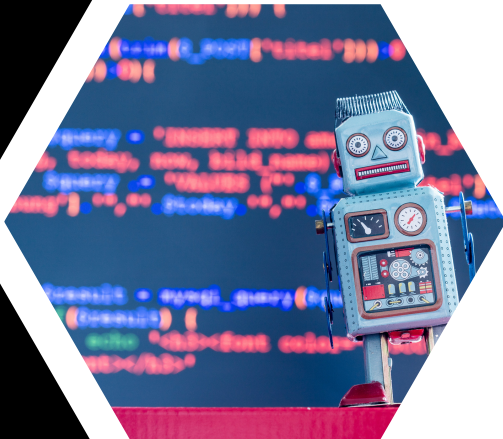




SPIDER R&D

Foreword

Despite the uncertainties brought by the Pandemic during the last academic year, Spider R&D club was quick to adapt and switch to an online mode of collaboration. We conducted Inductions for the first year in August-September 2020, providing them with simulation software for hardware related tasks, which ensured that the applicants need not go out to buy physical components.



There were mentors assigned to each one of the registered students, for all the four profiles (Algos, App Dev, Tronix, WebDev), who guided them throughout the duration of the 1 month-long induction process. Thus, Spider was able to carry out the induction process smoothly.

Following inductions, the club members started brainstorming projects for this academic year. The seniors (4th years) were a constant support throughout the ideation process and the project work thereafter. We were able to complete a good number of projects in this academic year and laid foundations for projects to be taken forward in the next academic year.

Thus, in spite of the lack of in-person interactions, Spider R&D was able to keep up with its motto of ideation and Innovation.

We also conducted KSS (knowledge sharing sessions) for juniors in the club on topics like Git, ROS (Robot Operating System), etc. In April 2021, we organized a set of competitions for the first years under the umbrella of Spider Week, which consisted of coding contests and Problem statements from all the four profiles of Spider, including a Workshop on the basics of Web Development.

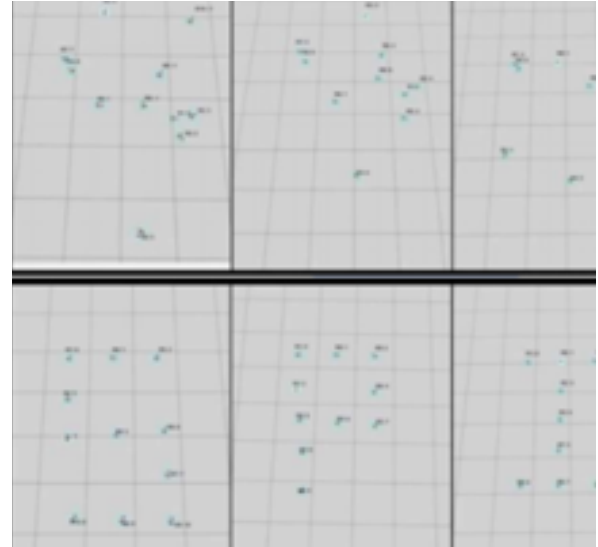
We first provided the first years with all the basic resources needed to learn, which was followed by contests and problem statements. Spider Week saw a whopping 450+ registrations from the first years and served as their first dive into the world of technology.

Our club members also participated in numerous hackathons and competitions conducted by reputed organizations, including Sangam Hardware Hackathon, Smart India Hackathon etc. and managed to win some of them and back respectable positions in others. The details of all the new projects and activities are described in the following sections.

INITIATIVES

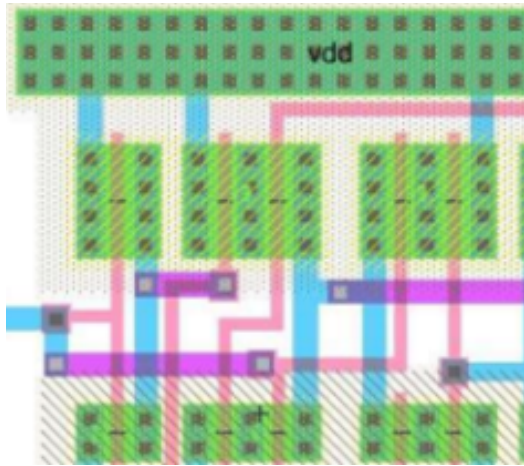
Bee-Bots 3.0

Beebots is a swarm robotics project that aims to explore swarm intelligence and coordination using biologically inspired algorithms. It explores the fascinating idea of simple local behaviors giving rise to global action. Project beebots is currently working on shape formation and shape recovery behavior in a swarm after obstacle interaction.



