



DEPARTMENT OF ENGINEERING DESIGN

# BROCHURE

2025 - 26

# WHY HIRE FROM ENGINEERING DESIGN, IIT MADRAS

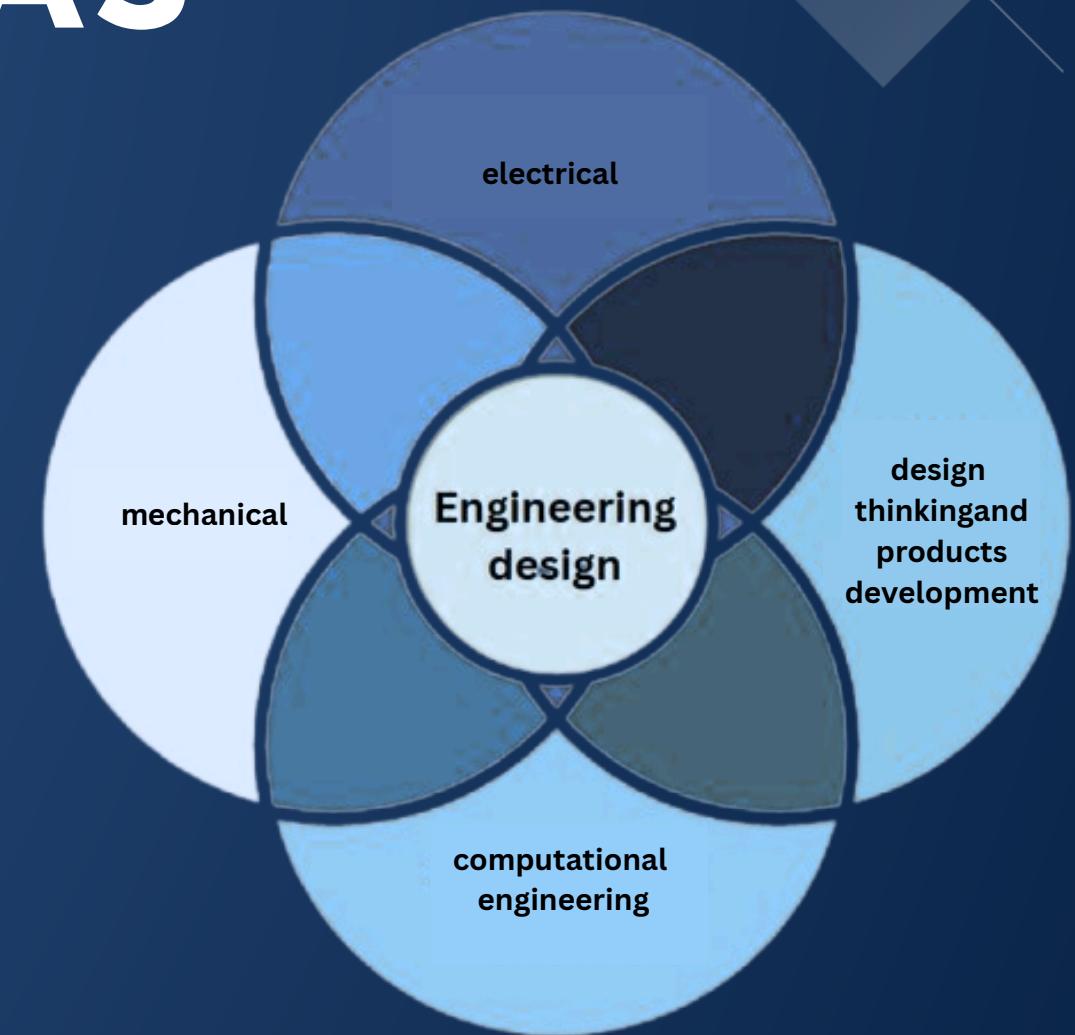
The Department of Engineering Design (ED) at IIT Madras is India's first and only dedicated design-engineering program. Our unique five-year dual degree blends Mechanical Engineering, Electronics, Computer Science, and Design Thinking, producing industry-ready innovators with a global outlook.

