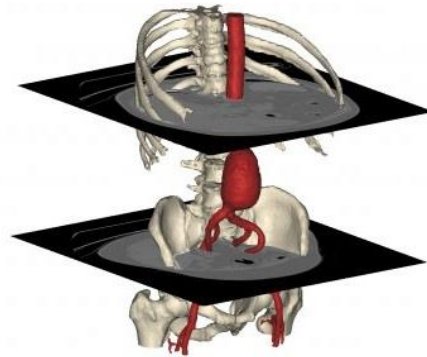


***3D Scanning - Medical Image Processing - 3D Printing -  
Design & Development of Medical Devices***



**Centre of Excellence  
In  
Industrial and Product Design**

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**PEC University of Technology  
Chandigarh, India**

The prototyping laboratory has equipments for additive manufacturing based on FDM and polyjet technologies. It also has facilities for conversion of CT scan images to 3D models. The facilities in this laboratory are being used for development of products for medical applications, assembly tools and workplace organisational aids.

Main facilities under prototyping laboratory include the following:

### **1. 3D Scanning System and Software**

3D scanner is used in development, quality assurance and production to reduce time and costs. Main applications are 3D inspection, reverse engineering and rapid manufacturing.

3D scanning system consist of two scanning heads- Atos core 45 5m and Atos core 300 5m, both the lenses generate point cloud of 5 million but have different measuring areas. Measuring area of Atos core 45 5m and Atos core 300 5m are 45 x 30 mm and 300 x 230 mm respectively



### **2. Mimics Innovation Suite**

The Mimics Innovation suite is complete set of tools developed for biomedical professionals that allow them to perform a multitude of engineering operations starting from medical imaging data.

The suite consists of three modules which include: Mimics, 3-matic and Magics.

- **Mimics**

This software is for Medical Image Segmentation and 3D model creation. The Mimics can be used for the segmentations of 3D medical images (coming from CT, MRI, micro-CT, CBCT, 3D Ultrasound, Confocal Microscopy). Results obtained are highly accurate 3D models of patient's anatomy.

- **3-matic**

3-matic is truly unique software to combine CAD tools with pre-processing (meshing) capabilities and is a perfect complement to CAD Package.

- **Magics**

Magics is the most powerful STL editor. It is a user-friendly data preparation software package.

### **3. Fused Deposition Modeling (FDM) : Fortus 400 MC (Small)**

It is an extrusion based rapid prototyping technology. FDM builds concept models, functional prototypes and end-use parts in standard, engineering-grade and high-performance thermoplastics. It's the only professional 3D printing technology that uses production-grade thermoplastics, so parts are unrivaled in mechanical, thermal and chemical strength.


**Brief Specifications:**

- Built Size: 10x10x14 inch
- Accuracy: .127 mm
- Slice Height: T12 (0.0070 or .178 mm), T16 (.010 or .254 mm)
- Material Available: ABS M30i



### **4. Polyjet Prototyping Machine : EDEN 260V**

PolyJet 3D printing is similar to inkjet printing, but instead of jetting drops of ink onto paper, PolyJet 3D Printers jet layers of curable liquid photopolymer onto a build tray. PolyJet 3D Printing technology offers many advantages for rapid tooling and prototyping, and even production parts including astonishingly fine detail, smooth surfaces, speed and precision.

<p><b>Brief Specifications:</b></p> <ul style="list-style-type: none"> <li>• Built Size: 10x9.9x7.9 inch</li> <li>• Accuracy: 20 to 28 microns for size below 50 mm &amp; 200 microns for full size model.</li> <li>• Layer Thickness: 16 microns.</li> <li>• Material Available:             <ol style="list-style-type: none"> <li>1. Bio-Compatible material (MED610)</li> <li>2. Rigid Opaque white material (VeroWhitePlus RGD835)</li> <li>3. Rubber-like black (TangoBlack FLX973)</li> <li>4. VeroClear-RGD810</li> </ol> </li> </ul>	 <p>The image shows a Stratasys EDEN260V 3D printer. It is a large, industrial-grade machine with a dark grey and black color scheme. The top section is a transparent chamber where the printing process takes place. The front panel features the Stratasys logo on the left and the model name 'EDEN260V' on the right. The machine is supported by four adjustable feet.</p>
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## 5. PCB Prototyping Machine and Altium Software

