DEV SHAH

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Education

Pandit Deendayal Petroleum University India
B. Tech. Mechanical Engineering *Jun. 2017 – May 2021*

- GPA, 9.33/10

Experience

Founder and R&D Head Jan 2021 – Present
Beyond2D LLP *India*

- 3 major verticals: Dental (Orthodontic and Prosthodontic) 3D Printing; 3D Printed Molds (Glass Filled) for low-volume Injection Molding; Replicating Injection Molding Parts for prototyping using different resins and curing techniques.
- Dental 3D Printing: Developed ISO 10993 compliant dental resins by working alongside local resin manufacturers. 3D Printing of Crowns, Dentures, Aligners and Surgical Guides was done for few high-end dental clinics in the Western India
- 3D Printed Molds for low-volume Injection Molding: Developed a highly glass filled resin that could print molds that can withstand the thermal and structural loads of Injection Molding of up to 100 complex Polycarobnate parts. (These 3D printed molds were used as inserts in steel frames.)
- Replicating Injection Molding Parts for prototyping using different resins and curing techniques: Developed different 3D printable resins that replicated the tensile and bending properties of common Injection Molding plastics and conducted Tensile, Compression, Fatigue, Bending and Hardness tests to show comparisons to clients in the form of data-sheets.

R&D Engineer May 2020 – Present
Mediscient Devices Pvt. Ltd. *Vadodara, India*

- Needle Safety Device for Lanreotide Drug: Developed a pre-filled syringe based passive needle safety device that houses the drug 'Lanreotide depot', a highly viscous drug for 'Acromegaly' and other growth-hormone related disorders. Conducted Usability Engineering study among patents, Risk Management as per ISO 14971, Test Protocols based on ISO 11608 an all documentation for registering the device (DHF, DMR etc.)
- InsuPress: Smart Wearable Insulin Injector: Mechanical Insulin Pump that can be worn on the body or carried as an injection in the pocket by a Diabetic Patients. Co-developed the design for both Disposable and reusable version, Conducted Risk Management as per ISO 14971 (DFMEA, Residual Risk benefit), Usability Engineering Study, All documentation of: DHF, DMR & Clinicial Trials, Designed test protocols based on ISO 11608
- A Fix-Multi Dose Platform Injector: that is 50% smaller in volume (size) in comparison to its competitors and way more ergonomic, consisting of a dose counter in less than Forteo (predicate) pen's part count, Injection Mold-able assembly, Co-developed it, Drafted a technical brief along with claims tree for patent submission, Conducted Risk Management as per ISO 14971 (DFMEA, Residual Risk benefit), Designed test protocols based on ISO 11608
- Reusable variable-dose Injection pen: Developed a new mechanism for variable dose injector pen that does not hamper any existing pen injector patents.
- Subcutaneous Port: Needle-less injection experience for people uncomfortable with needles
- Wearable Smart Sanitizer Dispenser: A wristband that detects hand-shakes or door-opening operation using an IMU and vibrates to remind user to sanitize their hands, can also dispense hand sanitizer.

Product Design Intern May. 2020 – Nov. 2020

Credence Management Corp. *Vadodara, India*

- Exploring the commercialization aspects of Compliant Surgical Gripper (more information in the Research section) for replacing the conventional tools like Towel Clamps, Sponge Forceps and Tube Clamps under the guidance of R&D Engineers that specialize in Designing and Manufacturing of Medical Devices.

R&D Intern April 2020 – Sept. 2020

Cargar *Remote, Part Time*

- Worked on the design and thermal analysis of a portable IP-65 rated battery pack made using 18650 cells for charging electric vehicles.
- Worked on the design and analysis of an electric vehicle that carries a 100kWh prismatic battery pack.

Research

Design and Development of Microneedle patch June 2021 – Present

with Ms. Tuhina Bhattacharya (MSc, Microbiology) | funded by Beyond2D LLP *Vadodara*

- This research focuses on development of Microneedle patch platform that can be utilised with any wearable injector eliminating the need for painful needles that have to stay in the body for up to 3 days in commercial wearable injectors like Omnipod, V-Go and Cequr Simplicity
- Hollow Microneedle with ISO 10993 compliant 3D printed resin is under development.
- Porcine skin testing and SEM analysis is underway for various microneedle profiles.
- Conducted extensive cost analysis to showcase how 3D Printing these microneedles is more commercially viable than Micro-InjectionMolding or Electro-Mechanical Machining
- Top 10 innovation award in National Manipal BioTech Hackathon 2021