## *Interdisciplinary Expertise*

ED graduates are trained at the overlap of mechanical, electronics, computer science, and design, equipping them to solve complex, real-world problems across domains.

## *Startup & Innovation Leaders*

Alumni have founded startups like Ather Energy and Croleon Labs. With 648+ research publications and multiple patents, ED showcases deep innovation strength.



## Hands-On & Holistic Learning

A 6-month full-time industrial internship and real-world projects ensure students graduate job-ready—with added exposure to communication, creativity, and design thinking.

# WHAT IS ENGINEERING DESIGN

The Engineering Design program at IIT Madras integrates mechanical engineering, electronics, and computer science to create solutions that involve both product and system design. It emphasizes a design-thinking methodology, nurturing creativity, user-centric thinking, and problem-solving skills in engineering contexts. The curriculum is designed with inputs from industry and focuses on product development, systems engineering, CAD/CAE tools, and prototyping, ensuring real-world relevance. Students are encouraged to take part in research, publish papers, file patents, and work on cutting-edge technologies in fields like autonomous vehicles, AI in design, and medical devices.



# DEGREE PROGRAMS OFFERED

## DUAL DEGREE PROGRAMS (B TECH + M TECH)

- Automotive Engineering: Covers electric and hybrid vehicle systems, vehicle dynamics, powertrain design, and autonomous technologies.
- Biomedical Engineering: Focuses on medical device development, bio-signal processing, prosthetics, and healthcare technologies.

## INTER-DISCIPLINARY DUAL DEGREE (IDDD)

- Robotics: Focuses on autonomous systems, control theory, sensors, and intelligent machines.
- Electric Vehicles: Covers EV systems, battery technology, power electronics, and sustainable mobility.
- Data Science: Emphasizes machine learning, data analytics, and data-driven decision-making

## RESEARCH PROGRAMS

- Master of Science (MS): Thesis-based program emphasizing in-depth research and specialization.
- Doctor of Philosophy (PhD): Rigorous research program aimed at advancing knowledge and innovation.

# COURSE & LAB CATEGORIES

Type	Courses	Labs
MECHANICAL ENGINEERING	<ul style="list-style-type: none"><li>• Design of Mechanical Systems I &amp; II</li><li>• Manufacturing Processes</li><li>• Finite Element Analysis</li><li>• Vehicle Dynamics</li><li>• Structural Design</li><li>• Thermal and Fluid Systems Design</li></ul>	<ul style="list-style-type: none"><li>• 3D Modeling / Computer Aided Design (CAD) Laboratory</li><li>• Engineering Design Workshop</li><li>• Product Design Laboratory</li><li>• Graphic Arts and Design Laboratory</li><li>• IC Engines &amp; Automotive Systems Laboratory</li><li>• Vehicle Dynamics Laboratory</li></ul>
ELECTRICAL & ELECTRONICS	<ul style="list-style-type: none"><li>• Analog and Digital Electronics</li><li>• Control Systems</li><li>• Power Electronics</li><li>• Electromagnetic Compatibility</li><li>• Digital Signal Processing</li><li>• Microprocessors &amp; Microcontrollers</li></ul>	<ul style="list-style-type: none"><li>• Electronics Laboratory</li><li>• Electromagnetic Compatibility Laboratory</li><li>• Power Electronics Laboratory</li><li>• Motors and Controllers Laboratory</li></ul>

