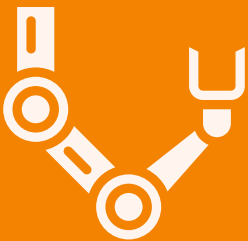
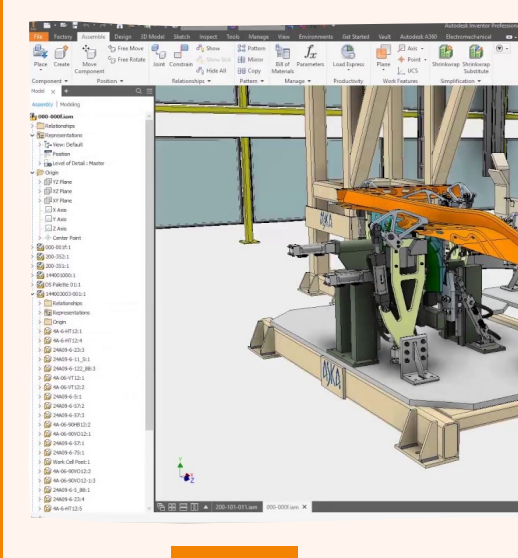


Foreword from the Core of '20-'21

The academic year 2020-21 has been uncertain and extraordinary. Getting accustomed to the virtual mode of work had its own technical hiccups, so the transition of the mode of work was a bit difficult.

Nevertheless, the remote work didn't stop us in DC from doing what we do, as most of the work we do is possible done remotely with meetings over video conferences. This year in DC, we have worked on 14 projects, took part in 7 product design competitions and hackathons, participated in 2 Conferences and published 4 Papers, worked on 4 projects in response to Covid 19,

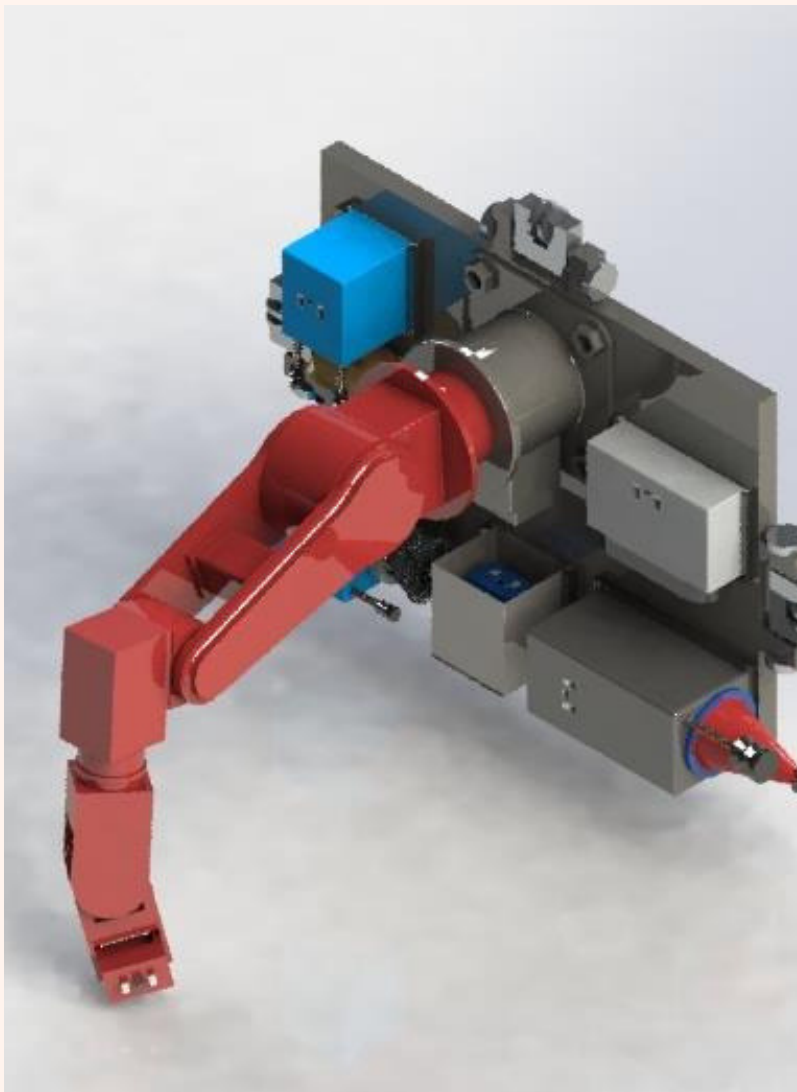
conducted a workshop and a product design hackathon exclusively for first years, did design consultancy for an alumnus, mentored 2 teams in Young Techie 2.0, formed DC Freshers' Forum to help first-years equip themselves with technical resources in the lockdown.