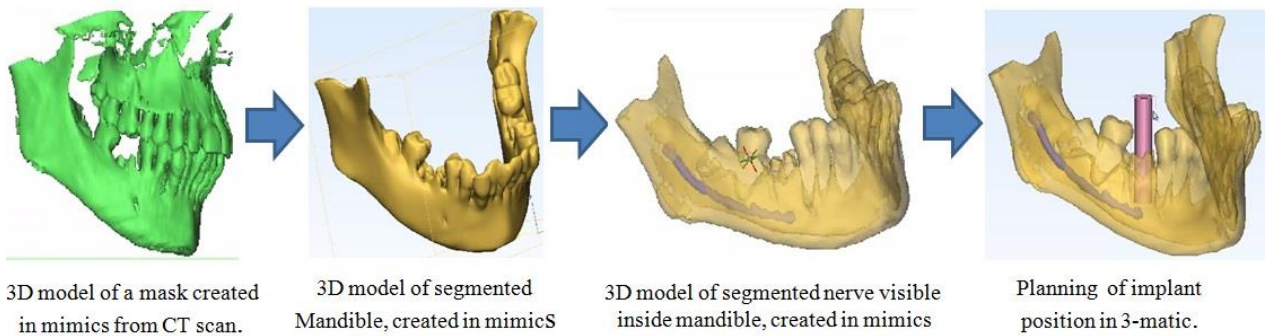
MITS PCB Prototyping System helps to build fine, accurate and rapid prototypes designs involving single, double sided, multilayer and high-density boards. Main Features include: Import option of CAD data (Gerber or DXF output format), accelerate the process of product development, addresses both Milling & Etching, ease of in-house PCB manufacturing for prototypes, experience high quality and precision at prototype level.

Altium is PCB designing and simulating software which makes highly constrained PCB design faster. Altium's unified electronics design environment links all aspects of electronics product design in a single application that is priced as affordable as possible. This enables electronics designers to innovate, harness the latest devices and technologies, manage their projects across broad design 'ecosystems', and create connected, intelligent designs.



Projects undertaken in collaboration with PGIMER, Chandigarh

- Thermal Analysis of Dental Implant Guides Fabricated by Rapid Prototyping



Team:

**Dr. Sanjeev Kumar**,  
Associate Professor,  
PEC, Chandigarh

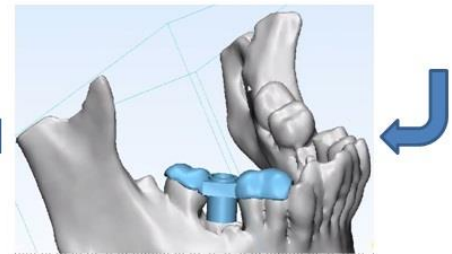
**Dr. Parveen Kalra**,  
Professor, PEC, Chandigarh

**Dr. Rahul Datta** (Research Partner)

**Mr. Varun Arora** (Research Scholar),  
PEC, Chandigarh

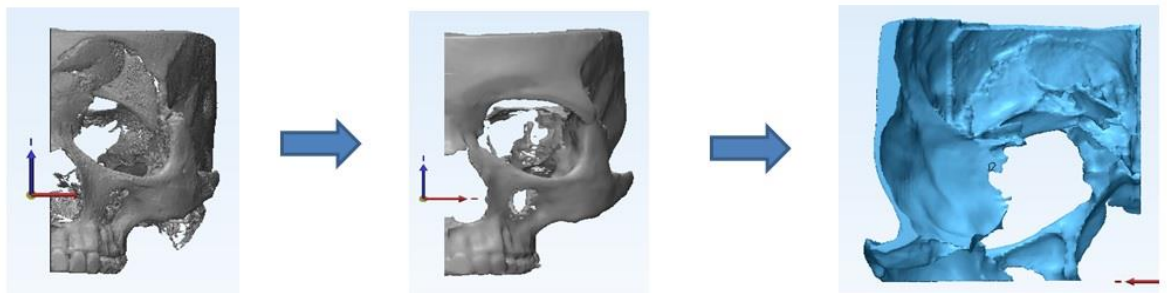


Dental drill guide fabricated on rapid prototyping machine (EDEN 260V) & fitted with SS 316L sleeve