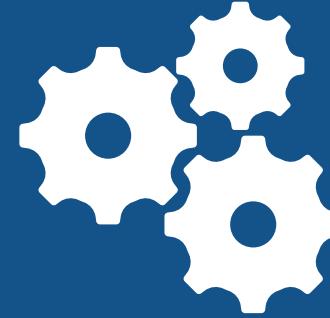
Type	Courses	Labs
Computer Science	<ul style="list-style-type: none"><li>• Programming and Data Structures</li><li>• Computational Methods in Design</li><li>• Machine Learning Applications</li><li>• Computer Graphics and Visualization</li><li>• Embedded Systems Programming</li><li>• Software Engineering</li></ul>	<ul style="list-style-type: none"><li>• Computer Programming and Visualization Laboratory</li><li>• E-Mobility Simulation Laboratory</li></ul>
Automotive Engineering	<ul style="list-style-type: none"><li>• Automotive Systems Fundamentals</li><li>• Powertrain Design</li><li>• Vehicle Control Systems</li><li>• Automotive Testing &amp; Validation</li><li>• Electric Vehicle Technology</li><li>• Automotive Safety Systems</li></ul>	<ul style="list-style-type: none"><li>• Battery Engineering Laboratory</li><li>• Charging Technology Laboratory</li><li>• E-Vehicle Engineering Laboratory</li></ul>
Biomedical Engineering	<ul style="list-style-type: none"><li>• Programming and Data Structures</li><li>• Computational Methods in Design</li><li>• Machine Learning Applications</li><li>• Computer Graphics and Visualization</li><li>• Embedded Systems Programming</li><li>• Software Engineering</li></ul>	<ul style="list-style-type: none"><li>• Anatomy and Physiology Laboratory</li><li>• Biomedical Equipment Laboratory</li></ul>

## SEMESTERS 1-5

### B.Tech Engineering Design

#### (Core)

- Foundation Courses (Math, Science, Engineering)
  - Core Engineering Design Subjects
  - Multi-disciplinary Exposure
- Basic Specialization Introduction



## SEMESTERS 5-6

### Specialization Selection

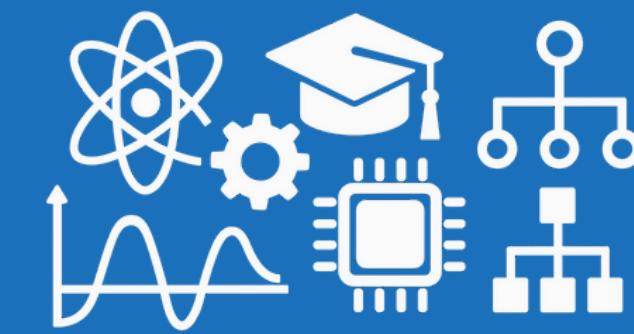
- At the start of the 5th semester, students choose between Automotive and Biomedical specializations.
- In the 6th semester, they can opt for IDDD courses based on their CGPA and interests.



## SEMESTERS 7-10

### M.Tech Specialization

- Advanced Specialized Courses
- Research Projects
- Industry Internship (6 months)



# IDDD PROGRAM FLOW

# RESEARCH OPPORTUNITIES

## YRF PROGRAM OVERVIEW

- IITM YRF is a unique, year-long program to immerse undergraduates in research at IIT Madras.
- It aims to foster deep scientific curiosity and exploration.

## RESEARCH OPPORTUNITIES

- Students have received prestigious research scholarships like DAAD, MITACS, CHARPAK, and CalTech SURF.
- They have also secured opportunities at top institutes abroad, including NTU, Tokyo University, Kyoto University, and Hokkaido University.

## ELIGIBILITY & FOCUS

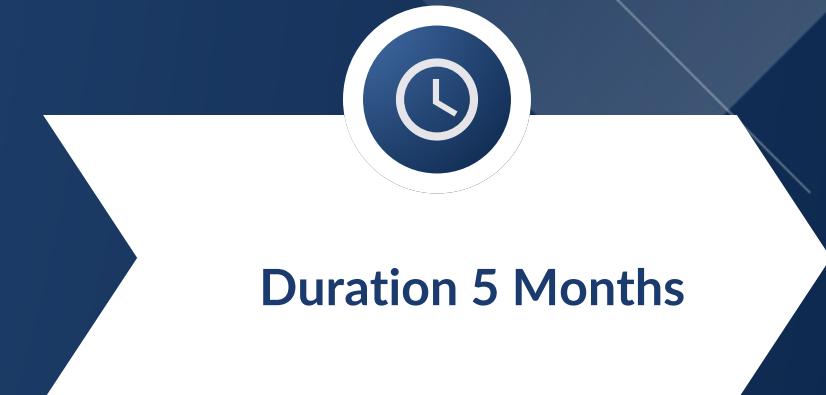
- Open to 5th semester undergrads, with special encouragement for women and those keen on interdisciplinary research.
- Aims to spark lifelong interest in high-level research.