INITIATIVES

Turbo-T

Turbo-T aims to provide an effective way to remove biofouling of various underwater surfaces and construction like bridge piers, ship hulls, dam surfaces. The product will result in less human interference in such dangerous and less efficient aquatic cleaning activities, hence decreasing the cost, increasing safety and efficiency.



Windcare

Currently, the windmill's performance is affected by many factors such as dust accumulation on the wind blade, cracks on the edges and surface of the wind blade and lightning strikes. Windcare is a semi-automated, cost effective product that will scan the blade, clean the surface and repair minor damages.

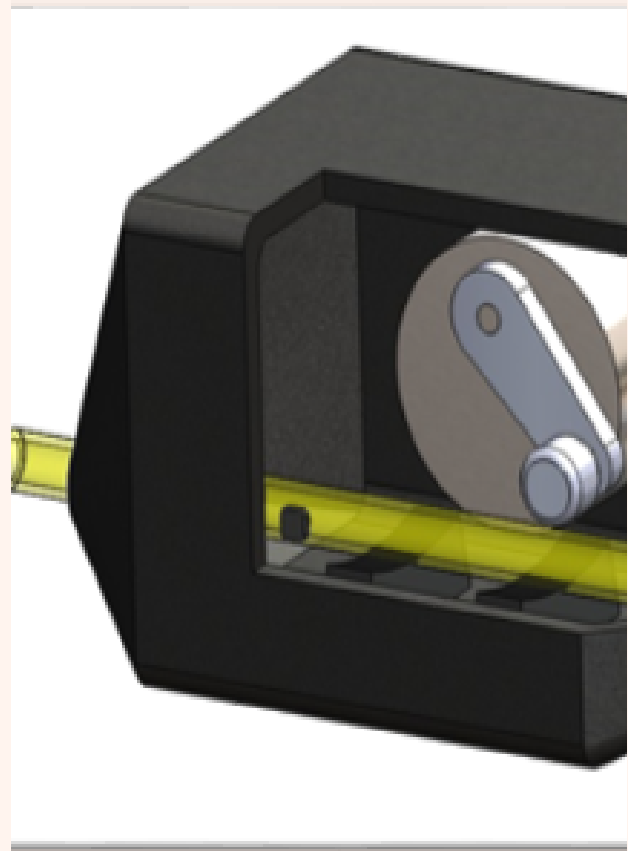


Stair-Trek

Weakening of the muscles and bones is a common problem with ageing. People over the age of 50 are prone to disorders such as arthritis and the weakening of their backbone, making it difficult for them to walk or climb stairs. The proposed solution is a stair-climbing grocery carrier that can be easily loaded in and out of the trunk of a vehicle, and an individual can own this product.

AutoCath

People with spinal cord injuries, especially paraplegics and quadriplegics often suffer from such urinary incontinence and bladder management problems. This product is an inexpensive and automated catheterization device to help decrease the occurrence of Urinary Tract Infections (UTIs), and minimize human intervention during bladder release.





Statio

A simple, low-cost yet effective product that makes it easier for wheelchair users to lock their wheelchair in place whenever they feel the need to perform functional activities. The user can lock the wheelchair in place with just the push of a button.

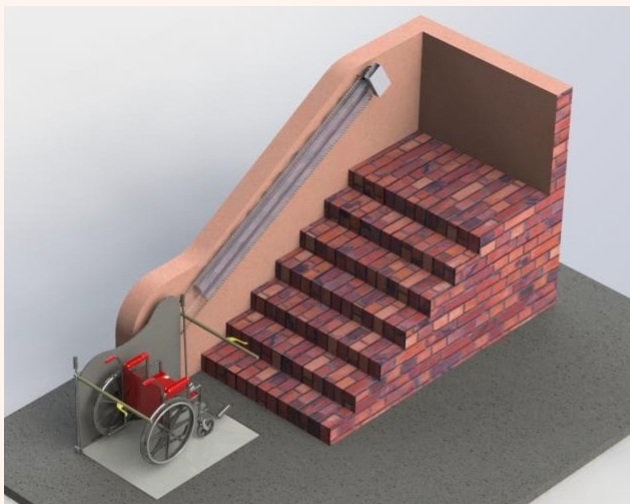
EARamend

EARamend attempts to be every deaf person's safety companion, alerting users of impending sources of danger, steering them to safety. It is a simple and customizable waist belt capable of alerting the user of any incoming risks with the unique combination of a LiDAR system and a trigger word detection model.



