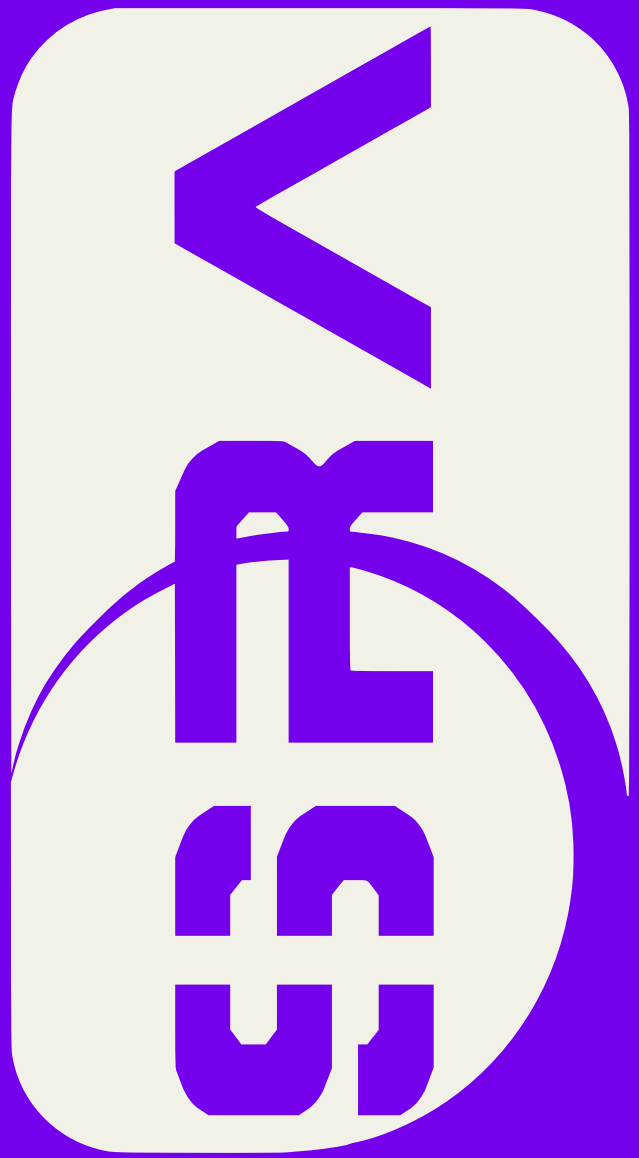


SOCIETY OF ROBOTICS AND AUTOMATION VJTI

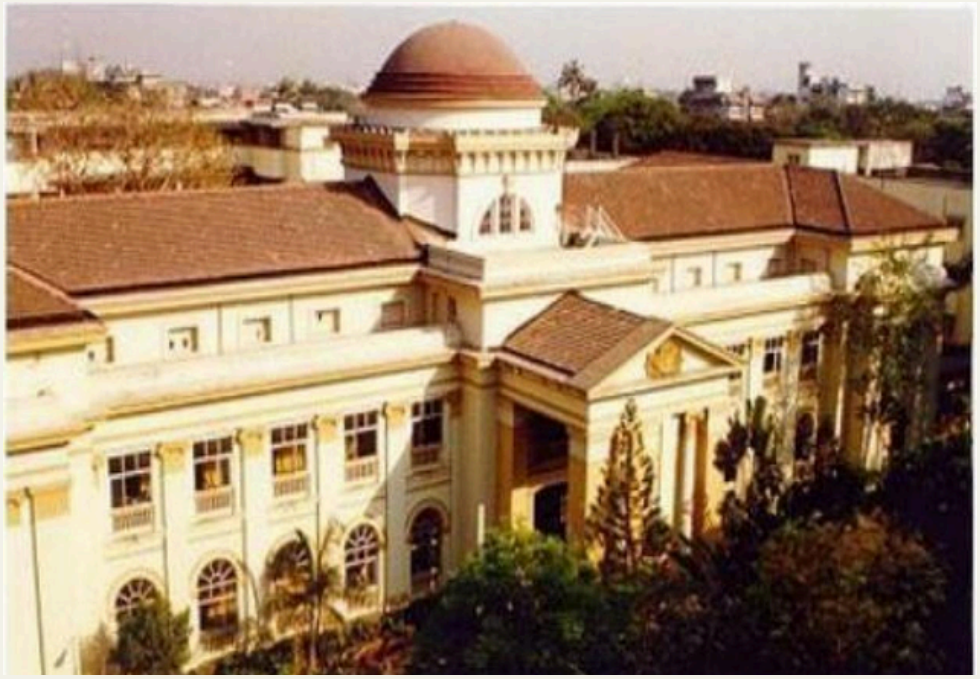
IDEATE. INNOVATE. INSPIRE

ABOUT VJTI

VJTI Mumbai (estd. in 1887 as Victoria Jubilee Technical Institute) has pioneered India's Engineering education, research and training ecosystem. VJTI has been instrumental in driving industrial growth throughout India, it has played a pivotal role in setting up IITs and RECs of India and strengthened the technology excellence of the country.

It is one of the premier institute of Maharashtra and one of the best college in Mumbai.

VJTI is known for its high quality teaching, collaborative research, industry connect and strong alumni network.



VISION

- To establish global leadership in the field of Technology and develop competent human resources for providing service to society

MISSION

- To create an intellectually stimulating environment for research, scholarship, creativity, innovation and professional activity.

ABOUT SRA VJTI

IDEATE
INNOVATE
INSPIRE.

WHAT DO WE DO?

- We are a student-led, self-sponsored, non-profit community helping change the narrative and use of technology at the grass-root level.
- Research ideas and create sustainable solutions in the field of Robotics, Embedded Systems, Computer Vision, Machine Learning, etc.
- Mentor students throughout their engineering career to be a part of our society so that we can cultivate a strong community which contributes to the technological advances in the field of robotics and computing.
- Conduct workshops, seminars, technical talks, domain sessions and competitions that help inspire students and make our society tech-proficient.

A LITTLE BIT ABOUT OUR INSANELY DETERMINED STUDENT COMMUNITY

Founded in September 2008, Society of Robotics And Automation, (better known as SRA) is VJTI's prominent student body that deals with Robotics, Machine Vision, Automation and allied fields. SRA aims to create awareness and promote Robotics among students at VJTI and other leading colleges in Mumbai.

