# ARAVIND MURALEEDHARAN

~ Curriculum Vitae ~

amuralee@purdue.edu
/in/aravindvenma
agm19.com

## EDUCATION

August 2024 - **_Doctor of Philosophy_**
**in Electrical & Computer Engineering** — **Purdue University, USA**
Areas of interest: Communication Networks
Key Courses: Radar, Digital Communication
GPA 4.0/4.0

August 2024 **_Master of Science (by Research)_**
**in Electrical Engineering** — **Indian Institute of Technology, Kanpur**
Specialization: Signal Processing and Communication Networks
Department of Electrical Engineering, IIT Kanpur
Key Courses: Wireless Communication, Random Variables and Random Processes, Convex Optimization, Linear Algebra, DSP, Machine Learning, 5G, MIMO
CGPA: 8.01/10.0

August 2019 **_Bachelor of Technology (Hons)_**
**in Electronics and Communication Engineering** — **TKM College of Engineering, Kollam**
APJ Abdul Kalam Technological University, Kerala, India
Key Courses: Signal Processing, Digital and Analog Circuits, Cyber Security, Computer Networks
CGPA: 8.73/10.0

May 2015 **School Education** — **Kendriya Vidyalaya Pattom**
Central Board of Secondary Education (CBSE)
Higher Secondary (XII): 93.8% ,
Secondary (X): 95% (CGPA 10.0/10.0)
Subjects: Physics, Mathematics, Chemistry, English, Computer Science

## TECH SKILLS

| | |
|---|---|
| Languages | C/C++, Python, MATLAB, HTML, JS, SQL, Java |
| Protocols | UART, I2C, SPI, Zigbee, BACnet, BLE |
| Hardware | LoRaWAN, JTAG, SWD, Boards-STM32, NXP, AVR, NRF |

## PROJECTS & RESEARCH EXPERIENCE

2023 **Shaping of Transmission Signals in Molecular Communications** — **Thesis Supervisor: Dr. Abhishek K Gupta**

- Master of Science by Research Thesis
- Molecular communication aims to make communication possible in areas where wireless communication fails, a significant use case being the facilitation of communication between bio-nano robots inside the human body. I worked on creating a coding scheme for ISI matching across symbols for molecular communication systems.
- *Conference paper submitted and accepted to NCC 2025, India.*

2021 **Course projects** — **Dr. Aditya K. Jagannatham, Dr. Rohit Budhiraja**

- Wireless Communication (EE670A), MIMO Wireless Communication (EE677A), IIT Kanpur
- Analysed Bit Error Rate and Signal to (Interference+Noise) Ratio for multiple antenna fading systems.
- Uplink Spectral Efficiency for line of sight and non-line of sight Massive MIMO channels for multi-cell systems. Languages: Python, MATLAB. Codes at: Github Repo

2020 **LoRa sensor monitor** — **Tismo Tech.**
Individually developed a proof of concept application for evaluating LoRa technology in all the 3 classes, where LoRa communication with real-time data collected from sensors is demonstrated, with a feature for firmware update over the air. Tech used: The Things Stack and a Microchip LoRa kit

2019 **Smart street light control using 3G and Zigbee** — **Tismo Tech.**
Worked on the firmware development (in Java ME) of a street light controller which has features designed to maintain energy efficiency.

2019 **Internet sharing for Smart street light control using Zigbee** — **Tismo Tech.**
As part of a team, got a chance to work on a proprietary mesh technology that enables many street light controllers to exchange information via Zigbee with one main controller (switchable) which has 3G internet connectivity so that the internet connectivity is now virtually shared among all the controller devices.

2019 **An inexpensive Unmanned Aquatic Vehicle for Underwater Human Detection** **Asst. Prof. MN Shafi**

- 8th semester B.Tech final year project
- Developed a low-cost working model of an underwater vehicle that is capable of performing object detection underwater while working autonomously.
- *Published a paper with the same title in American Institute of Physics Conference Proceedings, Volume 2222, Issue 1, article id 040015(2020).*

2016 **Bluetooth Enabled Assist Device (BEAD)** **Sophomore year project**

- 4th semester summer project
- Devised a prototype model for assisting indoor navigation for visually challenged people.
- Innovatively used multiple Android phones' Bluetooth feature, instead of relying on the then-costly BLE beacons for indoor mapping and developed an application to trigger the handheld device for direction advice.
- Paper was *accepted* in IEEE TENSYMP 2018, Sydney, Australia but could not participate.

