

# Karan Jakhar

SENIOR YEAR UNDERGRAD · MECHANICAL ENGINEERING · IIT PATNA

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## Publication

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- 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

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### Droplet Shape Analysis for Tensiometry Applications

IIT Patna

B.TECH PROJECT, THERMAL AND FLUID TRANSPORT LABORATORY (TFTL), 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

B.TECH PROJECT, THERMAL AND FLUID TRANSPORT LABORATORY (TFTL), 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 PROJECT, TFTL, 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

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### 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 solar adsorption refrigeration system with water as working fluid and zeolites as 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

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### 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 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

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

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### 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

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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

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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