NATIONAL ACHIEVEMENTS

TOP 10 RANK IN NATIONAL ROBOTICS COMPETITION 2023

3RD IN **EYANTRA** SELF-BALANCING BIKE THEME 2022

1ST IN **VISION BEYOND LIMITS IIT BOMBAY,** TECHFEST 2021

1ST POSITION **ML TRACK OF DATATHON** BY KJSCE 2021

1ST IN THE 72 HR **AI HACKATHON BY SITP** 2019

1ST POSITION **SMART INDIA HACKATHON** 2019

1ST POSITION **TATA MOTORS AI HACKATHON** 2019

3RD RUNNER-UP **ABU ROBOCON** 2018

1ST POSITION **NVIDIA JETSON DEVELOPER CHALLENGE** 2018

1ST POSITION **ERNEST YOUNG BLOCKCHAIN HACKATHON** 2017

1ST RUNNER-UP **ABU ROBOCON** 2014

INTERNATIONAL ACHIEVEMENTS

SECURED 2ND AND 3RD RANK IN SPATIAL AI COMPETITION 2023

20 SELECTIONS IN GOOGLE SUMMER OF CODE 2022

3RD IN AMD XILINX ADAPTIVE COMPUTING CHALLENGE 2022

2ND IN DELTA INTERNATIONAL MANUFACTURING CONTEST 2021

5 SELECTIONS IN MITACS GLOBALINK CANADA

3 SELECTIONS FOR SUMMER@EPFL SWITZERLAND

1ST POSITION GLOBAL CYBER CHALLENGE 2017

A team from SRA won the Darkathon competition and were felicitated by **Shri Amit Shah**.

SRA Members felicitated by **Shri Narendra Modi** for winning the Global Cyber Challenge Peace-a-thon

SRA wins Most Economical Robot at ABU Robocon

Members of Team DNS felicitated by **Shri Uday Samant** for winning Second prize in Delta International Manufacturing Contest

SRA Members present the Humminger at DRDO. It came within the Top 10 at DRDO's Golden Jubilee Competition

SRA is featured in the newspaper for 2nd prize at Robocon. SRA has also represented India previously in the International Robocon

SRA Members win the Hardware edition of the Smart India Hackathon for designing the VENOM Quadruped

Achievements of SRA Members in IIT-Bombay's Techfest are featured in the newspaper

OUR SOCIAL IMPACT

SKILL DEVELOPMENT

The objective of SRA's mentorship program is to develop the abilities necessary to accomplish the Government's "Make in India" objective. Students' skills are honed through practical experience in real-world projects.

RESEARCH & DEVELOPMENT

To raise awareness about active research topics, we host a variety of technical sessions and guest lectures.
We endeavour to raise the bar for research at VJTI and other engineering programmes at Mumbai University.
We aspire to share our experience gained from research internships in IITs, IISc, IISER, EPFL, CMU, TU Delft, and various Canadian Universities in order to promote the growth of a culture of research in VJTI.

COMMUNITY DEVELOPMENT

Assist Mumbai University in its mission by serving as a leading voice in robotics and related disciplines.

Conduct workshops in Robotics, Image Processing, Embedded Systems, Machine Learning, Robot Design, etc in order to grow the community of passionate engineers at VJTI. Conduct student competitions to promote healthy learning.

WHY SPONSOR US

By associating your brand with VJTI's most popular and technically proficient club, your brand's presence is enhanced. Students at VJTI are significantly more likely to recognise you and choose you as their first-choice vendor because you've held a relationship with them since they were in university.

"THE MIND IS NOT A VESSEL TO BE FILLED BUT A FIRE TO BE IGNITED" - PLUTARCH

SRA is a community where peer-to-peer knowledge transfer is pervasive as a result of our passion for growth and learning together. Meaning that we have a robust alumni network that can market your products and services both nationally and internationally.

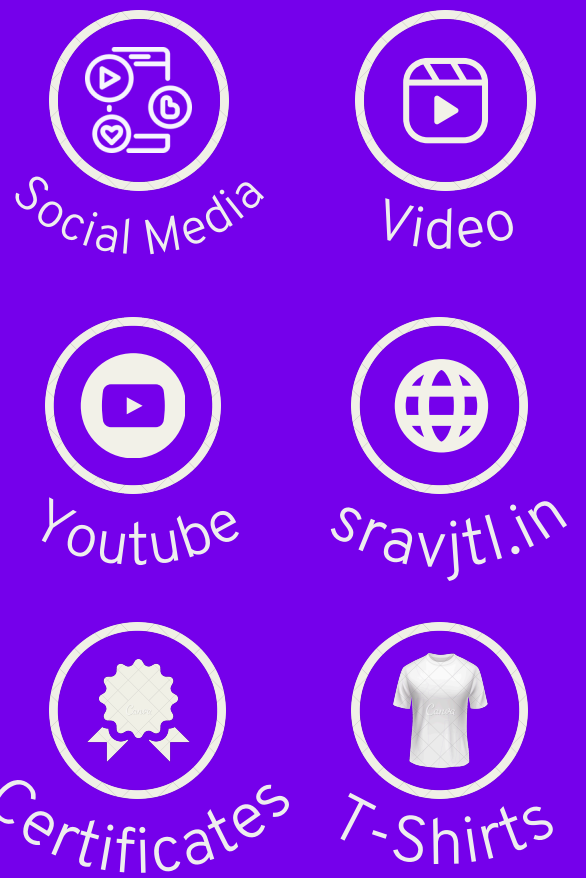
By associating your brand with our events, you make an impression on every student who participates. By sponsoring our events, you can simultaneously learn about customers, promote your products, and cultivate relationships with future leaders.