2015 **Autonomous Maze Solver** **Freshman Project**

The project was made for a tech event where we, as a group of 2, implemented a modified version of the Pledge Algorithm to make a robot that travels through a maze, finding its way to exit. The testing maze we made consisted of styrofoam walls and the robot relied on ultrasonic sensors to detect walls. The project participated in tech fests of NIT Calicut and my college.

2013 **Supermarket Billing Software** **11th grade high school project**

As a hobby project while learning C, I developed billing software that performed basic operations such as storing items, management, and preparing invoices. The work was then submitted for the high school final year project. Codes are available at: Github Repo

## SEMINARS AND PUBLICATIONS

2024 Dec Aravind Muraleedharan and Abhishek K. Gupta, *"Optimal Transmission Sequence Design with ISI Matching in Molecular Communication"*, accepted to NCC 2025, India **Conference**

2024 Jan Invited Reviewer for *Springer Nature's Sādhanā* Journal, by the Indian Academy of Sciences **Journal**

2024 (exp) M. Aravind, AK Gupta, Optimal Transmission Sequence Design in Molecular Communication for ISI Matching [work in progress] **Journal**

2020 An inexpensive unmanned aquatic vehicle for underwater human detection **Conference Paper**

M. Aravind, Shafi, M. N, P. Ashik, K. Sudheesh, and A. Romal. *"An inexpensive unmanned aquatic vehicle for underwater human detection."* In AIP Conference Proceedings, vol. 2222, no. 1. AIP Publishing, 2020

2019 Unmanned Aquatic Vehicles for underwater human detection and possible challenges **Poster Presentation**

International Conference On Microelectronics, Signals And Systems 2019, Kollam, India 27–28 September

2019 Microchip Masters Conference, Bengaluru **Corporate representative**

Attended Microchip Masters Conference, Bengaluru 2019, representing Tismo Technology Pvt Ltd.

2018 Bluetooth Enabled Assist Device (BEAD) **Conference paper**

M. Aravind, B. Supreeth, "Bluetooth Enabled Assist Device (BEAD)", IEEE TENSYMP 2018, Sydney, Australia, (Paper accepted for oral presentation)

2017 Noma in 5G **Undergraduate pre-final year seminar**

## WORK EXPERIENCE

Jan/2025 Apr/2024 **Teaching Assistant** **Purdue University**

TA for the lab course ECE362, Microprocessor Systems and Interfacing.

Aug/2024 Dec/2024 **Teaching Assistant** **Purdue University**

TA for the course ECE301, Signals & Systems. Work included the creation, correction, grading, and maintaining marks of quizzes, exams & assignments, and holding office hours.

Mar/2023 Aug/2022 **Teaching Assistant** **IIT Kanpur**

TA for the course ESC 201, Introduction to Electronics. Work included the correction, grading and maintaining marks of quizzes.

July/2021 Oct/2020 **Teacher** **(Self employed)**

Taught and helped students of high school (Math and Physics) and Engineering (Electronics, Communication) during the COVID-19 Pandemic.

Sep/2020 June/2019 **Software Engineer T1 (Firmware)** **Tismo Technology, Bengaluru, Karnataka**

- Corporate work experience in developing wireless communication projects for Internet of Things.
- Software development experience in C and java ME.
- Board bring-up experience with UART, SPI and I2C, with added expertise in Zigbee, BLE and LoRa.
- Attended Microchip Masters Conference, Bengaluru 2019, representing the firm.

July 2018 **Research Intern** **DSP Lab, National Institute of Technology, Calicut, Kerala**
Worked on implementing improved PCA methods for detecting principal moving objects from video sequences. PI: Dr. Sudhish N George, NIT Calicut

July 2017 **Intern** **Airports Authority of India**
Received training on Area, Approach, and Air Traffic Control during landing and take off of aeroplanes. Conducted a comprehensive examination of various machines employed in air communication and compiled an extensive report summarizing my findings.

July 2016 **Trainee** **Keltron Kerala**
As a freshman, I chose to participate in this industrial training to acquire exposure to various manufacturing techniques employed in the production of electronic components. Keltron is the Kerala State Electronics Development Corporation Limited.