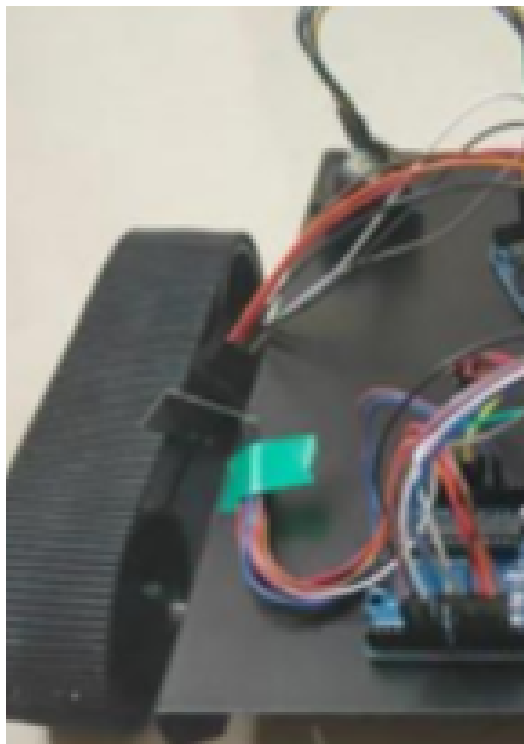
UAV-UGV

A cooperative parcel delivery system for an unmanned aerial vehicle (UAV) and an unmanned ground vehicle (UGV). The UAV enhances the poor traversability of the UGV by providing a wider range of scanning and mapping from the air and also responsible for last-mile delivery of parcels. Whereas UGV carries the parcels all way long and provides the charging support for UAV.



Standard Cell Library

This project attempts to develop a custom-made Standard cell Library for the newly open-sourced 130nm Sky-water Design Files. This project attempts to develop an industry-standard VLSI workflow at a club level using only open source tools.

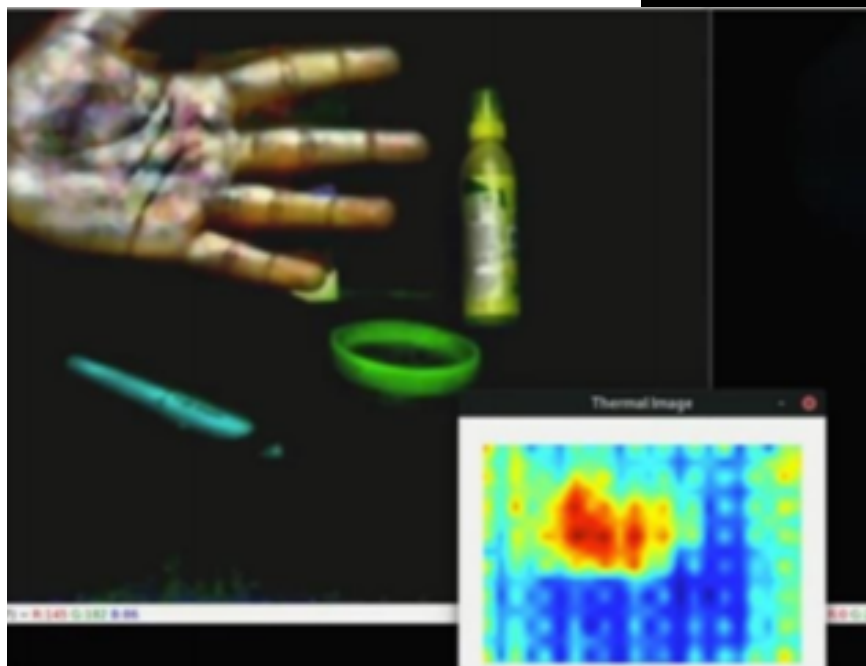


Landminer (Pragyan '21 Sangam Hardware Hackathon)

A landmine detection robot-assisted with the principle of GPR that uses DL pipelining, continuous track, and an arm mechanism for area probing. The transmitter antenna transmits the EM waves. Upon incidence on the landmine, it retracts back and is received by the receiver antenna. On running the simulation, we can identify the presence of a landmine by a sharp hyperbola in the C scans.