YOU ALSO HELP A GROUP OF PASSIONATE LEARNERS GROW IN THEIR RESPECTIVE FIELDS

SUPPORT US

BENEFITS OF SPONSORING

- **PROMOTIONAL POSTS ON ALL SOCIAL MEDIA**
- **UNBOXING AND VIDEO REVIEW ON PROVIDED HARDWARE**
- **IN-DEPTH PROJECT REVIEW ON YOUTUBE**
- **HAVE YOUR LOGOS AND SOCIALS FEATURED ON OUR WEBSITE**
- **YOUR COMPANY BRANDING ON OUR MERCHANDISE!**
- **COLLABORATE FOR WORKSHOPS/SEMINARS IN VJTI**
- **PROMOTION OF YOUR COMPANY ACROSS OUR ALUMNI NETWORK**



SPONSORSHIP TIERS

SILVER

UPTO INR 10K

- ✓ Social media marketing
- ✓ Get your logos and socials featured on our website
- × Unboxing and review videos on provided hardware
- × In-Depth Project review on youtube

Ideate

DIAMOND

ABOVE INR 25K

- ✓ All Gold Tier benefits +
- ✓ Exclusive logo on workshop kits
- ✓ Also on projects, merch, competitions, and our certificates
- ✓ Promotion of your company across our alumni network
- ✓ Collaborate to organize workshops/seminars in VJTI

Inspire

GOLD

INR 10K - 25K

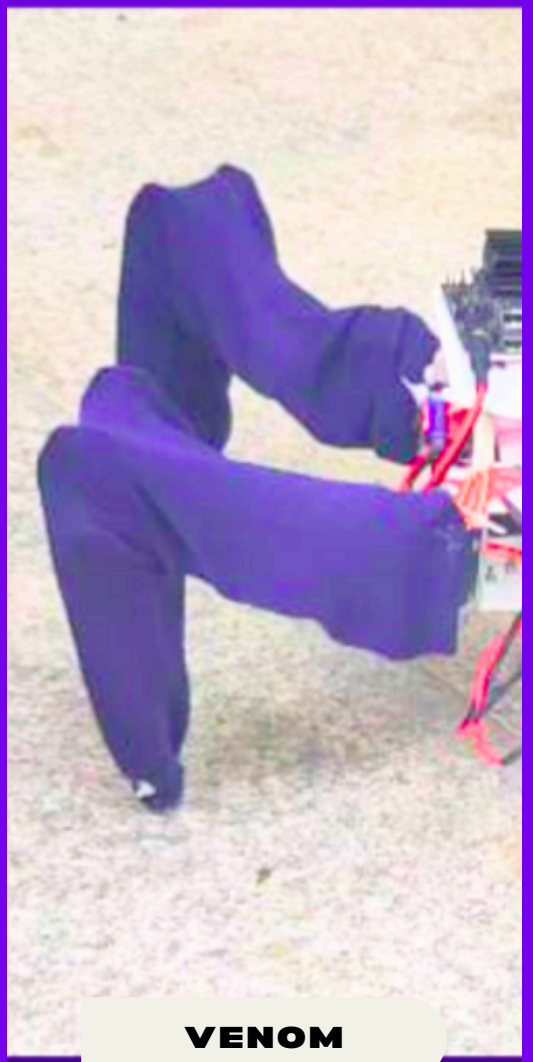
- ✓ Social media marketing
- ✓ Get your logos and socials featured on our website
- ✓ Unboxing and review videos on provided hardware
- ✓ In-Depth Project review on youtube

Innovate

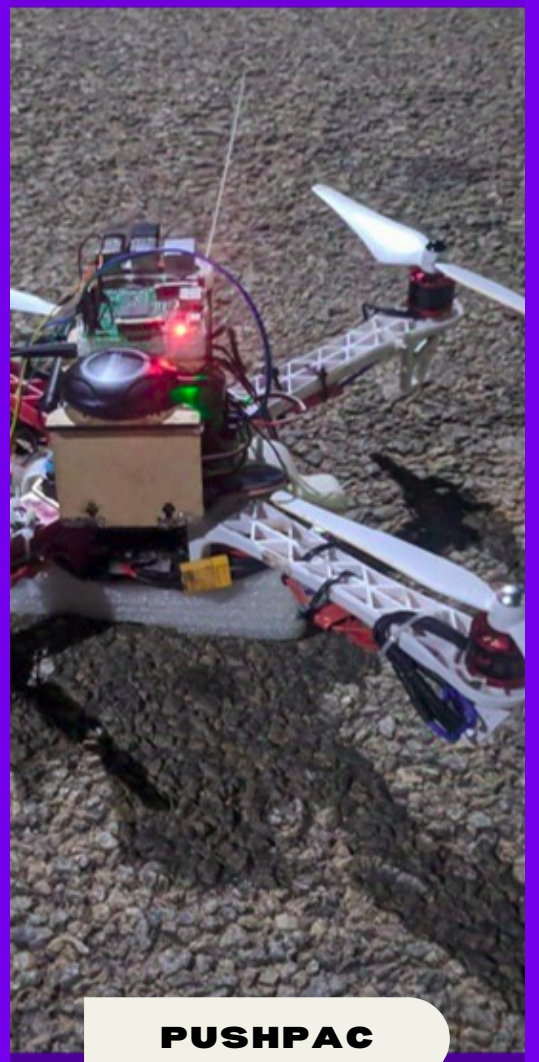
* Any other deliverables are flexibly subjected to discussion