Retro Ramp

The product addresses the hindrance faced by wheelchair occupants of a wide range of age and considering their physical disabilities, we have less effort interface which helps them to climb the staircase.



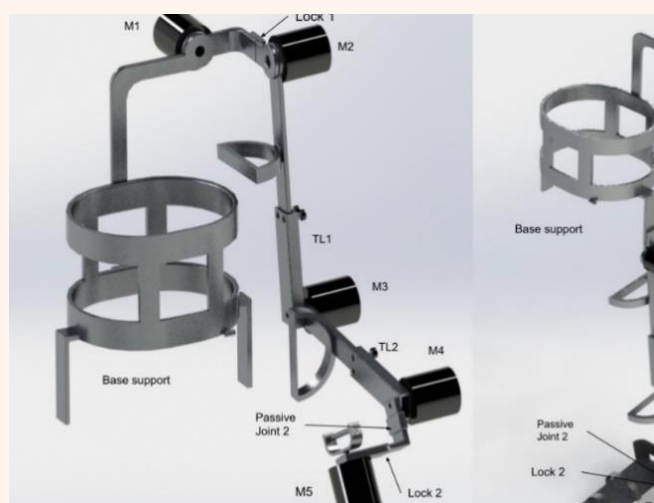


Wall-E

WALL-E (Wheelchair Assistive Light Labour - Exercise) is a simple, low cost and highly adaptable exercise equipment which allows wheelchair users to have a proper workout regimen from the comfort of their homes.

Upper and Lower limb interchangeable Exoskeleton-Robot for post-stroke rehabilitation

Hemiplegia is a medical condition in which half-side of the body gets paralyzed. Rehabilitation, using physiotherapy, is the most effective treatment for hemiplegia. This research aims to develop an exoskeleton that can be used to generate motion in the limbs to assist physiotherapy, thereby facilitating rehabilitation.



The exoskeleton is designed such that it can be used for both upper limbs and lower limbs, interchangeably.