DarkSight

Imaging in low light is challenging due to very low photon count and low SNR (signal to noise ratio). Our network operates directly on raw sensory data from cameras and aided by thermally imaged shots of a low-lit environment and maps to high exposure shots of the corresponding environment producing promising results.



Vitarana Drone (EYRC '21 @IIT Bombay)

Vitarana Drone is an autonomous parcel delivery drone incorporated with multiple sensors and cameras whose feedback is used by the drone to avoid the obstacle and reach the destination in the shortest period of time. We also have used a scheduling algorithm to make drone smart enough to decide the order of tasks.



Project - RECAL UAE CHAPTER

An app to keep in touch with REC/NIT Trichy alumni based in the Middle East. It allows the user to connect and network with other REC/NIT Trichy alumni across the Middle East region, build

build new connections with your long-lost college friends, enabling social and business professional networking.



Lower-Limb Exoskeleton - Exosim

This project aims to develop a lower limb exoskeleton simulation package in ROS-melodic and gazebo. It provides necessary interfaces and plugins for the control of the joint angles of the exoskeleton simulation.



Crawl-Locator (Pragyan '21 Sangam Hardware Hackathon)

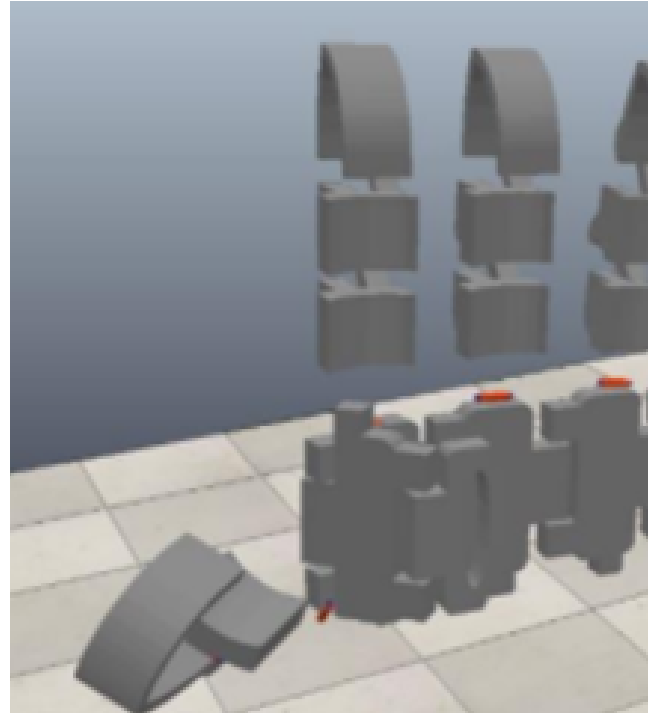
A disaster relief robot meant to operate in extreme conditions and dangerous locations to locate stranded victims in the debris after a disaster and transmit their location back to the relief team. It's an amphibious robot that can be controlled remotely from distances of up to 5 Km.

OTA Programming Module

The project aims to give AVR Microcontrollers the ability to receive and update their applications wirelessly. It makes use of a NodeMCU to connect to the WiFi which then serially communicates any updates it receives to the AVR Microcontroller.

GISiL (Sangam '21 Hardware Hackathon)

GISiL(Gesture Interpreter for Sign Language) provides a cost-effective way to translate sign language into conventional speech using wearable glove technology by utilizing mini-potentiometric pots in gloves with 3D printed frames to detect finger movements. The tech gloves are paired with a smartphone to translate the signs formed using ML and NLP to give audio and visual output.



Nirikshak Bot (EYRC '21 @IIT Bombay)

A conveyor belt keeps dropping balls at regular intervals on the ball balancing platform. The goal is to make the balls traverse through the maze on defined paths within a stipulated amount of time in order to determine the quality of the platform manufactured.



