>
<tr>
<th>Semester - III</th>
<th>Semester - IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissertation/Industry Project</td>
<td>Dissertation/Industry Project</td>
</tr>
</tbody>
</table>

List of Electives

<table>
<thead>
<tr>
<th>Interaction Design</th>
<th>Usability Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced CAD</td>
<td>CAD Applications in Medical Sciences</td>
</tr>
<tr>
<td>Physiological Signals Acquisition</td>
<td>Physiological Signals Acquisition and Processing</td>
</tr>
<tr>
<td>and Processing - I</td>
<td>II</td>
</tr>
<tr>
<td>Designs of Mechanical Assemblies - I</td>
<td>Designs of Mechanical Assemblies - II</td>
</tr>
<tr>
<td>Finite Element Analysis</td>
<td>Finite Element Analysis Applications</td>
</tr>
<tr>
<td>Robot Mechanics</td>
<td>Industrial Robotics</td>
</tr>
<tr>
<td>Mechatronics System Design - I</td>
<td>Mechatronics System Design - II</td>
</tr>
<tr>
<td>Design Management</td>
<td>Business Strategies</td>
</tr>
<tr>
<td>Business Model Innovation</td>
<td>Business Model Design</td>
</tr>
<tr>
<td>Occupational Biomechanics – I</td>
<td>Occupational Biomechanics – II</td>
</tr>
<tr>
<td>Venture Development</td>
<td></td>
</tr>
</tbody>
</table>
Major Ongoing Research

1. **Project Title**- Design of an Internal frame for School Backpacks

   ![Design Diagram](image1)

   **Research Collaborator**- National Institute of Industrial Engineering, Mumbai

2. **Project Title**-

   - Customized Design of Ankle Foot Orthosis
   - Design of Patient Specific Maxillofacial Implants, Templates and Cutting Guides
   - Pain Management Through Neuro Signal Tracking

   ![Orthosis and Implants](image2)

   **Research Collaborator**- PGIMER, Chandigarh
3. **Project Title**

- Development Of Dental Drill Guides For Improved Cooling At Drilling Site
- Ergonomic Evaluation Of Scaling Tool Handles

**Research Collaborator**- Dr. Harvansh Singh Judge Institute of Dental Science and Hospital, Panjab University, Chandigarh

4. **Project Title**- Mental Health Assessment Using Physiological Signals

**Research Collaborator**- Government Hospital, Sector 6, Panchkula
Publications

JOURNALS (SCI)

2014-15


2016-17


INTERNATIONAL CONFERENCES

2014-15


2015-16


2016-17


### Patents Filed

<table>
<thead>
<tr>
<th>Patent Filed</th>
<th>Application No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical guide with improved external irrigation for dental implant surgery</td>
<td>201711028565</td>
</tr>
<tr>
<td>Design of Universal osteotomy guide</td>
<td>201711028402</td>
</tr>
<tr>
<td>Customized 3-part Immediate Dental Implant.</td>
<td>201711032686</td>
</tr>
<tr>
<td>An Internal Backpack frame based on spinal kinematics</td>
<td>201711028564</td>
</tr>
</tbody>
</table>

### Details of Pre-surgical planning/Surgical assistance provided to PGIMER

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Technique</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible Reconstruction</td>
<td>3D reconstruction and 3D printing of templates for surgery</td>
<td>12</td>
</tr>
<tr>
<td>Maxilla Reconstruction</td>
<td>3D reconstruction and 3D printing of templates for surgery</td>
<td>4</td>
</tr>
<tr>
<td>Orbital Floor Reconstruction</td>
<td>Preoperative adaptation of plates using prototype</td>
<td>3</td>
</tr>
<tr>
<td>Frontal Bone Reconstruction</td>
<td>3D printing template for mesh plate bending</td>
<td>1</td>
</tr>
<tr>
<td>Crouzon and Apert Syndrome</td>
<td>Surgery planning- 3D Printing of template</td>
<td>3</td>
</tr>
<tr>
<td>Mucormycosis</td>
<td>3D design and fabrication of Zygomatic implant</td>
<td>1</td>
</tr>
</tbody>
</table>
Collaborations with Industries and Research Institutions/Organizations

Employment opportunities exists in some of the collaborating Industries
Contact us

Prof. Manoj K. Arora
Director, PEC University of Technology
Patron
Email: director@pec.ac.in

Prof. Parveen Kalra
Coordinator
Email: parveenkalra@pec.ac.in

Dr. Neelam R Prakash
Co-Coordinator
Email: neelamrprakash@pec.ac.in

Dr. Sanjeev Kumar
Co-Coordinator
Email: sanjeevkumar@pec.ac.in