EVENTS

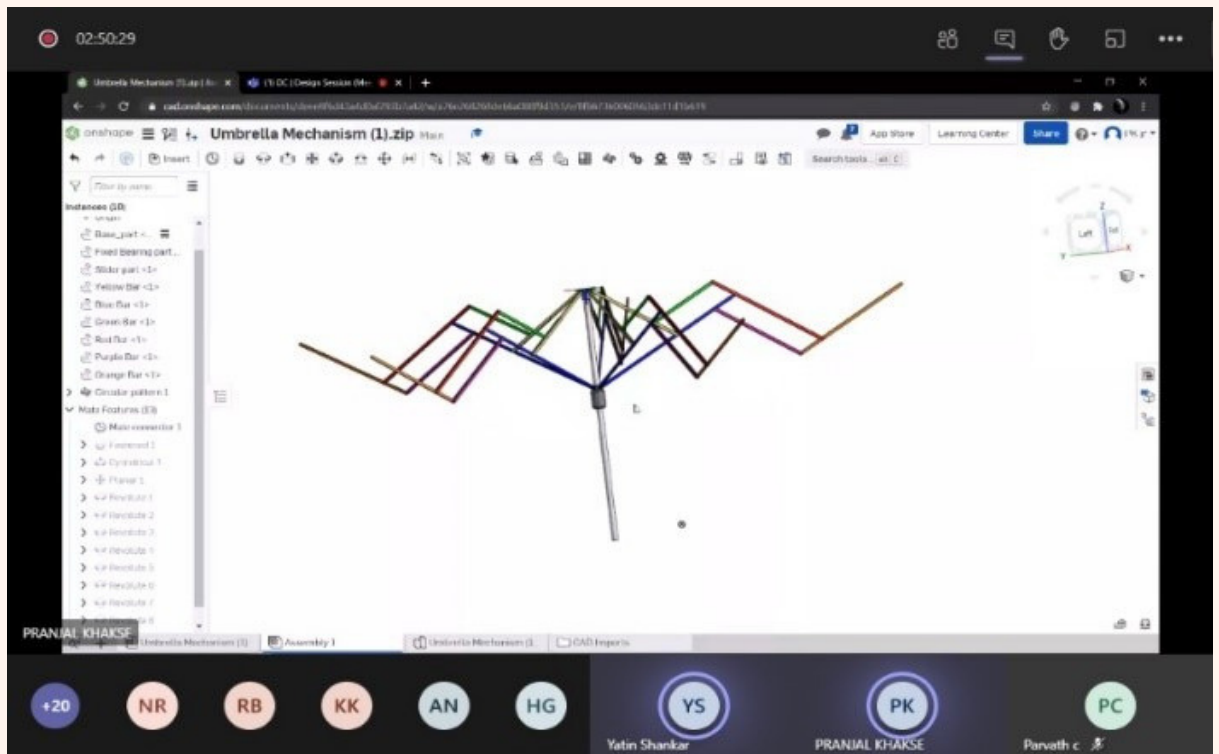
DC Freshers' Forum

We created a forum on Facebook, for the freshers to equip themselves with resources such as Solidworks, Arduino, Mechanics of Machines, etc., to make their lockdown period more productive. The DC Freshers' Forum in Facebook was created on 12th April 2020 and was live till 30th May 2020. This platform was aimed to help Freshers sharpen their technical skills in domains ranging from mechanics to electrical and electronics to material science to control and actuation. We released study material, tutorial videos for different software and exercises periodically. Apart from this we shared posts about many innovative products which have the potential to revolutionize this world. Around 190 members were actively part of the forum.

Techathlon 2021

As part of INHOTTSS - In-House edition of Pragyan'21, organised jointly by team Pragyan and the Technical Council of NIT Trichy, DC along with PSI Racing club conducted the annual technical workshop - Techathlon'21, the product designing and automobile workshop between 30th Jan and 1st Feb 2021. The workshop was conducted for free exclusively for the First years in MS Teams. The workshop involved 4 sessions:

- Mechanisms and Product design theory session by DC on 30th Jan
- Automobile subsystems theory session by PSI on 31st Jan
- CAD modelling session by DC on 31st Jan
- Data acquisition and FEA session by PSI 1st Feb



Contrive 2021

We conducted the annual product design hackathon - Contrive'21 between 7th Apr and 11th Apr 2021. The hackathon was conducted for free exclusively for the First years in MS Teams. Around 85 teams participated in this Hackathon wherein the participants were given 3 problem statements and were asked to come up with a product solution for any one of them, that has the potential to solve the problem, within 72 hours of disclosure of the same.

Through this event, the First years brought many innovative and feasible solutions for a few impending problems. Through the mentoring of the DC members, they were able to clear their doubts along the way and got their initial exposure to CAD modelling, Product Analysis (material used, strength) and circuitual connections and simulations. A cash prize worth 5K was given to the three winning teams.

COMPETITIONS

InnovIndia Hackathon 2020 - Young Indians Organization

InnovIndia Hackathon was a 24-hour virtual hackathon conducted by the Young Indians Organization on 31st July 2020, to encourage innovation to curb the COVID-19 pandemic situation. 4 teams from DC took part in the hackathon and we bagged 2 places one for Best Presentation and one for Best Team.

Designathon - Gravitass'20 (VIT, Vellore)

The Design-a-thon is a technical event that was conducted virtually by ADI-VIT club. It is a 24-hour design challenge to get creative solutions for modern world problems. The event was conducted from 2nd to 3rd October 2020. 5 teams from DC took part in the event and one team bagged Second place.

Online Design Challenge - Aaruush'20 (SRMIST, Chennai)

Online Design Challenge was a virtual CAD modelling competition conducted by SRMIST, Chennai as part of their technical fest - Aaruush'20 between 16th June 2020 to 5th July 2020. Under the Online design challenge, there were 5 different challenges. 3 teams from DC took part in the challenge.

Covideate - Techfest'20 (IIT Bombay)

Covideate is an event organized at Techfest, IIT Bombay to prevent the COVID-19 pandemic that is spreading rampantly and leaving thousands dead in its wake. The problem statement given was to develop a model that can be put in place to control the spread of the pandemic in Mumbai. One team from DC took part in the event.

