

**Title: Establishment of a Fabrication Facility for Rehabilitation Device Development**

Aim: The aim of this project is to establish a state-of-the-art fabrication facility dedicated to the development and testing of rehabilitation robotics. This facility will enhance our capabilities in creating innovative rehabilitation devices that improve patient outcomes and foster research in assistive technologies.

About the group: The REHAB Group is committed to pioneering research in the creation and development of indigenous assistive devices for rehabilitation. Through a multidisciplinary approach, the group promotes collaboration between engineering fields and medical institutions. Its core research focuses on orthosis design, rehabilitation robotics and control, biomedical signal processing, and machine learning.

Current Work: The REHAB group is actively engaged in developing rehabilitation devices aimed at enhancing mobility and recovery for individuals with physical impairments. Our current project includes:

1. **Robotic Exoskeletons:** Devices designed to assist with movement and mobility for patients recovering from injuries. This is initiated with funding from DST SERB in collaboration between NITK Surathkal, IIT Goa and Kasturba Medical College Mangalore. The primary aim is to bring a rehabilitation device for children with lower mobility issues.
2. Biomedical Signal Processing and Machine Learning for improved Human Machine Interaction.

Our team consists of skilled students and research fellows committed to advancing rehabilitation robotics, but we lack the necessary fabrication resources to fully realize our innovative concepts. This will greatly help in product development right from the ideation to the final prototyping.

**Material Requirements:**

To establish this fabrication facility, we require funding for the following components:

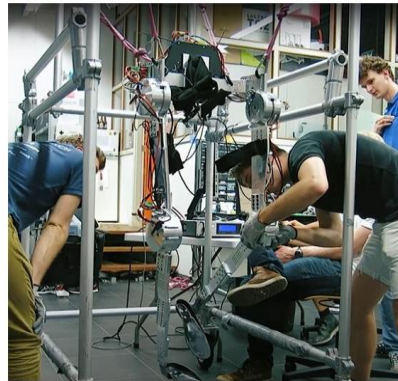
Table-1: Cost of hardware items for setting up a fabrication facility

Sl. No.	Item	Quantity	Cost (INR)
1	3D Printers with Accessories	1	2,00,000
2	Welding machines and accessories	1	25,000
3	Drilling Machine with accessories	1	10,000
4	Angle grinder with all accessories	1	6,000
5	Jigsaw with accessories	1	7,000
6	Rotary tool with all accessories	1	5,000
7	Die Grinder with all accessories	1	8,000
8	Spot Welder	1	20,000
9	Vacuum Cleaner	1	7,000
10	Vacuum compressor	1	24,000
11	Vacuum bagging accessories	1	30,000
12	High Quality Spanner Set	1	7,000
13	Workbench (8ft x 4ft)	1	8,000
14	Screw driver set (High Carbon Steel)	1	5,000
15	Hammer (Mallet, Metal, Wooden)	1	1,500
16	Cutting Plier, Nose Plier, Wire cutter, Wire Stripper, Solder Iron	1 set	15,000
17	Bench Power Supply	1	10000
18	Bench vice	1	5,000
19	Tapping Tool	1	2,000
20	C clamp Set	1	2,000
21	Palm Router	1	6,000
22	Power Planer	1	7,000
23	Power Sander	1	6,500
24	Reciprocating Saw	1	5,000
25	Air Blower	1	4,000



26	Heat Gun	1	2,500
27	Hot Glue Gun (High Quality, Adjustable temperature)	1	5,000
28	Woodworking Clamp	1	5,000
29	Tool Kit cupboard	1	20,000
30	Orbit Sander	1	7,000
31	Disc Bench Sander	1	15,000
32	Vernier Caliper	1	4,000
33	Metal Scales (1 ft, 2 ft, 3ft)	3	500
34	Measuring Tape	2	300
35	Utility Knife & Blade Sets	10	1,000
36	Impact Driver	1	7,000
37	Hack saw Frame with Blade Sets	1	1,000
38	Digital Angle Finder	1	4,000
39	Anvil	1	3,000
40	Weighing Scale (Small & Big)	1	8,000
41	Aluminum Alloy Set Square	4	3,500
42	1 kg Metal Weight	5	700
43	Allen Key Set	1	1,500
44	Water Bubble Leveler	5	1,000
45	Circular Saw Bit	1	3,500
46	Magnetizer & Demagnetizer	1	1,000
47	Safety Goggles, Masks, Ear Blockers & Hand Gloves	1 set	10,000
48	Radial Drill	1	10,000
49	Dimpling Plier	3	3,000
50	Titanium Scissor	1	4,000
51	Oscillating Multi Tool	1	4,000
52	Hanger facility for the prototype for Air Gaiting	1	60,000
TOTAL			4,11,500

Orthosis arrangement for air gaiting



*representative image, taken from Project March-TU Delft.

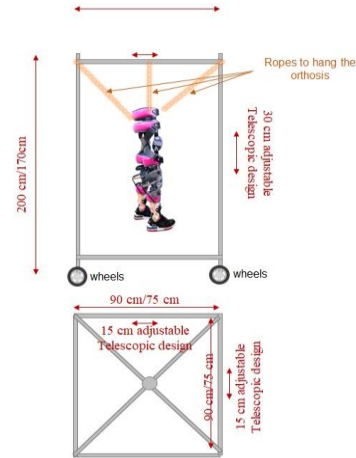


Fig. 1 shows the planned arrangement for air gaiting arrangement for orthosis

Manpower:

Hiring skilled technicians and part-time researchers to assist in device development and fabrication. To ensure successful project execution, we plan to hire part-time research assistants and interns. Their roles will focus on equipment operation, maintenance, and assisting in the development of rehabilitation devices. The budget allocates funds for their stipends and benefits over the project duration.

Table-2: Manpower Related cost for executing the project

Sl. No.	Stipend/month	# months	Role/Justification	Total
1	5000	6	Signal Processing/Data Collection/Sensor Integration	30,000.00
2	5000	6	Control Algorithm for the Exoskeleton	30,000.00
3	5000	6	Fabrication and Design upgrade/changes	30,000.00
4	5000	6	AI ML expert, App design etc.	30,000.00
TOTAL Manpower cost				1,20,000.00

Table-3: Total Budget

Sl. No.	Head	Amount
1	Equipment and other hardware items	4,11,500.00
2	Manpower (6 months)	1,20,000.00
3	Overheads (@15%)	79,725.00
TOTAL AMOUNT		6,11,225.00

**Timeline for execution**

Sl. No.	Activity	Month (8 months)							
		1	2	3	4	5	6	7	8
1.	Purchase of smaller items	■							
2.	Equipment Purchases	■	■	■					
3.	Intern-1 (Signal Processing)		■	■	■	■	■	■	
4.	Intern-2 (Controls)		■	■	■	■	■	■	
5.	Intern-3 (Fabrication)			■	■	■	■	■	■
6.	Intern-4 (App + ML)			■	■	■	■	■	■
7.	Fabrication with the facility						■	■	■

Final Deliverables:

1. A fully furnished fabrication facility.
2. Student publications in journals/conference proceedings (submitted).

Website Link for further information regarding the lab:

For more information about our group and past projects, please visit our website:

<https://sites.google.com/view/rehab-ee-nitk>

Conclusions:

The establishment of this fabrication facility is crucial for advancing our research in rehabilitation robotics. With adequate funding, we can create innovative solutions that significantly enhance rehabilitation processes for individuals with physical impairments. We kindly request your support in making this vision a reality.