Project - CAPTION BOT:

Our project uses methods from computer vision to understand the content of the image and a language model from the field of natural language processing to convert the understanding of images into words arranged in the right order. It can be utilised for assistive vision by converting obtained captions to audio which would benefit visually impaired people.

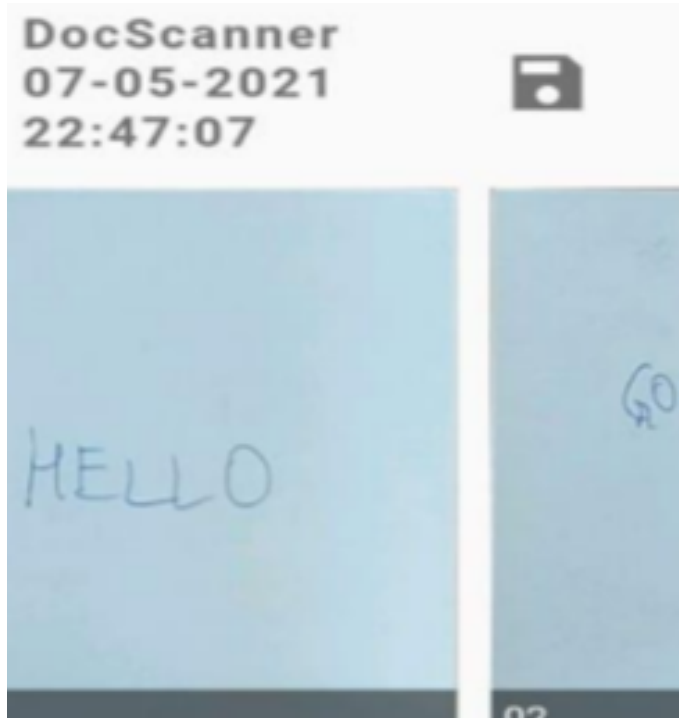
Doc Scanner App:

A DocScanner app built in flutter supported by a few external plugins, consisting of features such as image capture/selection, edge detection based cropping, self-cropping, multiple effects including HSV modulation, contrast and GreyScale modulation, pdf conversion, pdf merging, compressed sharing, direct image download from the app, etcetera. Base functionality is over, would be ready for release with a few UI enhancements.

young boy in swim trunks is jumping into t

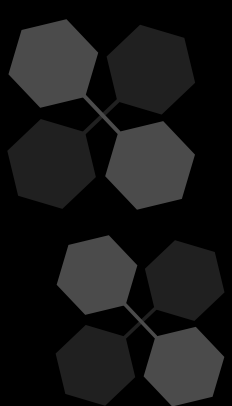


black dog is running through the water



COMPETITIONS

- Winners - Medihack Hackathon @ University of Lodz (Poland)
- 1st and 2nd Place - Sangam, Pragyan @ NIT Trichy
- 3rd Place - Circuitrix, Shaastra @ IIT Madras
- 3 Teams Pre-Finalists - E-Yantra Robotics Competition @ IIT Bombay & MHRD
- Google Kickstart 2021 AIR 4 and Global Rank 27
- Google Hashcode 2021 AIR 8 and Global Rank 97
- Etherpunk '21 Winner (\$4000 in LINK) [Blockchain Hackathon]
- Winner MIT Bitcoin Expo Hackathon (\$2500) [Blockchain Hackathon]
- Won Smart India Hackathon 2020
- ACM-ICPC 2020: One team qualified for Amritapuri & Pune-Gwalior Regionals (Top 50 in India). Another team qualified for Kanpur Regionals.
- Winner, Shaastra Circuit Design Challenge, Shaastra, Techfest, IIT Madras
- 1st and 2nd Place in Daksh, AR/VR Hackathon, SASTRA University, Trichy.
- 1st and 3rd Place, Pragyan Hackathon, Bangalore
- Women Safety Application-Pragyan '21 Hackathon: This Women's safety application recognizes the emotion of its user through their voice/speech, identifies certain keywords in their speech that represent fear or any other negative emotion, and performs necessary actions for the safety of its user. This is achieved by a Machine Learning model that detects the emotions in a particular audio clip.



