

KRITANK KALYAN

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EDUCATION

University of Pennsylvania

Batch: Fall 2021-2023

Master of Science in Engineering, Nanotechnology

Guru Nanak Dev Engineering College, Ludhiana, Punjab, India

Batch: 2014-2018

Punjab Technical University

BACHELOR OF TECHNOLOGY in Mechanical Engineering

GPA: 3.75

RESEARCH AND PUBLICATIONS

Singh Center for Nanotechnology, University of Pennsylvania, Philadelphia, PA, US

Mentored by Prof. Troy Olsson

Research Assistant at BIOTICS LAB

Nov 2021-Present

Optimizing depositing parameter of magnetostrictive film

- Nano-fabrication and characterization of magnetostrictive film using FeGa, FeGaB and FeCo using physical vapour deposition.

Residual stress characterization in sputtered AlScN

- Nano-fabricated and characterized AlScN microcantilever for internal stress reduction using physical vapour deposition.
- Beaucejour R, D'Agati M, Kalyan K, Olsson RH III. Compensation of the Stress Gradient in Physical Vapor Deposited $Al_{1-x}Sc_xN$ Films for Microelectromechanical Systems with Low Out-of-Plane Bending. *Micromachines* 2022, 13, 1169.

Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore, India

Mentored by Prof. Rudra Pratap with Ph.D. Scholar Kaustav Roy

Project Associate at MEMS/NEMS Lab

Oct 2020-Aug 2021

A PMUT Integrated Microfluidic System for Fluid Density Sensing

- Fabricated a Piezoelectric Micro-machined Ultrasonic Transducers (PMUT) integrated with microfluidic device to sense static and real-time density.
- Roy, K., Kalyan, K., Ashok, A., Shastri, V., Jeyaseelan, A., Mandal, A., & Pratap, R. (2021). *Journal of Microelectromechanical Systems*, vol. 30, no. 4, pp. 642-649, Aug. 2021.

An Optofluidic Dye Concentration Detector Based on Pulsed Photoacoustic Effect

- Detected the concentration of methylene blue in microfluidic channel via pulsed photoacoustic effect.
- Roy, K., Thomas, A., Paul, S., Ashok, A., Shastri, V., Kalyan, K., ... & Pratap, R. (2021, March). In *Microfluidics, BioMEMS, and Medical Microsystems XIX (Vol. 11637, p. 116370M)*. International Society for Optics and Photonics.

Towards the Development of Backing Layer for Piezoelectric Micromachined Ultrasound Transducers

- Fabricated a PMUT to engineer its quality factor by deposition of parylene C on the surface.
- Roy, K., Ashok, A., Kalyan, K., Shastri, V., Jeyaseelan, A., Nayak, M. M., & Pratap, R. (2021, March). *Imaging and Sensing 2021 (Vol. 11642, p. 1164240)*. International Society for Optics and Photonics.

A Pmut Integrated Microfluidic System for Volumetric Flow Rate Sensing

- Sensed volumetric flow rate using PMUT Integrated Microfluidic System.
- Roy, K., **Kalyan, K.**, Ashok, A., Shastri, V., & Pratap, R. (2021, June). In 2021 21st International Conference on Solid-State Sensors, Actuators and Microsystems ([Transducers](#)) (pp. 172-175). IEEE.

Development of Frequency Tunable Fluid Loaded PMUTs

- Developed a technique to tune the frequency of PMUT using fluid.
- Roy, K., **Kalyan, K.**, Ashok, A., Shastri, V., & Pratap, R. (2021, September). Development of Frequency Tunable Fluid Loaded PMUTs. In 2021 IEEE International Ultrasonics Symposium ([IUS](#)) (pp. 1-4). IEEE.

Sensing Viscosity of Biofluids Using a Single Cell PMUT

- Fabricated a fluid viscosity sensor by observing a change in the quality factor of a PMUT.

Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore, India

Mentored by Prof. Prosenjit Sen with Ph.D. Scholar Chandantaru Dey Modak

Project Assistant at MDHS Lab

Sep 2018-Sep 2020

Automation of single droplet inject printing setup

- Designed and manufactured the drop impact setup using 3D printer.
- Integrated and automated droplet impact setup and optimised for single drop ejection
- Acknowledged in publishing's, "[Drop impact printing in Nature Communications](#)".

Droplet impact of fluids over sieves

- Understanding droplet impact dynamics of a Newtonian fluid, Non-Newtonian Fluid and Viscoelastic fluids over Super-hydrophobic, Hydrophobic and hydrophilic sieve with different droplet impact velocity.

Droplet dynamics over super-slippery surfaces

- Fabricated a super-slippery sieve using etching technique followed by oil coating.
- Drop dynamic studies to see the effect on jet length, jet velocity and break time at different Weber number.

Mono-Dispersed Spraying using Super-hydrophobic sieves

- Fabricated a super-hydrophobic sieve using wet etch technique (i.e., growing nano-rods on a surface)
- The goal is to achieve mono-dispersed droplets using different pore opening of the superhydrophobic sieve.

Rail Coach Factory, Kapurthala, Punjab, India

Project Trainee

Feb 2018-May 2018

Improvement of paint job on LHB railway coaches

- An industrial project on improvement of paint job on Railway Coaches was done in a manner to increase the quality and the net profit of the factory.
- INR 160,000 and 7 days were saved on per month of units produced.

PATENT

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- Roy, K., **Kalyan, K.**, Ashok, A., Shastri, V. & Pratap, R. (2021). "Microfluidic device for fluid density sensing" Indian patent application no. 202141017269.

SKILLS

- **Fabrication Skills:-** Dry Etch | Wet Etch | Mask aligner | Chemical vapour deposition | Physical Vapour Deposition | Spin Coating | Laser micro-machining | Wire bonding | Microfluidics | 3D Printing
- **Characterization Skills:-** Optical Microscopy | UV-Vis-NIR Spectroscopy | Laser Doppler Vibrometer | Rheometer | High Speed Imaging | Scanning Electron Microscopy | Stress Profilometry | Z-Axis Microscopy | Lockin Amplifier | Time of flight secondary ion mass spectroscopy |
- **Computer aided Engineering:-** Python | Solidworks | AutoCad | Comsol | Ansys Fluent | Matlab | C++ | Image Processing | Raspberry Pie | Arduino

ACADEMIC & PERSONAL PROJECTS

Tracing Nano beads in a microfluidics Channeled device

Indian Institute of Science

March 2019

Analysed a microfluidic's Channeled device through high-speed imaging and image processing it through MatLab and thus plotting its locus.

Distance measurement using Ultrasonic sensor

Indian Institute of Science

Jan 2019

Measurement of distance was made by using HC-SR-04 ultrasonic sensor operated and code on a Raspberry pi 2 Model B.

Triphibious Unmanned Vehicle

Guru Nanak Dev Engineering College

Jan 2017-Dec 2017

Designed a drone which is capable of working on land, under-water and air. Modelled in SolidWorks and simulated in Ansys.

Vacuum Evaporative cooling

Guru Nanak Dev Engineering College

May 2016

Manufactured and designed a system that generates a cooling effect through evaporating water in a cooling chamber. Modelled and simulated in SolidWorks.

Electric Bike

Guru Nanak Dev Engineering College

Feb 2016-March 2016

Manufactured and designed an electric bike for an E-bike Challenge competition and won INR 55,000 prize.

HONORS AND AWARDS

MEMS STARS Project Assistantship

Oct 2020-Aug 2021

1st place in Intra-College Soccer Matches

Aug 2017

1st place in Intra-College Water Polo Matches

Sep 2017

1st runner-up E-Bike challenge with INR 50,000 prize

Feb 2016-April 2016

1st runner-up State Level Soccer Matches

Sep 2013