**Project Title:** Digitally fabricated design interventions for ALS/MND  
**Project Number:** ID00985

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IDC School of Design

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**Research Clusters:**

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Material Science/Engineering (including Nano, Metallurgy)</td>
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<tr>
<td>2</td>
<td>Energy, Green Chem, Chemistry, Catalysis, Reaction Eng</td>
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<tr>
<td>3</td>
<td>Math, CFD, Modelling, <strong>Manufacturing</strong></td>
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<tr>
<td>4</td>
<td>CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control</td>
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<td>5</td>
<td>Earth Sciences and Civil Engineering (Geo, Water, Climate)</td>
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<tr>
<td>6</td>
<td>Bio, Stem Cells, Bio Chem, Pharma, Food</td>
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<tr>
<td>7</td>
<td>Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng</td>
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<tr>
<td>8</td>
<td>HSS, <strong>Design</strong>, Management</td>
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</tbody>
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**Research Themes:**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Advanced computational engineering, simulation and manufacture</td>
</tr>
<tr>
<td>2</td>
<td>Infrastructure Engineering</td>
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<tr>
<td>3</td>
<td>Clean Energy</td>
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<tr>
<td>4</td>
<td>Water</td>
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<tr>
<td>5</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>6</td>
<td>Biotechnology and Stem Cell Research</td>
</tr>
<tr>
<td>7</td>
<td>Humanities and social sciences</td>
</tr>
<tr>
<td>8</td>
<td><strong>Design</strong></td>
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The research problem

Define the problem

This project will leverage the possibilities of digital fabrication to explore the production of low volume open-source assistive aids. These will be developed together with patients to explore the potential of bespoke design and fabrication in the assistive device field. Developing frameworks and techniques to scale these interventions within developing countries and communities.

Motor Neuron Disease (MND) is a degenerative neurological disorder. The nerves affected with this stop sending messages to the muscles leading to weakness and further wasting of those muscles. Amyotrophic Lateral Sclerosis (ALS) is the most common form of MND. It is characterised by weakness and wasting of both upper and lower limbs in the patient. As the disease progresses speech, swallowing and breathing impairment takes place. The patients gradually become completely dependent on the family members and caregivers.

Since this is a rare disease, not much design intervention has happened to make life easier for patients, caregivers or even physiotherapists and occupational therapists. The project will focus on identifying the various design opportunities, creating and testing products for selected problem areas for intervention and spread the awareness about the disease.

Project aims

Define the aims of the project

The aim of the project would be to design aids towards making the patients of early stage ALS/MND more independent so that they can lead a more respectful and confident life. It will improve the quality of life not just for the patients but also for the caregivers who are mostly family members in the Indian context. While exploring how digital fabrication can make the production of these low volume aids scalable and economically viable.

Expected outcomes

Highlight the expected outcomes of the project

A system-level intervention, products to help MND patients, and a framework for the creation of bespoke assistive aids using digital fabrication technologies.

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

Project will fall under Design theme and have a practice-based approach

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.
B.E./B.Tech. in Mechanical / Electrical / Electronics engineering

M.Tech. in Mechanical / Electrical / Electronics engineering
OR
M.Des. in Industrial / Product Design

### Necessary Courses

Name three tentative courses relevant to the project that the student should complete during his/her coursework at IITB (the student will require to secure 8 point in these courses)

- Qualitative research methods
- Mini Project I
- Mini Project II

### Potential Collaborators

Please visit the IITB website [www.iitb.ac.in](http://www.iitb.ac.in) OR Monash Website [www.monash.edu](http://www.monash.edu) to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Prof. Daphne Flynn and the Design Health Collab research lab work at the intersection of design and health and could work on this project. The Monash Institute of Medical Engineering could also support in addition to the Monash Young Med Tech Innovators. Dr. Page has experience working with all of these groups.

Select up to (4) keywords from the Academy’s approved keyword list ([available at http://www.iitbmonash.org/becoming-a-research-supervisor/](http://www.iitbmonash.org/becoming-a-research-supervisor/)) relating to this project to make it easier for the students to apply.

- Design
- Design for health