## SEMESTER EXCHANGE PROGRAMS

- Fellows can pursue research projects in any department or center aligned with their interests, guided by faculty mentors.
- They are encouraged to publish and present their work on international platforms for wider impact.

# 5-MONTH INDUSTRIAL INTERN

BENEFITS TO STUDENTS	BENEFITS TO COMPANIES
<b>Practical Experience</b> Apply classroom concepts in real industrial settings through live projects.	<b>Skilled Interns</b> Engage with students trained in design thinking, systems engineering, and interdisciplinary approaches.
<b>Skill Enhancement</b> Develop professional skills in teamwork, communication, and problem-solving.	<b>Project Support</b> Receive 6-month dedicated contribution on focused, outcome-oriented tasks.
<b>Career Insight</b> Clarify goals and gain understanding of industry roles and expectations.	<b>Recruitment Advantage</b> Assess potential hires over an extended period through real work.
<b>Technology Exposure</b> Work with contemporary tools, platforms, and engineering systems.	<b>Academic Collaboration</b> Tap into the latest research, tools, and innovation from IIT Madras.



# SOFTWARE PROFICIENCY

## PRODUCT DESIGN & 3D MODELING TOOLS



Fusion 360



AUTODESK  
Inventor



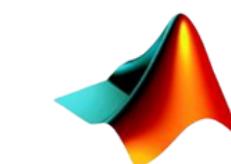
## ANALYSIS & SIMULATION



Unity



NATIONAL INSTRUMENTS  
LabVIEW



MATLAB

CoppeliaSim<sup>edu</sup>



## PROGRAMMING & DEVELOPMENT TOOLS



## LIBRARIES AND FRAMEWORK



MoveIt

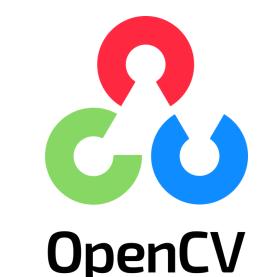
ROS

TensorFlow

mongoDB

PyTorch

MuJoCo



# INDUSTRY COLLABORATION

The Engineering Design Department was established in 2006 with support from industry leaders.

Key contributors like Ashok Leyland and Bosch helped set up the department's infrastructure, leading to the naming of the Center of Excellence in Engineering Design. Several companies have since partnered to create advanced Centers of Excellence for academic and research collaboration.



# FINANCIAL PROJECTIONS

## SAARANG



Saarang is IITM's cultural festival.

It is an entirely student-run, ISO 9001:2015 certified organization. It receives a footfall of over 70,000 every year with a budget of around INR18 million.

It is India's largest student-run festival. During Saarang, IIT Madras is host to an amalgam of events, food stalls, workshops, music, and dance performances by the best artists of India as well as from across the world

## CENTRE FOR INNOVATION CΦ

IITM boasts of being the only IIT to have a Center for Innovation (popularly known as CFI).

It is a completely student-run lab where students take up projects of their interest and work on them as and when they wish to. It receives funding from the institute.

It is the only building open 24/7. This is where all the technical clubs and competition teams work on their projects.

## SHAASTRA



Shaastra is IITM's technical festival. It receives a footfall of around 50,000 every year.

It is completely student-run and holds the distinction of being the first such event in the world to be ISO 9001:2015 certified for implementing a Quality Management System.