## LEADERSHIP & COMMUNITY SERVICE

2023 **Mathematics Teacher, Prayas (NGO)** **IIT Kanpur**
I teach Mathematics to 11th-grade students

2022 **Student nominee to Institute Senate, IITK** **IIT Kanpur**
I was one of the six special invitees to the Academic Senate at IIT Kanpur, which serves as the highest governing body responsible for overseeing institutional policies and decision-making. In this role, I played a key part in formulating proposals on behalf of the student community and served as their representative within the Senate.

2022 **Student nominee to Scholarships and Prizes Committee, IITK** **IIT Kanpur**
I was entrusted as a student panel member in the Senate Scholarships and Prizes Committee where I managed and helped in the overall conduct of interviews for selection of students for various awards instituted by the college.

2022 **Vice President, Public Relations, Toastmasters Club IITK** **IIT Kanpur**
I served as the inaugural Vice President of the Toastmasters Club at IIT Kanpur, where my responsibilities encompassed enhancing the club's visibility and bolstering its reputation among the college community. Additionally, I garnered recognition as the standout speaker and role-taker in numerous meetings.

2022 **Secretary, Photography Club IITK** **IIT Kanpur**
I served as the sole secretary for the entire postgraduate student body, which consisted of approximately 3,000+ individuals. My responsibilities included organizing events and workshops for the campus community.

2022 **PG Core Team Member, Institute Counselling Service** **IIT Kanpur**
Part of a team of Counselors and Mental health professionals to help students overcome stress and other difficulties during their time in the institute. Organized workshops and lectures on Mental health.
Organized Orientation (Welcoming/Freshers) for 1500+ PG students.
Web development head.

2019 **Co-founder, Space it lab** **TKM CE (during B.Tech)**
I was the co-founder of Space it Lab, a college initiative to open a technical laboratory for supporting and development of student-initiated projects, aimed at preparing and elevating students to the industrial requirements. {Newspaper report}

2018 **Student member, National Service Scheme** **TKM CE (during B.Tech)**
Made power banks, and emergency lights and volunteered in making kits for providing to families affected during the 2018 Kerala floods.

2018 **Co-founder, Automation & Robotics Club** **TKM CE (during B.Tech)**

2017 **Student member and volunteer, IEEE, ISTE, IETE** **TKM CE (during B.Tech)**

2015 **School Captain, School Vice Captain, School Council Member for multiple tenures** **Kendriya Vidyalaya Pattom**

• In school, I served in leadership positions in different roles like sports captain, prefect, and house captain for a record 7 times from primary school through higher secondary. In IIT K also, I could contribute to various short-term committees related to college matters, apart from the commitments I already mentioned.

## EXTRA-CURRICULAR ACTIVITIES

- Athletics: Frequent participant in 5K running and 50K cycling events.
- Quiz enthusiastic: 1st in Inter-KV All Kerala Quiz Competition (2014) and various other quiz competitions.
- Professionally trained (since 2007) Mridangam player (Carnatic Music) and have played in school, college and office events. Also played Ukulele, Guitar, Keyboard, Tabla, and Cajón for different events.

- Loves Bike Ride, Photography, Acting & Theatre, Art & Music, and Amateur Astronomy.

## KEY AWARDS & RECOGNITIONS

- Holder of General Grade Amateur **Radio License** (Call sign: **VU2LWH**),
  issued by Wireless Planning and Coordination Wing, Ministry of Communications, Govt. of India.
- Secured O[S] grade (Scored above 90%) in **all** mathematical subjects in the undergraduate curriculum.
- Secured **(Hons.)** from university for completing additional Master's level coursework credits within B.Tech course span.
- **Google** Science Fair Regional **Finalist**, Asia Pacific: 2 times consecutive during **2012** and **2013**, for presenting one among the **top 30** projects **worldwide** in the age category 14-16.
- Certificate of Merit, cash award from KV Sangathan for **excellence** in AISSE (Xth standard board examination) (2013).
- Proficiency Test Scores: *IELTS*: Band 7.5 (Reading 8.5), GRE: 310 (Quants: 162),
  *Purdue OEPT*: Secured 55/55.
  *GATE* All India Ranks: 579 (Instrumentation Engineering), 1935 (Electronics and Communication Engineering.).
- Secured complete funding for my Master's studies at IIT Kanpur from MHRD, Government of India.