Agri India Hackathon - Govt. of India

Agri India Hackathon is the largest virtual gathering to accelerate innovations in agriculture. The Agri India Hackathon was organized by Pusa Krishi, ICAR - Indian Agricultural Research Institute (IARI), Indian Council of Agricultural Research (ICAR) & Department of Agriculture, Cooperation & Farmers' Welfare, Ministry of Agriculture & Farmers' Welfare. 3 teams from DC took part in the event.

Fusion Hack - Pragyan'21

Fusion Hack was a virtual CAD Modelling event organized at Pragyan, the technical fest of NIT Trichy. One team from DC took part in the Hackathon.

AT Makeathon - Shaastra'21 (IIT Madras)

Assistive Technology Hackathon (AT Makeathon) was conducted by the R2D2 lab of IIT Madras as part of Shaastra, the technical fest of IIT Madras on 25th Feb 2021. Five teams participated in the hackathon from DC and one team bagged the third place.

Sangam - Pragyan'21

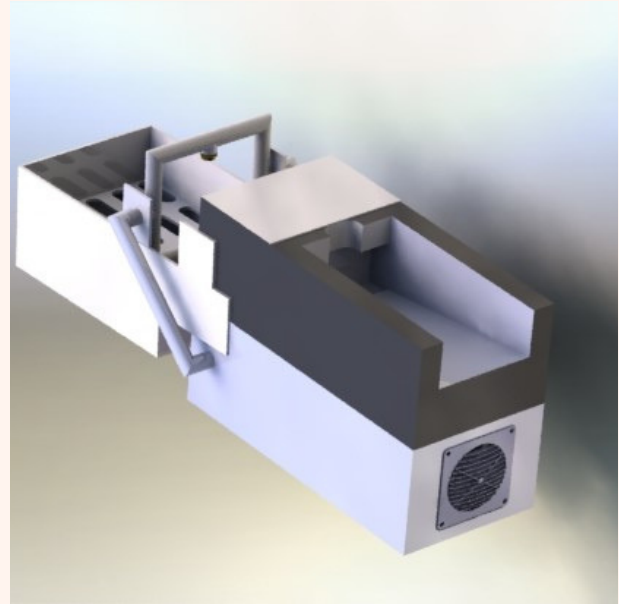
Sangam is the intra college technical competition. It is the Hardware Hackathon of Pragyan. Three teams took part in Sangam and two teams bagged First place in the domains of Healthcare and Energy.



CAMPUS DEVELOPMENT

C-Cube (Cash Cleaning Counter)

Cash is a potential carrier for the pathogen, which could stay on for 6-10 hours. The solution, C-Cube, sanitizes the cash quickly to facilitate faster cash exchange. Aqueous Ozone is used as a sanitizer because of its high effectiveness, less time, absence of harmful residue, and little to no damage to cash.

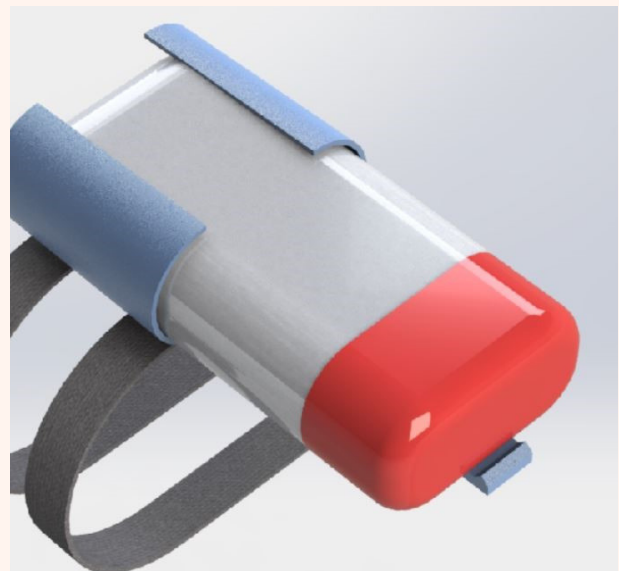


Everyday Utility Cleaner - Ozone Technology

EUC-OT involves the use of ozonized water to effectively sanitize the surfaces of all products needed for the household needs. The product is envisioned for use in main market junctions involved in retail distribution ensuring sanitized goods delivered to the consumer.