- **AMIGO - INOUT HACKATHON:** Participated in India's biggest hackathon INOUT 7.0 after a stringent selection process and worked on a student connectivity app aimed at connecting students and implementing other features. The app aimed at anonymity along with connectivity and allowed students to post confessions with pure anonymity.
- **Companion- XPLORE '21 Hackathon:** A web app detects the user's emotion by asking various questions and helps them learn about their emotions and understand them through articles, videos, and biblical phrases, which may help the user to gain peace, and have control over their emotions.
- **Twitemotion - Hackmol 2.0 Hackathon:** Latest Tweets Analysis customized for Query (Hashtags, Username, etc.) searched by User. While the User can visit the Internet and get lost in the huge number of different Opinions Available, the Model gives an Overview of the Situation in terms of Clear Stats and Visual Analysis corresponding to Tweets fetched from Live Recent Data.
- **Bet on Better- InOut 7.0 Hackathon:** A website that facilitates the process of donating materials to needy people around one's neighbourhood. At our interface, a donor is free to donate the stuff he wants to the nearest neighbourhood possible. The charity organization can add or update a request for a donation. There is no restriction on materials a donor can donate. It can be old goods, clothes, food, etc.

CAMPUS DEVELOPMENT

Orientation App

An android app for the freshmen of NIT-T 2020. The app was built on the React Native framework and had an events page, contacts page with the contacts of admin, orientation team and peer supporters, it also bundled in the documents provided by the NITT admin and had an interactive map of the NIT-T campus.

Document Requisition Portal (studentrequest.nitt.edu)

A portal for students of NITT applying for official documents from the college administration requesting any of Bonafide, Transcript, Rank card, Grade card, Course Re-registration, Course De-registration. This automates the process for college admin to deliver documents through Email or Post or both.

Maintenance and Bug Fixes :

Hostel allocation Site

Mess Site

Sportsfete app

OD portal

Sigma Website

(sigma.nitt.edu)

SIGMA - The Business Club of NITT club website. Built for the club, used for giving updates on its projects, events, workshops, guest lectures and competitions. Along with recent updates for all its fields of interest and resources for students to gain an insight on the field.

Spider Main Website (<https://spider.nitt.edu/>) :

Spider site, the club's official website, being renewed with a better UI and some additional pages/features. A members page displaying members from all batches like the previous site, a blog page, where all the medium articles and research papers etc. written by the members will be displayed, a projects page, which will have a short description of all the projects done, and an achievements page, listing all the achievements of the club.

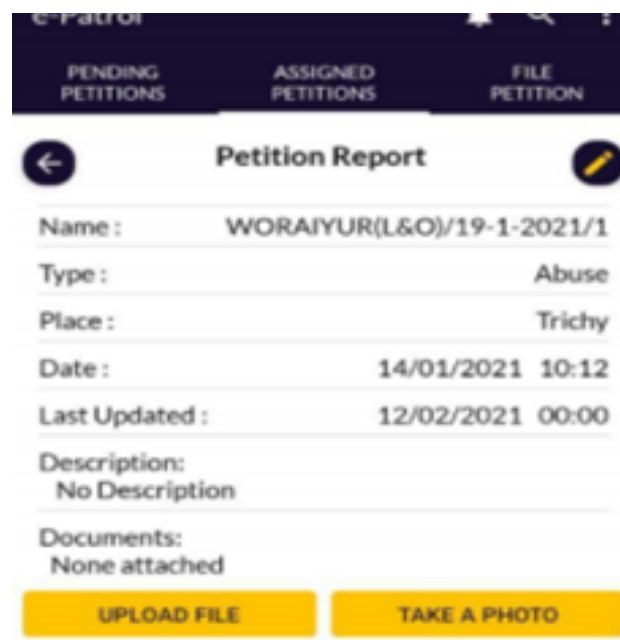
COLLABORATIONS

Happy Hunt project - Startup

React Application built for a Scavenger Hunt game conducted by Event Specials in Pune. The app has 1500+ users who need to solve missions (clues) scattered all over Pune. The admin portal has features like auto evaluation, admin evaluation, adding or updating the missions, feed control, etc. The end-user interface consists of a portal to check clues and submit answers to the clues.