Dental drill guide designed in 3-matic

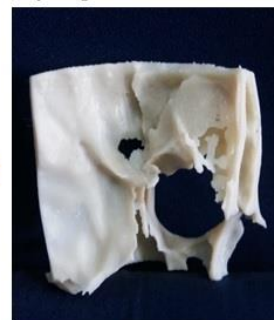
- Mesh Plate Bending



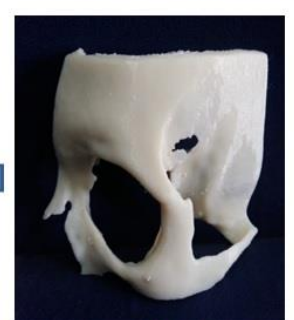
Team-  
**Dr. Vidya Rattan**  
& Team  
**Dr. Parveen Kalra** & Team



Mesh Plate Adaptation

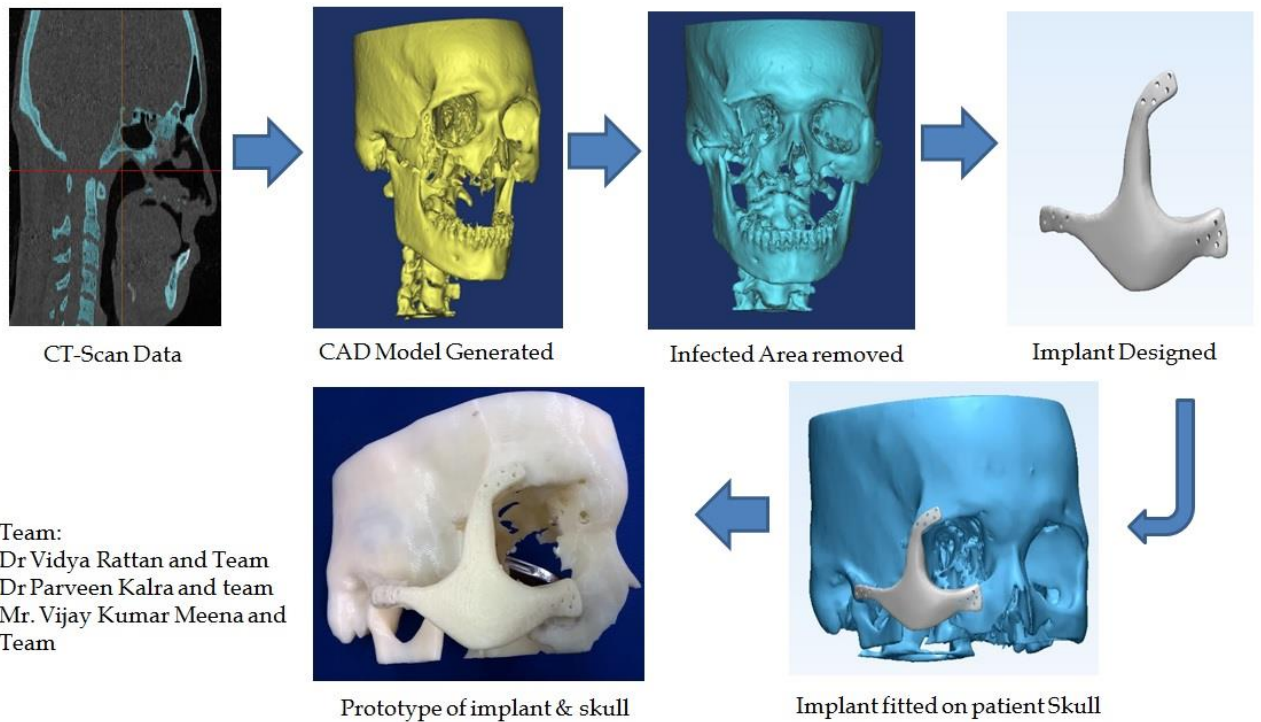


Prototype- Fracture reference at the back

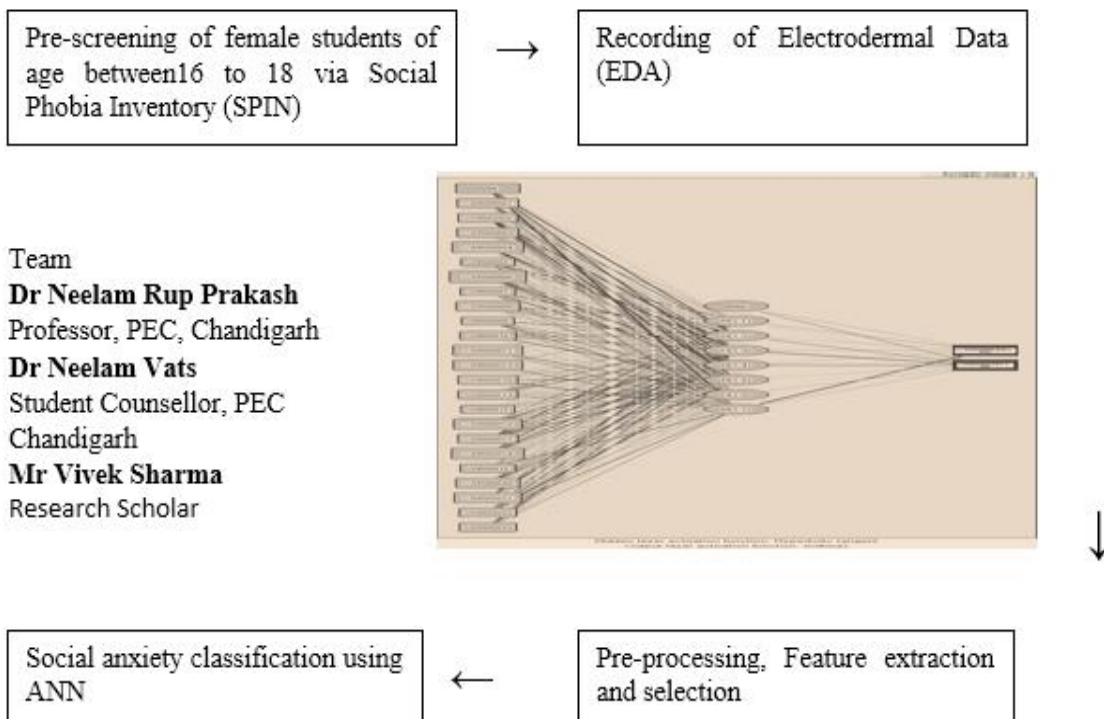


Printed Template of Refined Skull Prototype

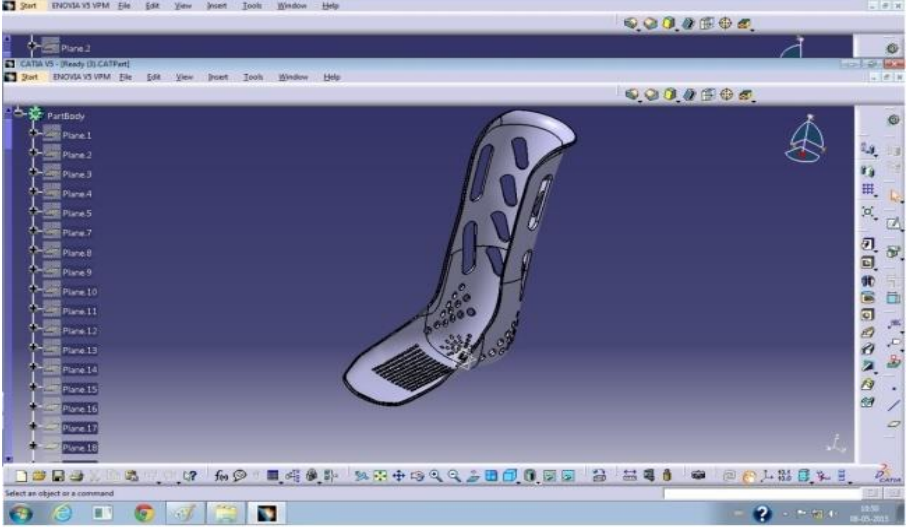
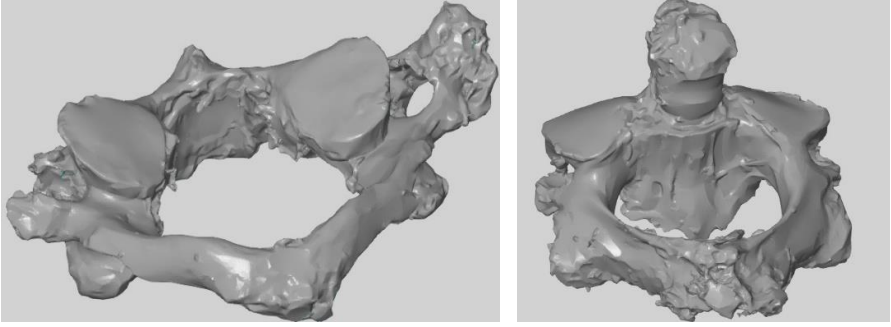