It has a budget of around 9 million INR.

## NIRMAAN



IIT Madras has a pre-incubation cell, Nirmaan, to support select startups with potential.

It also has a research park to support the startups that show progress and potential during their time in the pre-incubation cell or Nirmaan.

## E-CELL



The Entrepreneurship Cell, run by students, hosts startup speakers to inspire entrepreneurial thinking. It organizes an annual E-Summit featuring competitions, mentorship, and financial support for startup ideas, along with talks by corporate leaders.

## SANGAM



The institute's cultural club committee is called Sangam.

It is a group of well coordinated clubs for almost all cultural activities like music, dance, art, VFX design, oratory, and many more, where the students sharpen their talents.

# COMPETITION TEAMS

## Raftaar

Raftaar builds Formula Student race cars, promoting motorsports, engineering talent, and global competitiveness from IIT Madras.



## Avishkar Hyperloop

Avishkar develops sustainable Hyperloop tech with government support, featuring contactless propulsion, braking, and levitation-ready design.



## Agnirath

Founded in 2021, Agnirath builds efficient solar cars for global contests like BWSC, driving innovation in sustainable mobility.



## Abhiyaan

Abhiyaan is a student team at IIT Madras building intelligent and safe autonomous ground vehicles for advanced navigation.



## Amogh

Amogh is IIT Madras's AUV (Autonomous Underwater Vehicle) team, developing intelligent underwater robots for exploration and robotics competitions.



## iGEM

iGEM is a synthetic biology team from IIT Madras, engineering innovative bio-solutions and representing India at the global iGEM competition.

## Abhyuday

Abhyuday is IIT Madras's rocketry team, developing space tech and building India's first student-made hybrid rocket engine.

## Anveshak

Anveshak is a 30+ member IIT Madras team specializing in building Mars rovers for international robotics competitions.

## CΦ CENTER FOR INNOVATION

### COMPETITION TEAMS



Raftar IIT Madras secured 2nd place overall in Formula Bharat (Electric) with their RFR24 and won the Best Design Award. They've developed India's first indigenous Vehicle Control Unit and high-performance tyres with MRF. With a strong record at Formula Bharat and FS-Germany, they were the first Indian team to clear all dynamic events and Technical Inspection in 2019.

## ACHEIVEMENTS



World Solar Challenge 2023: Only Indian team to qualify with "Aarush" (Cd: 0.12, 75 km/h cruising speed).  
Rapid Prototyping: Built functional prototype "Aagneya" in 2 months; showcased at IITM Open House with Railway officials.  
Industry Support: Backed by GameChange Solar for their 2025 World Solar Challenge solar vehicle.



Team Avishkar was the only Asian team in the top 47 at international competitions. Represented IIT Madras and the country in international competitions including the SpaceX Hyperloop Pod Competition. Received support from the Indian Government for their sustainable transportation initiatives.



Team Abhiyaan placed second in the Intelligent Ground Vehicle Competition.

Team Abhiyaan won the Second Place in the Intelligent Ground Vehicle Challenge 2019, held at Oakland University, Michigan, USA. I Consistently represents India in international autonomous vehicle competitions.

## ACHEIVEMENTS

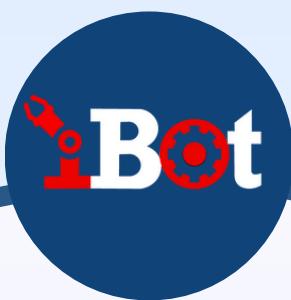


IRC 2019: Champions: Secured 1st place at the Indian Rover Challenge.  
URC 2019: Ranked 12th globally at the University Rover Challenge in Utah, USA.  
Consistent Growth: Improved URC ranks from 29th (2017) → 25th (2018) → 12th (2019).