FLAGSHIP PROJECTS

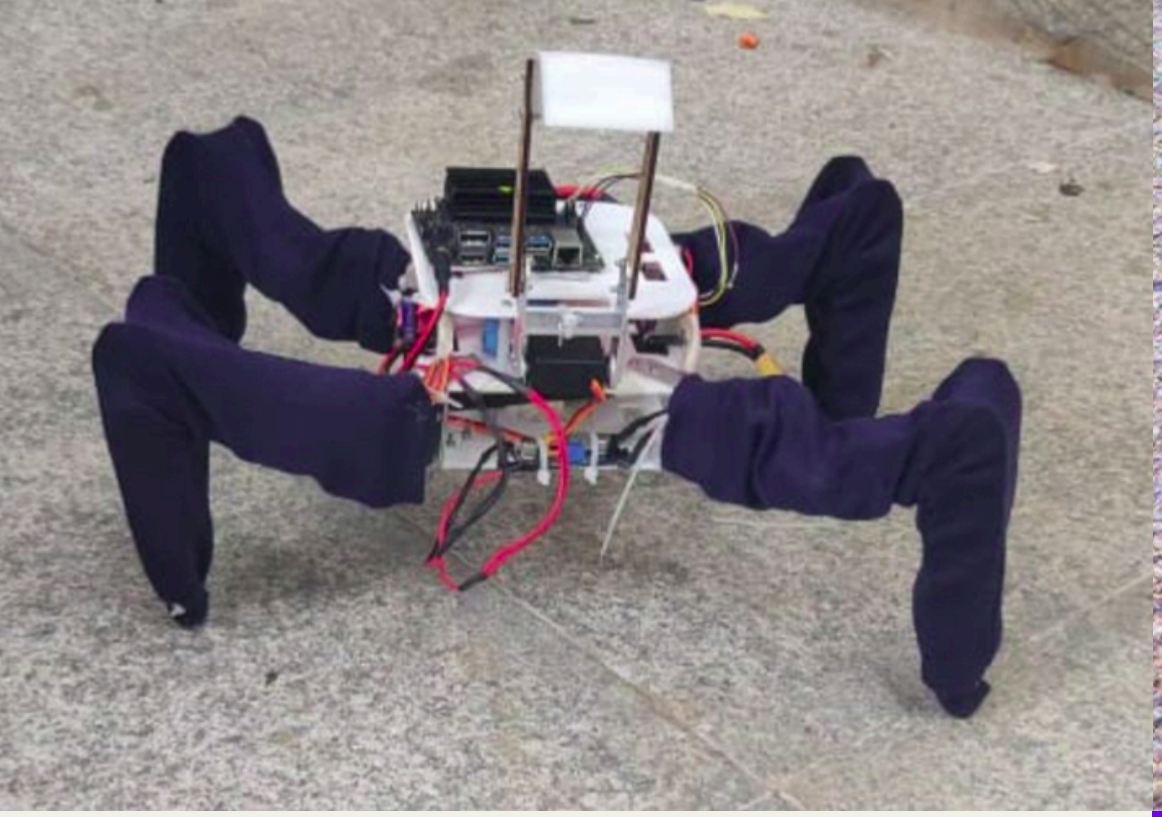
AVITRA



VENOM



PUSHPAC

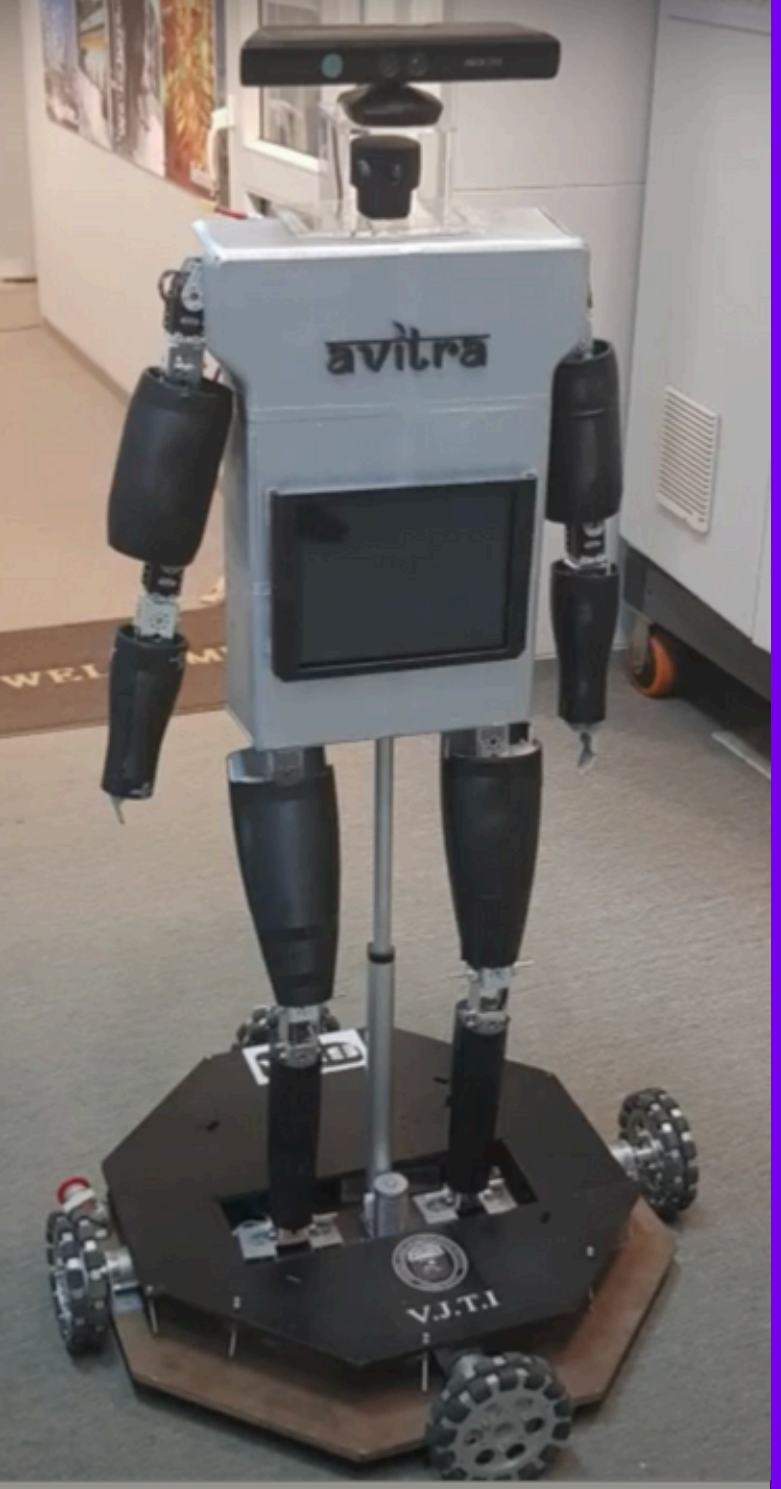


FOUR LEGGED QUADRUPED (VENOM)

Venom is an unmanned four legged robot equipped with RGB-Depth Camera and an ARM Processor for onboard computation. A legged vehicle like Venom, gives multiple-terrain mobility, superior to existing wheeled and tracked vehicles. It can also negotiate terrain with minimum of human guidance and intervention.

HYBRID UNMANNED AERIAL VEHICLE (PUSHPAC)

Pushpac is a hybrid unmanned vehicle developed for functioning both in air and underwater. Pushpac is capable of extracting data regarding the bed profile of a water body up to a depth of 10 metres, and also performing surveillance and localisation using its vision capabilities, underwater as well as in flight.