Design and Analysis of Compliant Surgical Tools July 2019 – Dec 2020

with Dr. Krunal Mehta | funded by ORSP, PDPU *Gandhinagar & Vadodara*

- This research focused on the use of a Compliant joint in surgical gripper made up of bio-compatible plastics or Nitinol which would eliminate the need of multi-part assemblies for devices like Towel Clamps, Sponge Forceps and Tube Clamps.
- Interning with Credence Management Corp. for commercialization of this device
- Received a funding of 1,25,287 INR from the Office of Research and Sponsored Projects, PDPU
- Filed for patent in Dec. 2020

Prediction of nCovid-19 outbreak in India Jan 2020 – April 2020

with guidance from Dr. Krunal Mehta *PDPU, Gandhinagar*

- Prediction of nCovid-19 outbreak in India in different scenarios modelled using a computational SEIR model (Modified for nCovid-19) and suggestive approaches for resolution of the epidemic in an optimized way to keep the deaths at a minimum and avoiding pausing of the economy to a viable extent.
- Published in UGC approved journal: IJSREM Volume: 04 Issue: 04 | Impact Factor: 4.106 | e-ISSN: 2582-3930 | Indexed by ROAD

e-ATV Research Group Mar 2020 – Jan 2021

with Dr. Alok Jain and Mr. Rahul Deharkar *PDPU, Gandhinagar*

- Leading a team of 5 for the structural & thermal design of an electric All-Terrain Vehicle to compete in e-BAJA SAE India, 2021.
- Carried out CFD analysis of entire [Battery + Electronics + Motor] system for determining the optimum placement of each component.
- Increased the torsional stiffness of the rollcage by 10% in comparison to last year's design while also reducing it's weight by 2.3 Kgs
- Developed an e-CVT

ATV Research Group Feb 2018– Jan 2020

Head of Design | with Dr. Vivek Patel and Mr. Rahul Deharkar *PDPU, Gandhinagar*

- Came first in Virtual Design Round among 350 teams from all over India
- Reduced the weight of the ATV by 12 Kgs
- Utilized Generative Design and Topology Optimization for designing some parts of wheel assemblies for weight reduction
- Conducted RULA and REBA analysis for enesuring driver ergonomics inside the rollcage
- Designed a 2-stage reduction gear box and a continuous variable transmission
- Carried out plenty of Explicit Dynamics Simulations to ensure safety of the driver during several types of possible accidents.
- Tried to develop an e-CVT but fell short of time.

Projects

Rapid Development of a Mobile Sanitization Kit Jul 2020 – August 2020

Hackathon by Innovation and Incubation Center, PDPU

- Designed a sanitization Kit consisting of intuitively designed items useful in a wide variety of scenarios for fighting Covid-19.
- Kit included a varying density sanitizer dispenser, UV light stick, UV Disinfection box and Door Handler
- All of the products could be carried in a shoulder-laptop bag along with a laptop inside

Self-Learning Automatic Gear Box with user preferences Nov 2020 – Sept 2021

with Dr. Harshal Oza

- A conventional automated manual transmission (AMT) with a machine learning algorithm that learns from the feedback loop of user's manual paddle shifts during the automatic transmission mode.

Skills

Languages: Python, MATLAB
Human Languages: English, Hindi, Gujarati
Softwares: Siemens NX, Ansys, Comsol, Star CCM+, Solidworks, Fusion 360, Adams.
MOOC Courses:

- Medical Device Regulation 2017/745 EU Regulatory Affairs (Udemy)
- Materials Data Science Informatics (Georgia Institute of Technology): 89%
- Intelligent Machining (University at Buffalo, The State University of New York): 87%
- Control of Mobile Robots (Georgia Institute of Technology): 89%
- Neural Networks and Deep Learning (deeplearning.ai): 92%
- Self Driving Cars Specialization (University of Toronto): 91% (Partially Completed)

Volunteering and Extra-Curricular

Mathematics Teacher May 2018 – June 2018

Lion's Blind Girl's School

- Devised innovative methods to teach math to young blind kids
- Made permanent teachers more comfortable with Computers and Tablets so they could utilize those things for teaching the kids once my internship was completed.

National Karate Champion 2010 – 2015

Black Belt

- Represented India in South Asia Karate Championship and came third.
- Won several national, state and district karate tournaments.