

AKSHAY KUMAR

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EDUCATION

Sant Longowal Institute of Engineering and Technology, Punjab, India BACHELOR OF ENGINEERING Computer Science & Engineering	<i>Batch: 2014-2017</i>
Sant Longowal Institute of Engineering and Technology, Punjab, India DIPLOMA PROGRAMME Computer Science & Engineering	<i>Batch: 2012-2014</i>
Sant Longowal Institute of Engineering and Technology, Punjab, India CERTIFICATE PROGRAMME Computer Applications	<i>Batch: 2010-2012</i>

WORK EXPERIENCE

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 2021- Present

Biofluid viscosity sensing using piezoelectric micromachined ultrasound transducers (PMUT), Patent pending

- Nano-fabricated PMUT in National Nanofabrication Centre, India.
- Designed a PCB to do parametric sweep, signal amplifier, passive signal filter and data acquisition on PMUT.
- Programmed an ARM-based microcontroller for data acquisition and sweep control, digital signal processing, curve fitting and calibration.

Mentored by Prof. Sri-Rajasekhar Kothapalli and Prof. Rudra Pratap
Grant Awards from the National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institutes of Health (NIH) In collaboration with Biophotonics And Ultrasound Imaging Laboratory, Penn State University

A portable photoacoustic imager for diagnosing vascular diseases

- Purposed novel idea of fabrication of hand-held high-density 2d array 240 channel PVDF based photoacoustic transducers for vascular disease imaging, *US Patent Pending*.
- Designed Interconnect PCB for pre-signal conditioning and impedance matching.
- Hand-held Housing design.
- Developed economical and labour inexpensive 2d array transducer fabrication procedure.
- Backing layer characterization enhancing receive sensitivity of element.

Mentored by Prof. Ajay Tijore and Prof. Rudra Pratap
At Mechanobiology Lab, Centre for Biosystems Science and Engineering, Biological Sciences Building, IISc

Ultrasound induced cancer cell apoptosis

- Developed acoustic pressure calibration and cancer cell treatment setup.
- Treatment of breast and oral cancer cells maximizing apoptosis rate in cancer cells controlling various parameters like duty cycle frequency, and acoustic pressure.
- Developed 3D acoustic field scanning robot.

- Fabrication of PDMS based microfluidic channel to study the cyclic pressure when cells are in varying confinement.
- Live cell apoptosis imaging setup.

Mentored by [Prof. Mayanglambam Suheshkumar Singh](#) and [Prof. Rudra Pratap](#)
At [Biomedical Instrumentation and Imaging Laboratory, School of Physics, IISER TVM](#)

Photoacoustic experiments with PMUT

- Enhanced quality of PMUT generated photo acoustic image with deep learning.
- Characterized electrical and mechanical properties of PMUT.
- Roy, K., Paramanik, A., Paul, S., **Kalyan, A.**, Sarkar, E., Ashok, A., ... & Singh, M. S. (2022). Photoacoustic Image Quality Improvement from a Single Cell Low Frequency PMUT. [arXiv preprint arXiv:2211.17145](#).

Mentored by [Prof. Jaya Prakash](#) and [Prof. Rudra Pratap](#)
At [Imaging Spectroscopy and Theranostics \(FIST\) lab, Department of Instrumentation and Applied Physics, IISc](#)

A PMUT based photoacoustic system as a microfluidic concentration detector

- Designed and developed low noise amplifier PCB.
- Roy, K., Shastri, V., **Kumar, A.**, Rout, J., Isha, I., Kalyan, K., ... & Pratap, R. (2022, March). A PMUT based photoacoustic system as a microfluidic concentration detector. In *Photons Plus Ultrasound: Imaging and Sensing 2022* (Vol. 11960, pp. 282-288). SPIE.

[Department of Mechanical and Industrial Engineering, Indian Institute Of Technology, Roorkee, Uttarakhand, India](#)

Mentored by [Prof. Bhupendra K. Gandhi](#)

Project Associate at [Fluid Mechanics And Fluid Machinery Laboratory](#) Feb 2020- Oct 2021

Development of small-scale Francis turbine testing rig to study and mitigation of rotating vortex rope in draught tube increasing the overall efficiency

- Designed and developed a SCADA System using N.I. Labview
- Instrumentation and programming: Mag Flow meter, pressure transmitter, Butterfly valve opening control, ultrasonic level sensor, torque and speed sensor, rotary encoder, AC motor control with frequency drive, submersible pressure gauge, vortex flow meter, LVDT, Oceanographic Thermometer, piezoresistive pressure transducer, Servo Motor.
- Developed Digitally controlled guide vanes system for Francis Turbine. *Indian Patent Pending.*
- Programmed PID control loops to have constant hydrostatic pressure or constant flow rate controlling the two pumps' speed parameters.