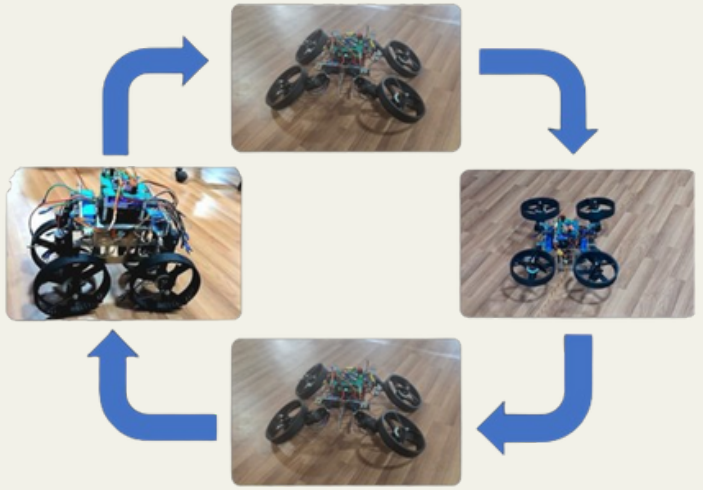


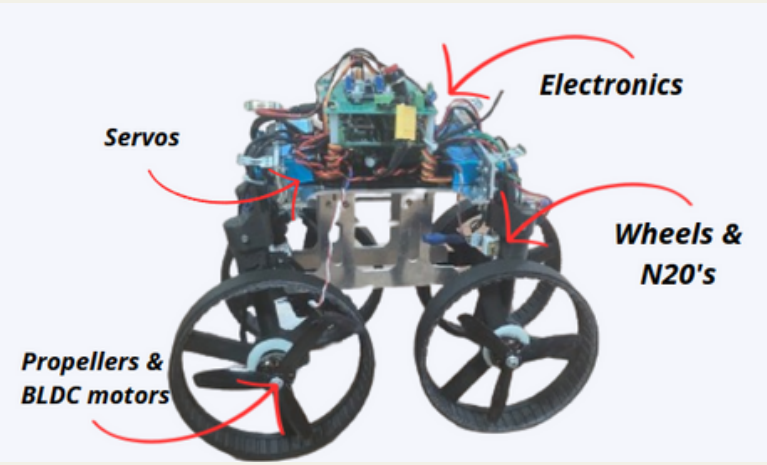
5-DOF SERIAL MANIPULATOR

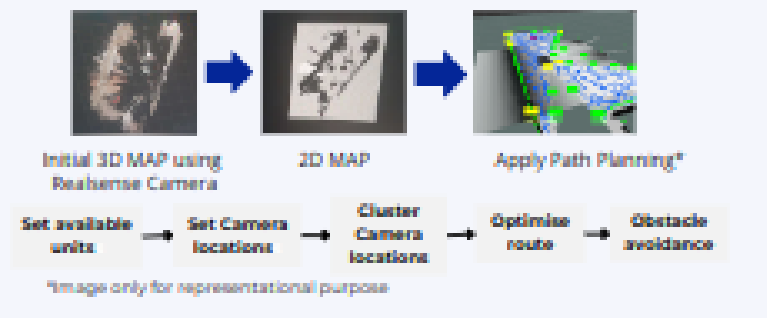
AVITRA

AVITRA is a 5-DOF Serial Manipulator retro-fitted on a holonomic drive platform capable of mapping unknown environments, autonomously navigating known environments and manipulating small objects of various shapes. It's driven by an Intel NUC as its main controller. It uses open-source software like ROS to make develpoment of applications using it easy

HERE'S A GLIMPSE OF KIKI CHALLENGE PERFORMED BY NONE OTHER THAN AVITRA!