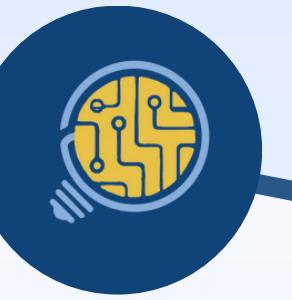
Global Rank: 16th in flight performance at Spaceport America Cup among 150+ teams.  
Innovation: Built India's first student hybrid rocket engine with in-house avionics.  
Optimization: Developing canards and minimal diameter rocket for peak efficiency.

# CENTRE FOR INNOVATION - CLUBS



- iBot, the robotics club at IIT Madras under CFI, focuses on building autonomous robots, participating in competitions, and developing robotic solutions.
- The CVG group has completed industrial projects for ITC, Indian Railways, and VDime, and was recognized as the best CVG team at the International Aerial Robotics Competition (IARC).

IBOT



- The Electronics Club focuses on electronic circuit design, embedded systems, IoT applications, digital design, and PCB development.
- It conducted online sessions on Digital Design, IoT, Machine Learning, and PCB designing during CFI Summer School 2021 and 2022, and secured 3rd place at the TechnoVIT competition held by VIT in September 2022.

ELECTRNOICS



- Sahaay focuses on accessibility and assistive technology, developing inclusive solutions for people with disabilities.
- The team developed a low-cost Electrolarynx to aid individuals who have lost their voice box due to illness, reflecting their commitment to affordable assistive technologies.

SAHAAY

# CENTRE FOR INNOVATION - CLUBS



- The Aero Club specializes in aircraft design, aerodynamics, and building flying vehicles including drones and aircraft.
- It has excelled in national and international competitions like IARC and NAL MICAV, with members valuing the experience of building and flying aircraft as deeply rewarding.

AERO



- The 3D Printing Club at CFI, IIT Madras, focuses on additive manufacturing, rapid prototyping, and exploring diverse 3D printing technologies and materials.
- Founded by visionary students, the club has provided 3D printing services and training to other CFI teams, contributing significantly to the prototyping needs of various innovation projects.