- Patient Specific Custom Implant Development for Maxillofacial Patient

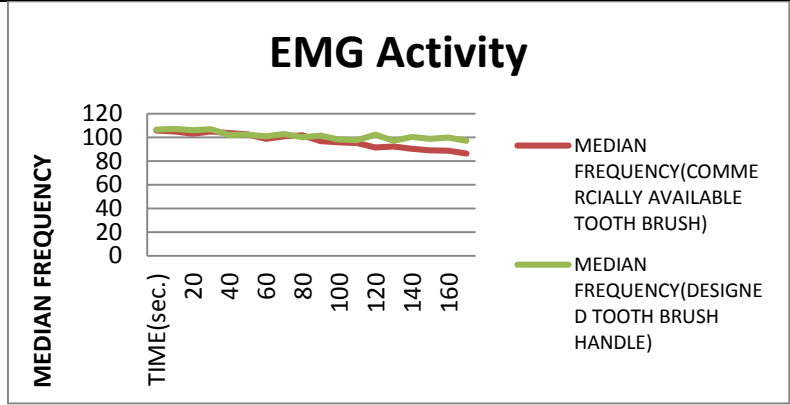
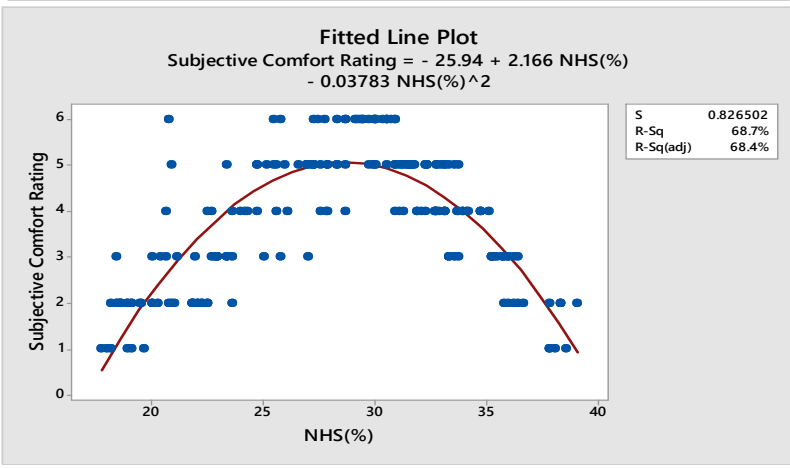
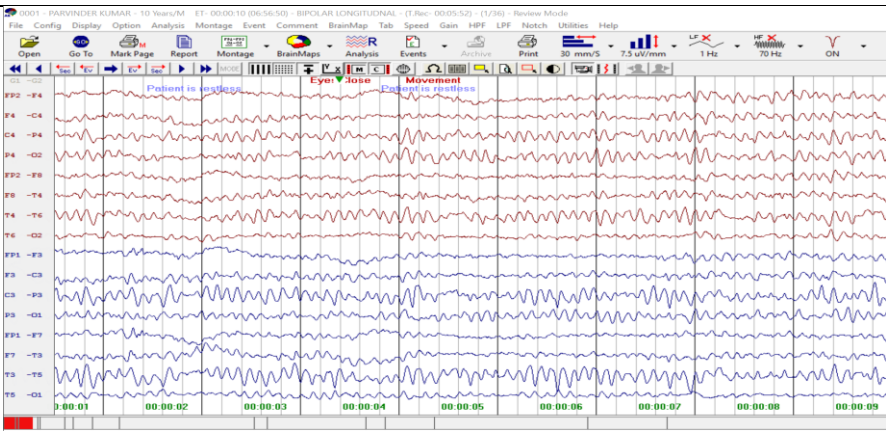



- Anxiety detection using Physiological Signals



*Other Projects Undertaken / Ongoing*

1	Design & Fabrication of Customized Ankle Foot Orthosis	
2	Characterization of surfaces of cadaver spinal vertebrae	
3	Development of wearable EDA sensor	
4	Development of games for autistic children	

5	Development of ergonomically designed tooth brush	 <p><b>EMG Activity</b></p> <p>MEDIAN FREQUENCY (COMMONLY AVAILABLE TOOTH BRUSH)</p> <p>MEDIAN FREQUENCY (DESIGNED TOOTH BRUSH HANDLE)</p>  <p><b>Fitted Line Plot</b></p> <p>Subjective Comfort Rating = - 25.94 + 2.166 NHS(%) - 0.03783 NHS(%)<sup>2</sup></p> <p>S 0.826502 R-Sq 68.7% R-Sq(adj) 68.4%</p>
6	Co-relation of pain with EEG signals	
7	Virtual restoration of archeological artifacts	

[Contact us](#)

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