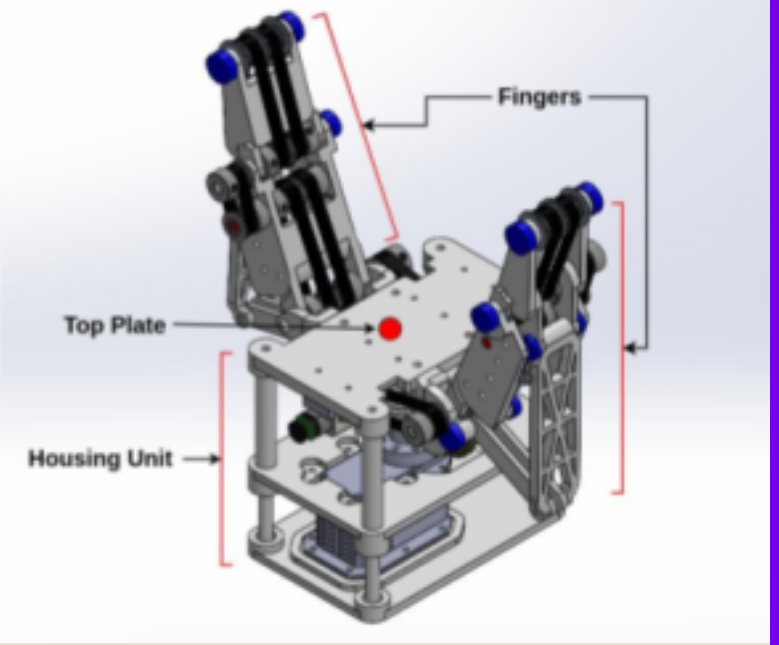


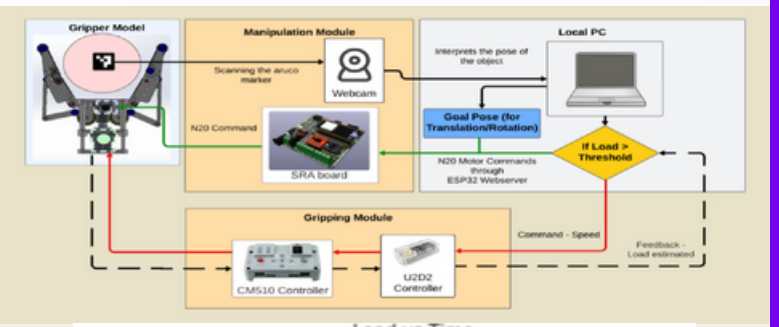


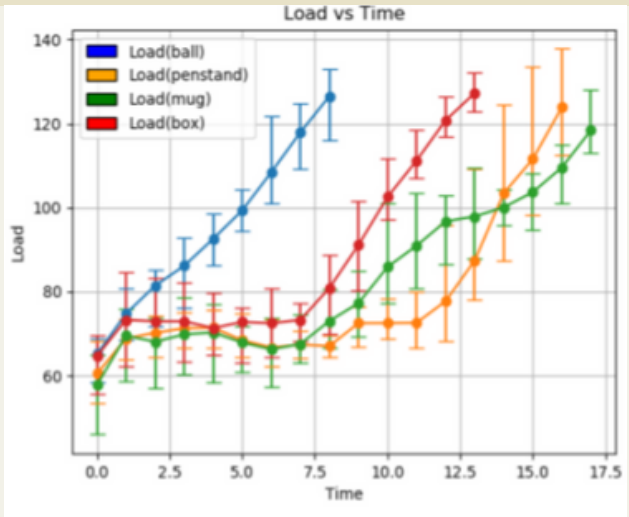


EVOBORNE

- The EvoBorne was designed, assembled and tested entirely from scratch in 45 days. It has four single DOF arms, thus giving it the capability to act as a limb. The bot comes with a thruster attached to the end of the limbs which provides it with the maneuvering capabilities of a drone.
- The main feature of the solution is that our bot can change its form as per the conditions. It can be driven on the ground for terrain-based tasks and if the path planner requires its movement in the vertical axis, it morphs into a drone and hovers to a given height. Our solution will include a camera that will be used to map the surroundings; hence, using this data, the bot will ask the user where they want to go, wait for the user's description of the supplied target and direction, confirm the direction, and head there autonomously.
- Through the integration of our custom-made PCB's and a specialized robot design, we've substantially elevated the robot's functionality, specifically to meet the demands of rescue operations with utmost effectiveness.







ACTI-V-LINK

- End-effectors in a robotic system generally have the role of executing operations related to manipulating and handling the objects.The traditional grippers are restricted to the scope of performing a specific task, which limits their capability of adapting to changes in the physical properties of the objects.
- The grippers can become more efficient when integrated with a sub-system catering to manipulating varied sized objects within the existing gripper workspace. Many state-of-the-art methods have used tendon-based and active surface (belt-driven) actuation techniques to effectively change the pose of a wide range of objects within the gripper (in hand).
- We proposed the design of a gripper system that leverages the role of an active surface based actuation technique integrated with an underactuated linkage mechanism capable of performing complex manipulations. We have curated an object list, all having different shapes, and executed experimental rotation and translation of objects.
- We take help of vision based feedback to accurately execute targeted goal pose motion and additionally demonstrate the gripper's response to mechanical stresses (through analysis) and grasping an object through torque feedback.

....AND MANY MORE TO COME

Low Power Wireless Communication using Tunnel Diodes

A highly efficient radio transmitter using tunnel diodes that consumes at least 10x less power than commercial radio transmitters. Developed a highly efficient cross-mcu compatible baseband generator and paired it with a tunnel diode oscillator with end-to-end power consumption of a few milliwatts, outperforming traditional radio communication and backscatter systems that consume hundreds of milliwatts of power. The proposed technology was reliable upto 7m and could be used in long and short range RFID applications, as well as edge devices with a potentially year-long battery life.

Software Defined System Using Phased Array Antennas

WIth its quicker transmission speeds and lower latency, millimetre wave technology (mmWave), which uses GHz frequencies, has completely changed communication systems. Using phased array antenna frontends, a mmWave software-defined radio system was created that offers flexibility in electronically producing multiple beams and in controlling, transceiving, and directing diverse beam patterns at speed of upto 10ms/beam.

ACTIVITIES AND WORSHOPS

- Teaching freshman students to build a self-balancing and line following robot from scratch.
- Introducing students to the foundations of computer vision and image processing.
- Teaching students all the concepts that are required to build a robotic manipulator arm in simulation and hands-on hardware.
- Teaching students concepts of designing and CAD modelling along with hands-on exercises

TECHNOLOGIES INVOLVED

- FreeRTOS
- ESP-IDF v5.2
- CMake

- 200+ Students

SELF BALANCING AND LINE FOLLOWING WORKSHOP (WALL-E)

The Wall-E robot is an autonomous self-balancing and line-following robot that operates on SRA's custom designed PCB(Printed Circuit Board)

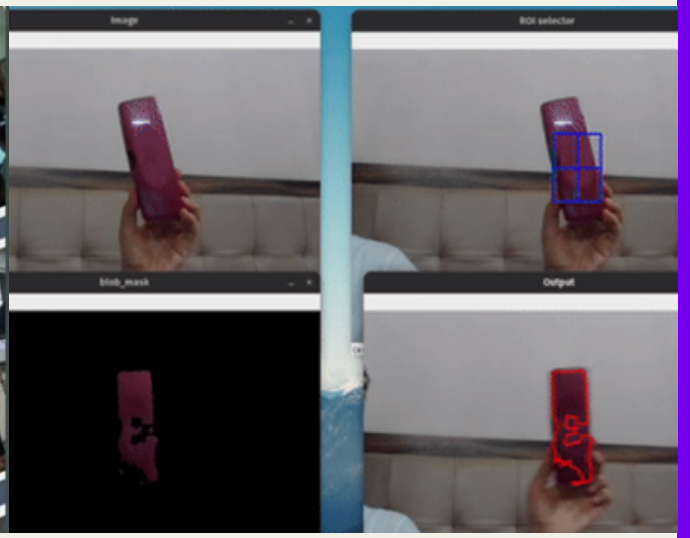
The fundamentals of embedded systems, electronics power systems, and robotics are taught to participating students.

The concepts are taught from scratch over the course of 3 days.

COMPUTER VISION AND IMAGE PROCESSING SEMINAR (PIXELS)

Speed cameras and medical imaging have revolutionized technology services and we strive to do the same in Pixels.
PIXELS introduces students to the world of computer vision using OpenCV and image processing. It serves as the basis for future forays into fundamental domains.

Concepts like Convolution, Filtering, Masking and Blob Detection are taught via interactive examples and live demonstrations.



