Karan **Jakhar**

Senior Year Undergrad · Mechanical Engineering · IIT Patna

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Publication

- Jakhar, K.; Chattopadhyay, A.; Thakur, A.; Raj, R. *Spline Based Shape Prediction and Analysis of Uniformly Rotating Sessile and Pendant Droplets.* **Langmuir,** 2017.
  DOI - 10.1021/acs.langmuir.7b00811

Research

Droplet Shape Analysis for Tensiometry Applications

IIT Patna

Research, Thermal and Fluid Transport Laboratory, Adviser: Dr. Rishi Raj — *Ongoing*

- Developing an algorithm to calculate bond number and surface tension values of experimentally captured droplet shapes by performing inverse analysis on droplet shape prediction algorithm.

Bifurcation of Uniformly Rotating and Pendant Droplets

IIT Patna

Research, Thermal and Fluid Transport Laboratory, Adviser: Dr. Rishi Raj — *Ongoing*

- Developed algorithm to identify critical rotational bond number value at which a uniformly rotating droplet bifurcates.
- Developed algorithm to identify critical gravitational bond number and volume for buoyancy induced detachment of uniformly rotating and non-rotating pendant droplets.

Droplet Shape Prediction

IIT Patna

B.Tech Thesis, Thermal & Fluid Transport Laboratory, Adviser: Dr. Rishi Raj & Dr. Atul Thakur — *Aug. 2016 - Mar. 2017*

- Developed a cubic spline based geometric reconstruction algorithm that can capture the macroscopic shape of the liquid-vapor interface in tandem with the subtleties near the contact line, particularly in the regime where the droplet shape deviates significantly from the idealized spherical cap geometry.
- The algorithm efficiently predicts the shape of sessile and pendant droplets and bubbles under the action of centrifugal force over a broad range of surface contact angle and bond number values.
- Utilises a novel thermodynamic free energy minimization based heuristic which bypasses the onerous task of mathematically solving partial differential equation (Young-Laplace equation).

Experience

Platform to Help Build Smart Restaurants

New Delhi, India

Summer Internship, Aficionado Ventures Private Ltd. (Startup) — *May 2016 - Jul. 2016*

- Aficionado Ventures is a food service and hospitality purchase platform which helps build smart restaurants that can scale profitably and fast.
- Worked on identifying the pain points of the food-service and hospitality industry via one-on-one interviews.
- Developed a prototype, designed a prospective solution - a Web platform built on 'Meteor' a MEAN stack based framework.

Solar Adsorption Refrigeration System using Zeolite-Water pair

Jodhpur, India

Research Internship, Defence Research and Development Organisation, Defence Lab Jodhpur — *May 2015 - Jul. 2015*

- Determined a suitable fluid to provide heat for the solar adsorption refrigeration system with water as working fluid and zeolites as the adsorbent by solar heating of the fluid.

Future Scope of Automotive Manufacturing Technology

Jodhpur, India

Summer Internship, Mahindra — *Jun. 2015 - Aug. 2015*

- Researched and analysed the future scope of automotive manufacturing technology and compiled few technical blog posts.
- Blog: xlr8ers.wordpress.com

Projects

Capacity Control for Refrigeration and Air-Conditioning Systems
IIT Patna

Senior Year Project — *Mar 2017 - Apr. 2017*

- Investigated capacity control of a vapor compression refrigeration system for hot-gas by-pass, cylinder-unloading and suction gas throttling capacity control schemes for refrigerant R-134a.
- Performed a comparative study among these schemes in terms of the system coefficient of performance (COP), the operating temperatures and the percentage of refrigerant mass fraction as a function of the percentage of full-load system capacity.

SAEINDIA-BAJA
Chandigarh, India

All Terrain Vehicle Fabrication and Race Event — *Jun. 2015*

- Modelled a transmission for the All Terrain Vehicle (ATV) using continuously variable transmission (CVT).
- Represented IIT Patna for the virtual round and qualified for fabricating vehicle.

Mechanical Model for Irrigation
IIT Patna

Research Project for Rural Technology Development Club — *Aug. 2014 - Feb. 2015*

- Conceptualised a Mechanical Model for farmers to irrigate from artificial and natural water channels with water level below ground.
- The model utilised the dynamic pressure of the flow to lift water to higher hydraulic head and lower flow rate.

Education

Indian Institute of Technology Patna
Patna, India

B.Tech. in Mechanical Engineering — *Jul. 2013 - Present*

- SPI of 8.95 (on 10), previous semester. CPI of 7.28 (on 10).

MDS Public School
Udaipur, India

Higher Secondary Studies, Central Board of Secondary Education — *Apr. 2011 - Mar. 2013*

- 89.2% marks.

Kendriya Vidyalaya No. 1
Udaipur, India

Secondary Studies, Central Board of Secondary Education — *Apr. 2010 - Jul. 2011*

- 10/10 GPA

Honors & Awards

2016	**Second Prize**, Grand Challenge, ISED 2016	*Patna, Bihar*
2013	**Top 0.3 percentile**, All India Joint Entrance Exam (approx 1,300,000 appeared)	*Udaipur, India*
2010	**All India Rank 6**, International Earth Science Olympiad	*Hyderabad, India*

Extracurricular Activity

2015-16	**Coordinator**, Industrial Relations, Entrepreneurship Club	*IIT Patna*
2014-15	**Sub-Coordinator**, Media & Public Relations, Anwesha 15 (Techno-Cultural Fest)	*IIT Patna*
2014-15	**General Secretary**, Student's Gymkhana, Sophomore Year	*IIT Patna*
2013-14	**Technical Secretary**, Student's Gymkhana, Freshman Year	*IIT Patna*
2013-15	**Goalkeeper**, College Football Team, 49th & 50th Inter IIT Sports Meet	*IIT Patna*
2013-15	**Guitarist**, Pankha, Fun Rock Band	*IIT Patna*