[Le Smartomation \(A Home and Industrial Automation Start up\) Punjab, India](#)

Co-Founder and CEO

June 2017-Present

IoT Automation Products

- Relay-controlled smart switches and sensors with scheduling and timing control using Wi-Fi 802.11.
- Programmed an ultrasonic sensor for water level sensing with auto cut-off.
- Energy and power monitoring system for single and three phase.
- Mapped and reproduced the colours of LED via pulse width modulation.
- Controlled electrical home appliances via Alexa Smart Home Voice Control using AWS Lambda.
- Power supply design for IoT-enabled systems.
- Fire and Gas sensor alarming system.
- Light dimming and fan speed control via pulse width modulation.
- Smart diagnostic and alerting system that detects device failures.
- A cloud-based Android app to install, control or analyse multiple devices via MQTT Protocol.

- Smart Home sensors analytic dashboard
- Grafana-based data visualization system and time series database for telemetry data storage.

Rail Coach Factory, Kapurthala, Punjab, India

Project Trainee

June 2015 - July 2015

Training Center Registration System

- Developed a networked registration system for the training center using python.
- Earned Certificate of Merit.

CERTIFICATIONS

The Graduate Aptitude Test in Engineering (GATE)

2017

GATE qualified

SKILLS & COMPETENCE

- **Clean Room Processes:-** Dry Etch | Wet Etch | Mask Writer | Mask aligner | Physical Vapour Deposition | Spin Coating | Laser micro-machining | Microfluidics
- **Characterization Tools:-** Impedance Analyzer, MSO, NI multifunctional IO, Network analyzer, spectrum analyzer, Laser Doppler Vibrometer, surface acoustic microscopy, SEM, UTM, surface profilometer, optical spectrometer, Pulser-Receivers.
- **Programming Languages:-** Python | Labview | Embedded C | C++ | Matlab | Javascript | Dart | Java | Php
- **Industrial skills:-** FDM and SLA 3D Printing | PCB Design | CAD modeling | Circuit Design and Analysis | µVision | Data Acquisition System | PLC Programming | SCADA | HMI | STM32CubeMX | Arduino | Multi function I/O | Power Supply Design | Signal Conditioning | Raspberry Pi Programming | SolidWorks | Altium | SPICE | Proteus | TINA-TI | Origin
- **Web Technologies:-** HTML | CSS | API Development | Chrome Dev Tools | Vue.js | JQuery | Express.js | JSON | XML | React.js | Wordpress | Web Hosting | Web Crawling | Web Scraping | AWS
- **SDK and Toolkits :-** Android Studio | Flutter | Git | Adobe XD | Grafana | Selenium | Firebase
- **Database Management System:-** MongoDB | MySQL | InfluxDB | Cloud Firestore
- **Miscellaneous skills:-** AI | Deep Learning | CNN | Embedded System Programming | FPGA programming | CUDA Programming | Multiprocessing and Multithreading | Wireless Communication Devices | Hardware Troubleshooting & Diagnostics | Linux System Administration | Pattern Recognition | Mobile App. Development | Data Mining | API Development | UI Design & Animation

PROJECTS

Climate Control System

Le Smartomation

Regulated temperature and humidity using temperature and humidity sensor.

MegaSensors

Sant Longowal Institute of Engineering and Technology, Punjab, India

A device based on Raspberry Pi equipped with multiple sensing modules using SSH protocol. A Portal is designed to access features of the project which is secured by privilege level to access control over Raspberry Pi with various sensors.

Sudoku solver

Coded a Sudoku solver in python.

HONORS & AWARDS

Reviewer of Sensing for Smart and Connected Healthcare IEEE APSCON 2023	<i>Sep 2022-Present</i>
MEMS STARS Project Assistantship at Indian Institute of Science, Bangalore, India	<i>Oct 2021-Present</i>
Sponsored Research Assistantship at Indian Institute Of Technology, Roorkee, India	<i>Jan 2021</i>
Codewars Competitive Coding	<i>Leaderboard Position: less than Top 0.5% Globally</i>
National level chess player	<i>Oct 2007</i>
Chess.com	<i>Rating-1700</i>
2nd place at Inter Hostle Football Tournament	<i>2017</i>