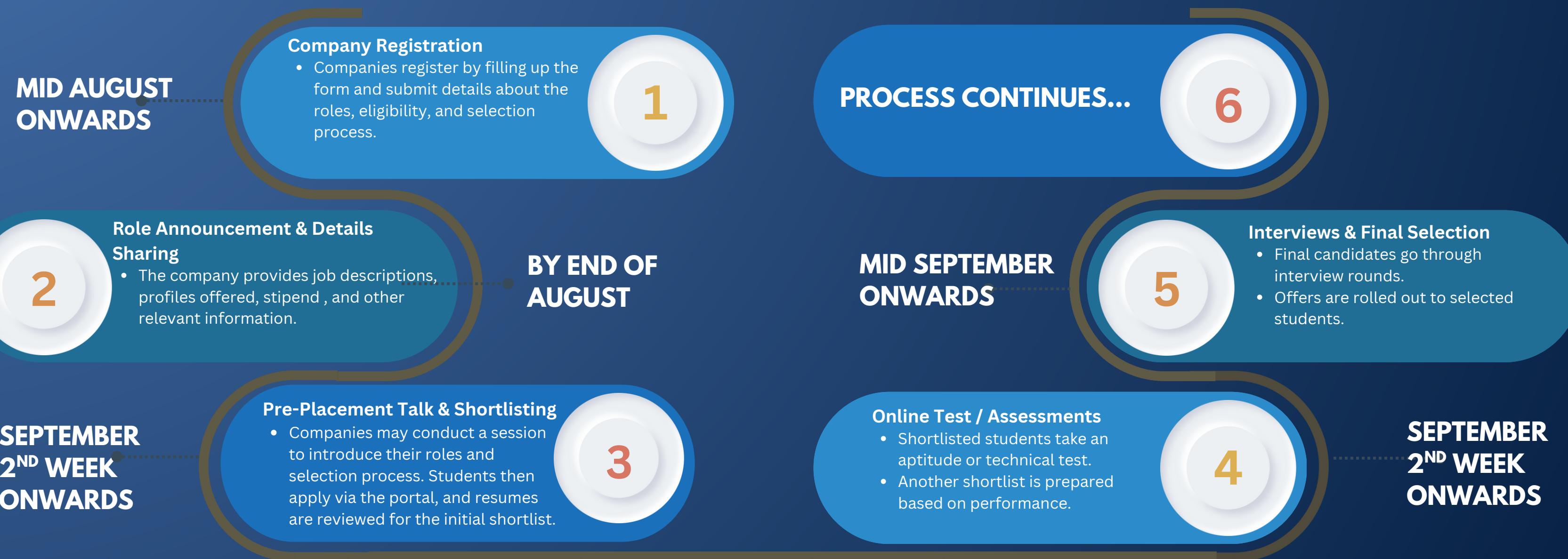
3D PRINTING



- The Product Design Club focuses on conceptualizing, designing, and prototyping innovative, user-centered products for diverse applications.
- As part of CFI's innovation ecosystem, the club contributes to projects that have led to multiple patents and industry collaborations.

PRODUCT DESIGN

# INTERNSHIP PROCEDURE



# ED STARTUPS



- Terero Mobility, founded by IIT Madras alumni, began as a Lockheed Martin-sponsored R&D project.
- It developed the Cargo Ground Buildup System (CGBS) and now builds unmanned/autonomous vehicles for military, mining, and construction in extreme environments.



- Predible uses AI in medical imaging to enable faster, more accurate, and patient-centric cancer care.
- Its cloud platform aids radiologists in diagnosing from CT, MR, and PET scans, with flagship products Predible Liver and Predible Lung focused on oncology.



- Croleon Innovation Labs developed a scar-free organ retractor for reduced-port laparoscopic surgery using a novel suture-to-endo-grasper mechanism.
- They are also building devices to automate surgical tasks typically done by assistant surgeons.



- Ather Energy, founded in 2013, pioneered smart electric scooters in India with the Ather 450 series – including models like 450X, 450S, and Rizta.
- It also builds charging infrastructure, with all products fully designed and manufactured in India.



- Ghost Vision, an IIT Madras-incubated company, is redefining vision through emerging technology.
- Specializing in Augmented Reality, it delivers immersive solutions designed to leave a lasting impact.



- Shira MedTech is a national award-winning startup designing medical devices to make healthcare more accessible.
- Its patented Microvascular Clamp simplifies complex surgeries and is recognized by the Govt. of India, DBT, DST, Tata Trusts, Lockheed Martin, and Titan.



- Perceptyne is an AI-driven company specializing in video and image analytics for intelligent surveillance, security, and compliance monitoring.
- It serves sectors like smart cities, transportation, manufacturing, and defense with scalable, real-time video intelligence solutions.



- Elisar Vision Technology is a Chennai-based startup developing innovative and affordable ophthalmic diagnostic devices to make eye care more accessible.
- With ISO 13485:2016 certification, it has deployed over 340 devices across 25 states in India.

# PREVIOUS RECRUITERS

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**Honeywell**



Mercedes-Benz



**ATHER**

**Adobe**

 **Predible**

 **Mahindra**

 **BOSCH**

 **wipro**

**Goldman  
Sachs**

**J.P.Morgan**

**McKinsey  
& Company**



 **Flipkart**

**PHILIPS**

 **ITC Limited**

 **ITC Limited**

 **BAJAJ**

**PANASONIC**

**TERERO  
MOBILITY**

 **P&G**

**JLR**

 **GHOST VISION**

 **RENAULT NISSAN**

 **BOEING**

 **OLA**

 **Croleon  
Innovation Labs**

 **Predible**

 **AXTRIA  
INGENIOUS INSIGHTS**

**TATA MOTORS**

 **Walmart Global Tech**

 **ASHOK LEYLAND**

 **sprinklr**

 **SHIRA  
medtech**

**AIRBUS**

 **accenture**

 **BCG**

# **CONTACT US**

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