Police CMS App - Trichy City Police

Police CMS App project is a complaint management app for the Trichy Police, to store, edit, search and process complaints in an efficient manner. The application authenticates the user by OTP verification and then provides different services like filing a new petition, sending notifications to the user about new and ongoing petitions. Completed, approval from Trichy police is pending.



EVENTS

Algo Cup:

Flagship Competitive Coding Event that was conducted on CodeChef and was open for all participants across the world. The event saw more than 600 unique participants and more than 2000 unique code submissions and was a great success.

No[wa]mber Contest:

A new Competitive Coding Event conducted for the first time with the purpose of bringing some change for the students in the midst of a pandemic. It was open for all NITT students and saw more than 300 registrations and 100+ unique participants at the end.

MDecoder (March 2021) in association with Pragyan:

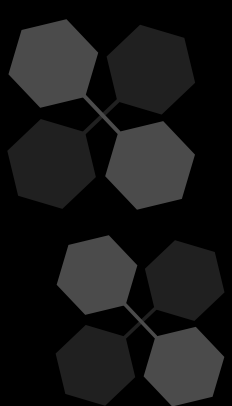
Pragyan event in association with Maximus club of NITT hosted an event for decoding and solving problem-related to mathematics and logic.

Spider Circuit Simulation Contest:

InHOTT is an event conducted by Pragyan and the Technical Council of NIT Trichy exclusively for the First Years of NIT Trichy to showcase their technical knowledge. Every year, Spider conducts an event under InHOTT. In the academic year 2020-21, Spider conducted an event with the name Spider Circuit Simulation Contest (SCSC).

Tasks were based on the field of Embedded Systems and Electronics. Participants were given simple problems statements and asked to design basic circuits with an Arduino Microcontroller. The objective was to give a quick introduction to microcontrollers and electronic circuits.

The event was conducted ONLINE on the TinkerCAD platform.



Spider Week (April-2021)

Set of contests conducted for the first years, for all profiles of Spider (Algos, App Dev, Tronix, Web Dev) , spread across the entire 3rd week of April 2021. Participants were also provided with the resources to learn the concepts a week before the contests were started.

Spider week saw over 400 participants in total. Below are the details of all events conducted under the umbrella of Spider Week :

- Blind coding
- ICY Cup
- The world is your canvas.js
- Web-trivia quiz
- CTF (Capture the Flag)
- Web-Dev workshop
- Code connoisseur
- Clash of Code (IP, ML)
- Spider UNO-verse
- casCADE
- Spidey Sense

Medium Article Series

- Web Wednesdays

A collection of short articles, written by the members of Spider Web Dev, published weekly under the title "Web Wednesdays", covering a wide array of development and programming concepts. Each article contains a detailed explanation of the topic, along with comprehensible code modules (wherever applicable), which enables readers to code along.

- Tronix Thursdays

This Medium article series was a collection of short articles, written by the members of Spider Tronix, published weekly under the title "Tronix Thursdays", covering a wide array of hardware technologies for 1 month. Each article contained a detailed explanation of the topic.

Medium Page:

<https://medium.com/spidernitt>

Vortex Web-Dev workshop:

Spider conducted a workshop during the Vortex Symposium of CSE department on “Basics of Web Development” in January for participants from other institutes to give them an introduction to the world of website development. We focused on the frontend part of the web, teaching them about HTML, CSS and JavaScript. With a limited seating of 100 people, the workshop was a success.

Spider Inductions '20:

The induction process for Spider R&D for the year 2020-21 was conducted in Aug 2020 in online mode, with Over 400 participants

CircusTrix (March-April 2021)

CircusTrix is an event conducted by Pragyan, NIT Trichy. The event is an open-to-all. Every year, Spider helps the Pragyan Events team in formulating problem statements and evaluating submissions. In the academic year 2020-21, Spider again like the previous year(s) coordinated and helped the events team.

Spider Orientation Program (SOP):

A mentorship program for freshers was conducted in the months of April -May 2020, with over 500 participants.