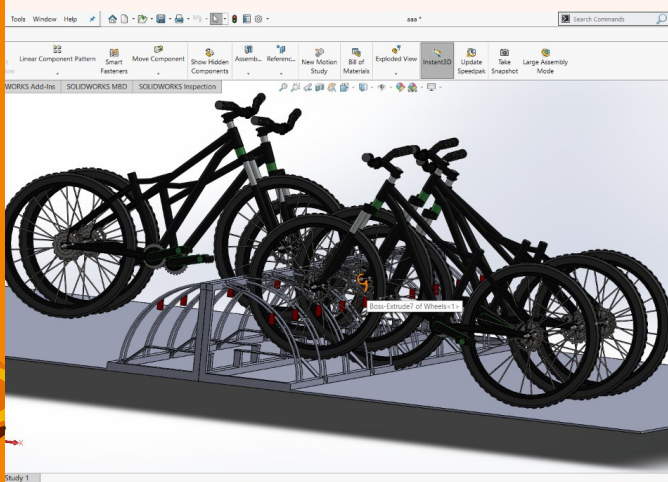
Arm-held Sanitiser

The Armheld Sanitizer is a very simple but potentially very effective snap-fit wearable solution to not only keep a sanitiser nearby at all times but also to psychologically encourage the person wearing it to disinfect their hands regularly.



ATM Cleaner

Public ATMs are subject to frequent use by many different users and can potentially be hotspots for surface transmission of viruses. The ATM Cleaner is an automated device that can be installed on ATMs. After every use of the ATM, the device, which allows contact with the keypad only via a sheet in between, sprays disinfectant and circulates the sheet to a clean area for the next user.



RFID Cycle stand

We have proposed an idea of using RFID cards for parking and safely locking the cycles to a stand which will ensure optimised use of the parking area as well.

Pedal operated water dispenser

We have also proposed the idea of using a pedal operated retrofitting device to use the water dispensers in the hostel and academic zones of the campus.

PAPER PUBLICATIONS & PATENTS

RoAI 2020: International conference on robotics and artificial intelligence 2020
RoAI 2020 conference was conducted virtually by IIT Madras between 28-29 December 2020. Four papers were presented from DC and all four papers were accepted and published in Journal of Physics: Conference Series, Volume 1831, 2020.

S. No.	Authors	Paper Title	Citation
1	Seetharam Krishnapuram Adithya Kameswara Rao K M Dhivakar Mayank Kapur	Robotic arm for automatic brake testing and control	Seetharam Krishnapuram <i>et al</i> 2021 <i>J. Phys.: Conf. Ser.</i> 1831 012021
2	K Harikrishna K M Dhivakar L N Puthiyavan Navneeth Rajiv S Premkumar T A Girithar	Benchmark device to mitigate jaw tremor using gyroscopic effect	K Harikrishna <i>et al</i> 2021 <i>J. Phys.: Conf. Ser.</i> 1831 012022
3	S Premkumar T A Girithar P Niranjana Kumar R Saimothish Vaibhav Ashok Malani Rubin Jacob	5-Position 4-Actuator automated bed to prevent bed sores	S Premkumar <i>et al</i> 2021 <i>J. Phys.: Conf. Ser.</i> 1831 012024
4	Vishaal Kanna Sivakumar Vishnu Mani Hema Seetharam Krishnapuram Shubhodeep Saha Ajay Bharadwaj Rohit Surya Kumar Raja Ramanan Sundara Raman	An automated retrofittable street light solar panel cleaner	Vishaal Kanna Sivakumar <i>et al</i> 2021 <i>J. Phys.: Conf. Ser.</i> 1831 012023

The proceedings are indexed in Scopus, as well as EI Compendex, Inspec and Conference Proceedings Citation Index CPC-I, a Web of Science Core Collection database.

