Medical 3D Printing Training Workshop – India 2017

Goal – To provide sufficient training for clinicians to be able to use 3D printers to manufacture custom medical devices (prosthetic hands focus). By the end, the clinicians should be able to download files from the internet, modify the files in both meshmixer and cura, effectively slice and prepare models, identify and properly add support structures, set-up a 3D printer, upload files for printing, execute a 3D print, properly remove and process parts, assemble and fit prosthetic devices, maintain the machines and materials.

Methods – Provide training sessions that include both tutorial videos, in-person training, hands-on practice sessions, real-world application case studies, and a validation testing process at the end of the week.

Schedule – **refer to specific talk details below the schedule**

	10:00	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**
Day 1	Introduction	What is 3D Printing?	Watch first video	Lunch	Watch second video	Designing for 3D printing	Downloading already designed parts and modifying them
Day 2	Measuring and taking pictures for prosthetics (3D scanning)	Modifying 3D scans in meshmixer	3D print scanned model	Lunch	Idea generation for case study	Prosthetic hand assembly	Prosthetic hand assembly
Day 3	Review 3D print from day before	Case study execution	Case study execution	Lunch	Final review	Questions and idea generate and final testing	Final Testing
Day 4	Case study	Case study	Case study	Lunch	Case study	Case study	Case study
Day 5	Case study	Case study	Case study	Lunch	Case study	Final Review	Final Review

Summary –

Bala and Mathu were trained and passed the administered tests to be efficient in the following processes and technologies:

- Setting up a 3d printer
- Maintenance on a 3d printer
- Slicing files and preparing them for printing
- Running a 3d printer and trouble-shooting
- Materials and their differences
- Using a 3d scanner attached to an iPad
- Uploading the 3d scan file and sending to make print file
- Idea generation for 3d printable assistive devices and prosthetics

The two technicians are now able to identify a patient's need for a 3d printed device. Take a 3D scan of the patient's residual limb, edit the file, take the resulting socket/device design, prepare the file for printing, slice, create the gcode, and print the file. They can then post-process the printed parts, add additional materials and assemble the devices.

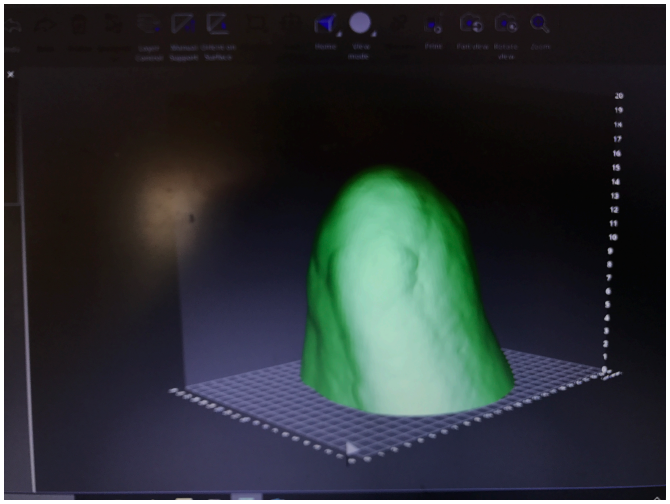

Leg shell (Size – 04)
PVC Knee joint mould
Leg shell (Size – 04)
COMMODE CHAIR

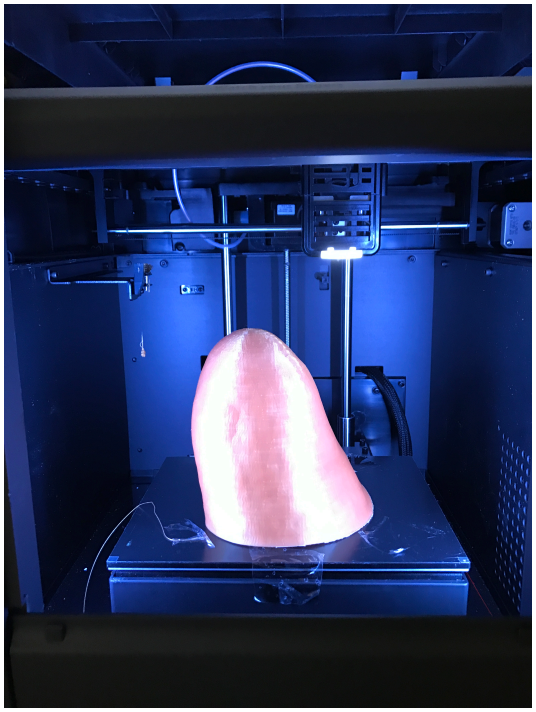
In addition to training Bala and Mathu, the team of PT's were trained on 3D printing, how it works, when is can be used, and how to identify situations in a patient's daily routine that a custom 3D printed device could be implemented.