TECHNOLOGIES INVOLVED

- OpenCV
- C++
- GNU Make and Build Systems

- 150+ Students

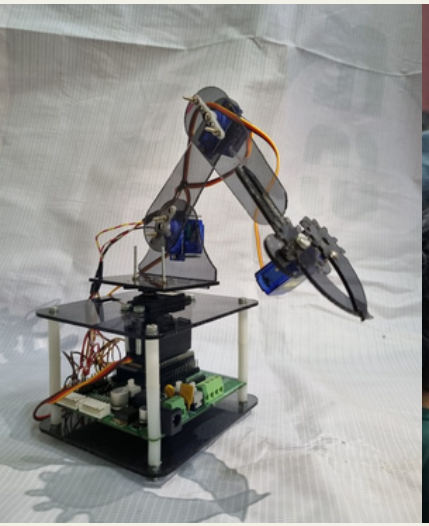
MANIPULATOR WITH 3 D.O.F WORKSHOP

MARIO

MARIO is a 3-DOF robotic arm that aims to emulate the human arm by modelling its joints intelligently.

Robot Operating System (ROS), Python and Embedded Systems concepts are taught in detail with a focus on understanding.

The fundamentals of kinematics in the context of modern technology are also covered.



TECHNOLOGIES INVOLVED

- ROS (Robot Operating System)
- Gazebo
- Python

- 200+ Students

TECHNOLOGIES INVOLVED

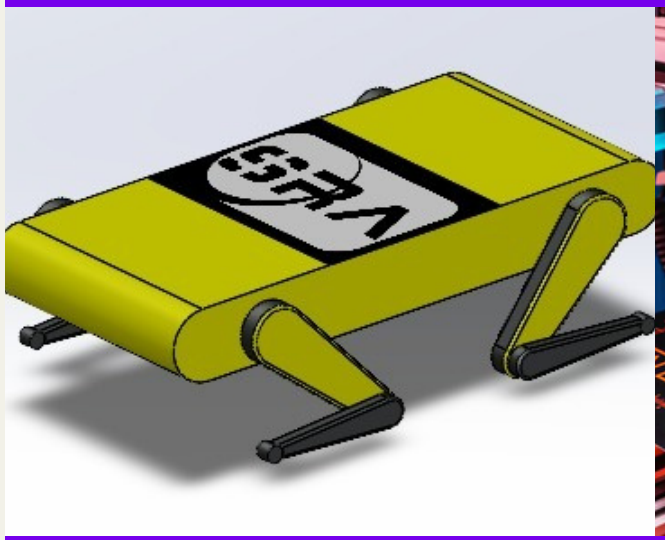
- SolidWorks
- Fusion360
- Cura 3D-printing
- Visualization software (RVIZ)

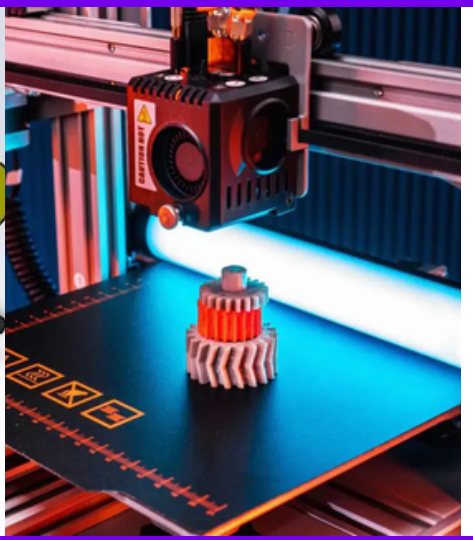
- 150+ Students

MECHANICAL DESIGNING SEMINAR (DIMENSIONS)

Dimensions is the seminar in which students are introduced to machine design, CAD modelling, and fundamentals of design thinking.

Important Skills like machine drawing, problem based designing, and 3D printing are taught.





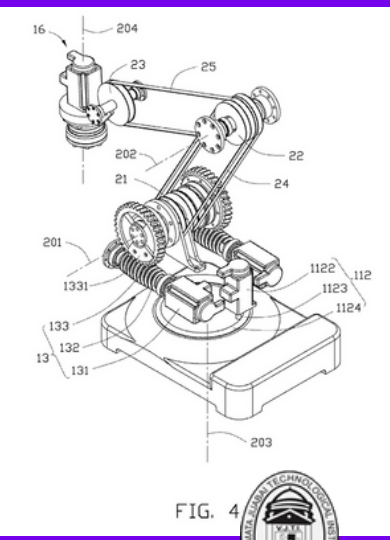
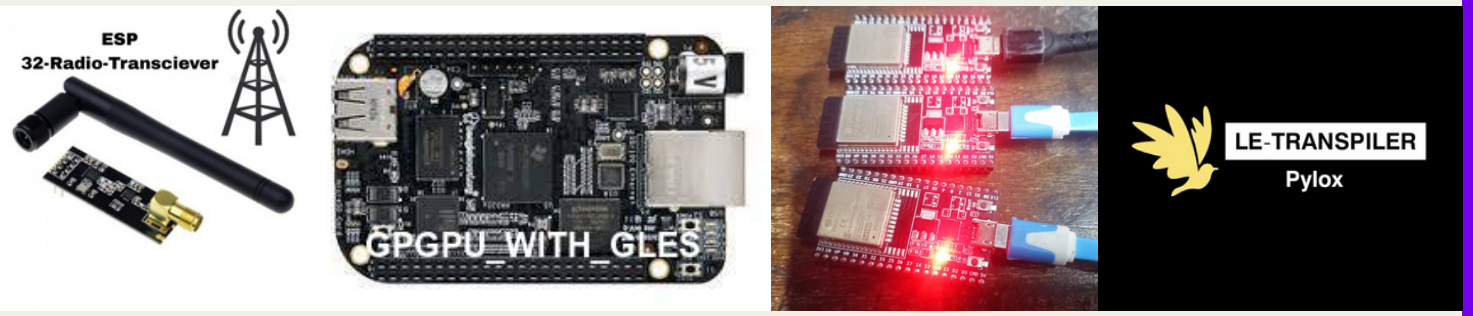
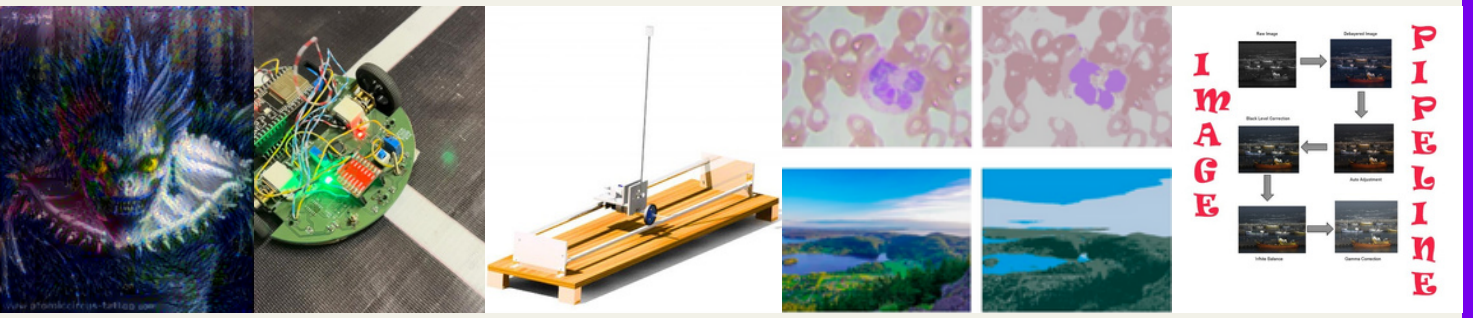