S. No.	Authors	Paper Title	Citation
1	Premkumar S Yash Prakash Burhanuddin Shirose K M Dhivakar Mayank Kapur Puthiyavan L N Ssmrithi Arul	T-Ceres – An automated machine for each T-shirt to bag conversion	Yet to be published
2	Adithya Kameswara Rao Karthi S K Vedhanarayan A Ssmrithi Niranjan Kumar P Kevin Mathew Thomas Mayank Kapur	Self-Sustainable toilet system	Yet to be published
3	Adithya Kameswara Rao Sudarsana Jayandan J Harikrishna K Jayendran R Niranjan Kumar P	Novel water-conserving faucet attachment	Yet to be published
4	Karthi S Yash Prakash Kunal Yadav Amritha Suresh Nithin K Subash Siddharth Mahesh	Saarathi	Yet to be published
5	Kulkarni Atharva Kumar Deepshika S M Kevin Thomas Kunal Yadav Navneeth Rajiv Rohit Surya K Vedhanarayan K	Novel Design of selective action knee assistive device	Yet to be published

IPDIMS 2020: 2nd Innovative Product Design and Intelligent Manufacturing System: National Conference

IPDIMS 2020 Conference was conducted by National Institute of Technology, Rourkela on 12th and 13th Feb 2021. Five papers from DC were presented in the conference. All five papers are accepted, they are yet to be published.

Anti Manipulation Combination Lock Mechanism -

The Anti Manipulation Combination Lock Mechanism (Zafer) Project is in the process of patent application through the Intellectual Property Rights Cell of NITT. The first stage involved pitching the idea to the IPR Cell in front of a panel upon filling forms 5 and 5A, describing details of the invention.

Once the panel approved the idea to be pursued as a patent, the next step was the prior art search. This was carried out by a third party called DexPatents. the invention was found to be novel, and the likelihood of patenting the invention was found to be 'High'

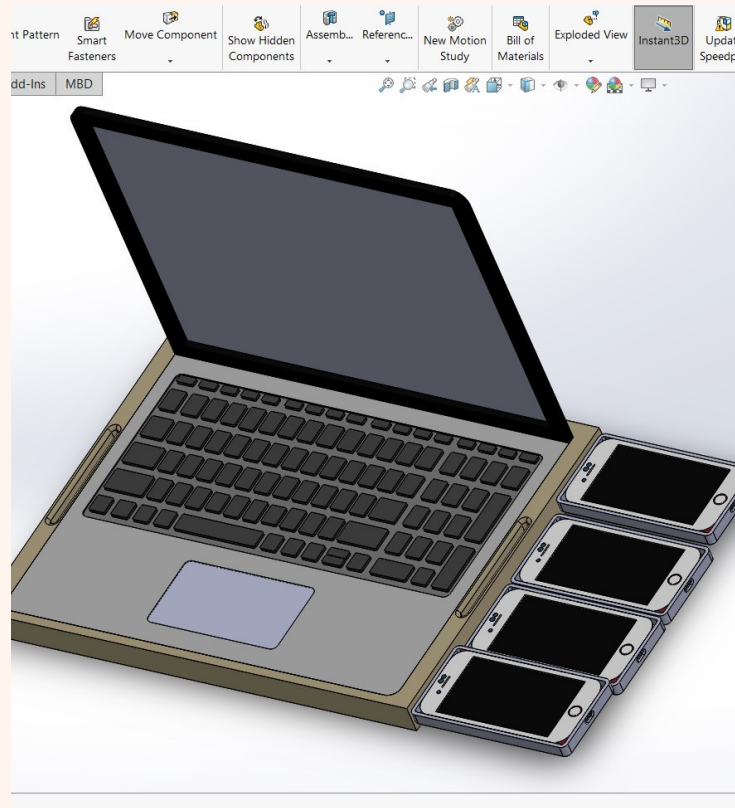
Once the prior art search was done, a third party called Altacit was contacted to prepare the patent draft. From our side (the inventors), a detailed form specifying the technical details and some other application

details was filled and provided to them to prepare the draft. At the time of writing this report, Altacit is expected to submit the preliminary draft in the first week of May 2021, after which the inventors can review it and suggest changes or corrections to be made.

COLLABORATION

Battery Backup

An Alumnus of NITT, Mr. Subhash from the Batch of 2012, approached us with a problem statement to design a battery integrated luggage with laptop charging capability. Since the batteries are enclosed in fabric, a novel system for temperature management is to be designed. Two members from DC namely Kevin and Dhivakar worked on it.



Young Techie 2.0

As part of the Young Techie 2.0 initiative by the Pragyan Social Responsibility team, conducted to encourage school students to innovate, two members from DC mentored two school student teams. They held periodic meetings with the teams to help them ideate and solve problems in their ideas.