Case 1:

Patient: Samy
Requirement: Above knee prosthetic socket
Process:

1. 3d scan of patient's residual limb
2. computer design of socket created from scan
3. socket was 3d printed
4. Patient was fitted with socket to confirm fit





Case 2:

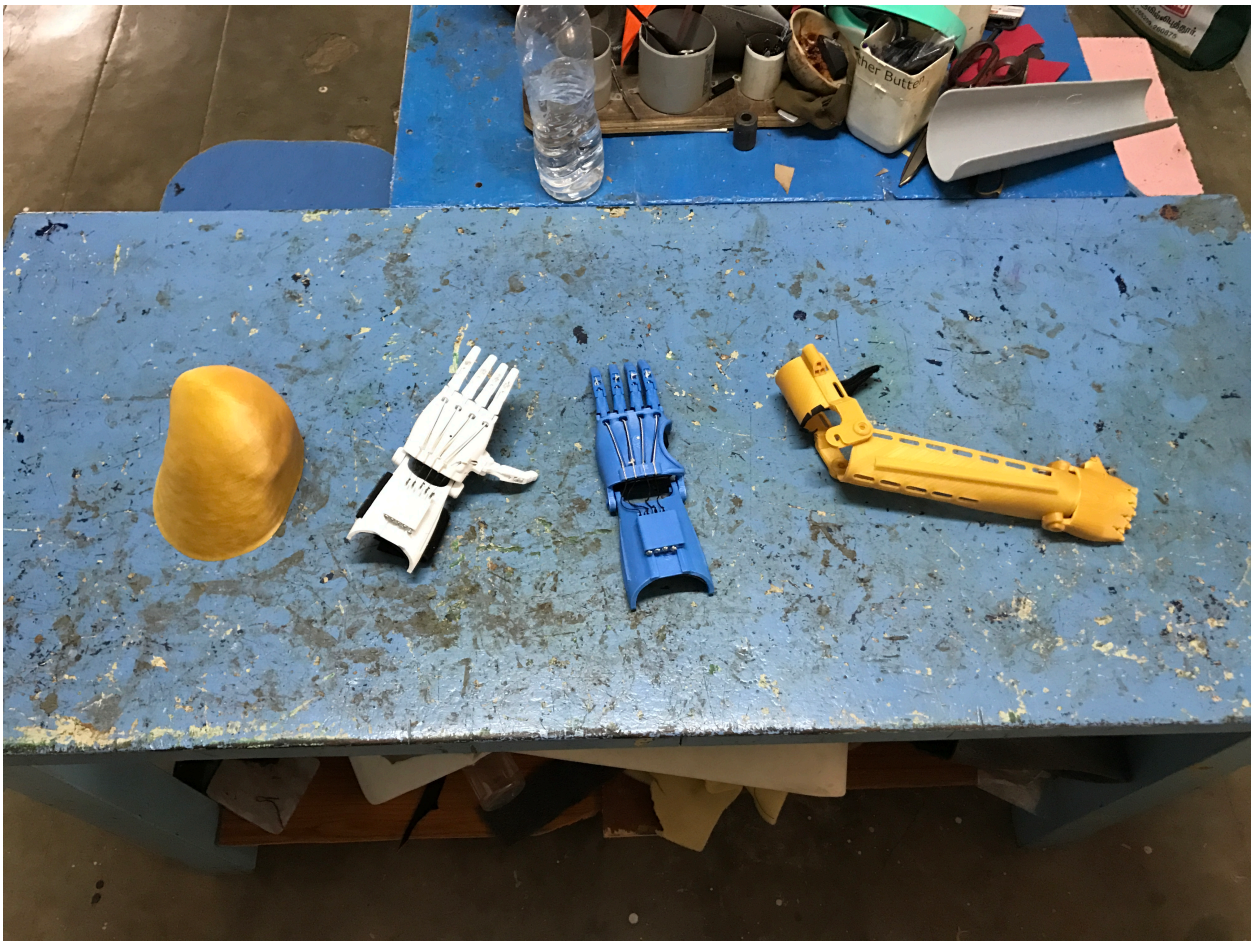
Patient: Ponumanickam
Requirement: trans-radial device for typing on computer at work
Process:

1. Caliper measurements and photos of residual limb taken
2. computer design of typing device created from scan
3. device was 3d printed
4. Patient was fitted with device to confirm fit and angle of the appendage
5. An additional “finger” was designed, printed, and attached to the device as per patient suggestion
6. Patient accepted device and types with it now.

Case 3:

Patient: Pattaraj
Requirement: trans-radial arm prosthetic
Process:

1. 3d scan of patient's residual limb
2. computer design of socket and arm created from scan
3. socket and arm was 3d printed
4. Patient was fitted with socket to confirm fit
5. Arm was assembled and tested



Case 4:

Patient: Petchiammal
Requirement: splint for trigger-finger
Process:

1. 3d scan of patient's hand
2. computer design of splint
3. splint was 3d printed

Case 5:

Patient: Palani
Requirement: Leg, transtibial
Process:

1. 3d scan of patient's residual limb
2. computer design of socket and arm created from scan
3. socket was designed for 3d printed

Case 6:

Patient: Sudali
Requirement: Leg, transtibial
Process:

1. 3d scan of patient's residual limb
2. computer design of socket and arm created from scan
3. socket was designed for 3d printed