FIG. 4

SUMMER MENTORSHIP PROGRAMME (EKLAVYA)





DOMAINS

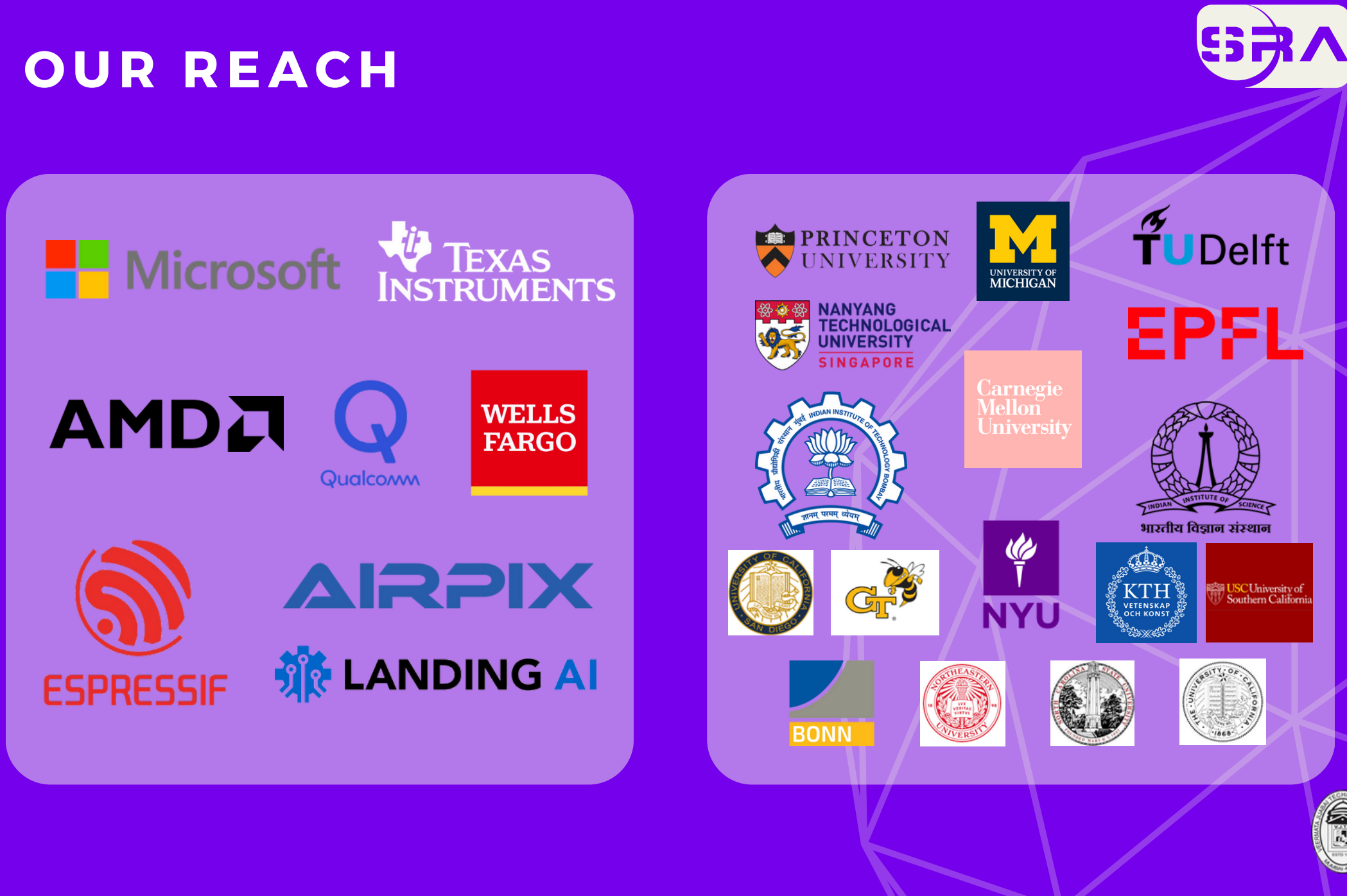
- Robotics
- Control Systems
- Computer Vision
- Embedded Systems
- FPGA (Field Programmable Gate Arrays)
- Image Processing
- Machine Learning
- Reinforcement Learning
- GPU Programming

40+ Students
20+ Teams
20+ Mentors

OUR PARTNERS

We would like to thank our partners for supporting us through the journey of learning and growing, their contribution is immensely valued for us

OUR REACH


Microsoft
Texas Instruments
AMD
Qualcomm
WELLS FARGO
ESPRESSIF
AIRPIX
LANDING AI
PRINCETON UNIVERSITY
UNIVERSITY OF MICHIGAN
TU Delft
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
EPFL
Carnegie Mellon University
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
INDIAN INSTITUTE OF SCIENCE
भारतीय विज्ञान संस्थान
UNIVERSITY OF CALIFORNIA SAN DIEGO
GT
NYU
KTH VETENSKAP OCH KONST
USC University of Southern California
BONN
NORTHEASTERN UNIVERSITY
THE UNIVERSITY OF CALIFORNIA 1868

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Mumbai - 400019

OUR TEAM

Atharva Kashalkar - General Secretary
Atharva Atre - Jt. Gen. Secretary
Shankari - Jt. Gen. Secretary

VJTI,
Quadrangle

The best way to talk to us is through our email, we'll get back to you asap!