Nilay **SHETH**

Embedded | Control Systems

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Delft, Netherlands
Engineer at MAVLab, TU Delft
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Professional Experience

MAVLab | AIRR - Drone Racing, USA

TU Delft drone race team | Control, Trajectory planning (full-time) Jan 2019 - Current

- Finished as world champions amongst 432 research teams, with a prize of $1M (highlights).
- AlphaPilot AI Robotic Racing (AIRR) is about autonomous racing against human pilots and was mentored by experts from Lockheed Martin, Drone Racing League and MIT's Aerospace lab.
- Master thesis on state estimation and optimal control for racing drones.
- Firmware of Sense-and-Avoid air traffic control for drones under the European Single-Skies initiative.

Espressif Systems, Shanghai

Applications Engineering | Audio Processing | esp-idf (full-time) Jul 2016 - Aug 2017

- Added Linear Algebra (LAPACK) and FFT support, MIPS and FLOPS profiling for matrix inversion.
- Developed parts of the famous esp-idf alongwith Amazon Web Services for embedded platforms.
- Audio Processing for Speech Analysis using Fixed point arithmetic on ESP-32's Tensilica Processor.
- Designed motor control drivers: BLDC/brushed/servo and I2C/SPI drivers for LCDs.

FIRST Robotics, Sydney

Coach FRC-6024 | Control Systems (contract) Jan 2015 - Mar 2016

- Layed out the control system & drive-train (credits to WPI-lib) over the CAN bus of NI-Rio.
- Mentored India's debut FRC team to finish in the top 10 of Australian regionals.

ABU Robocon, Asia Pacific region

Team captain ABU-Robocon | Electrical Drivetrain (part-time) Nov 2013 - Mar 2016

- Competition for prototyping mechatronic systems addressing novel problem statements in robotics.
- Quarter-Finalist at Robocon 2016, Semi-Finalist at Robocon 2014: promoting VJTI to internationals.
- Represented India at the International ABU-RoboCon, winning the Panasonic Award for Innovation.

Academics and Co-curriculars

TU Delft, Netherlands

Masters in Embedded Systems Aug 2017 - Sept 2019

- Satellite Orbit Determination: GPS, non linear least squares, orbit dynamics, tracking and prediction.
- Implemented detumbling on the Attitude Control subsystem of Delft's PocketCube satellite.
- Magnetometer & IMU calibration, closed loop attitude control laws over Hardware in Loop (HIL) tests.
- Networked & Distributed Control: convex optimization, sampling + synchronization algorithms.
- Vehicle Dynamics: ABS, path planning algorithms, localization with Particle Filters.

Veermata Jijabai Technological Institute (VJTI)

Bachelor of Technology in Electronics Engineering Aug 2012 - May 2016

- Graded 'A+' on "Swarm Robots in Closed Loop Visual Odometry system, using Li-Fi".
- Semi-finalist at Texas Instruments Challenge for building a hybrid wrist-watch multimeter.
- Designed a line following and grid solving robot that won at TechFest 2014, IIT-Bombay.
- Conducted workshops on embedded robotics to 300+ students in Mumbai (ARM, AVR, Tensilica).
- Built an Hybrid HID device on ARM Cortex M4 to aid the differently-abled to use computers.
- MIT Media Labs DI: Open Sourced and prototyped a wrist band for taking 360°panoramas.
- numerical techniques, applied math, digital signal processing, op-amps and filters, VLSI design.

Publications

Dec 2019	Our work on drone racing is featured at Wired Business Insider Bloomberg TU Delft BBC.
Sept 2017	Published in Advances in Intelligent Systems and Computing (Springer, Germany) on LiFi Swarm Robots.
Dec 2015	Published MOSFET based motor drivers with closed loop control at the 12th International IEEE Conference, Indicon.
Jun 2015	Hindustan Times, India: Tech students engineer fixes for health-care issues: reference: SRA, VJTI.
Aug 2014	NHK Japan, Hindustan Times, Times of India: City College VJTI representing India internationally, ref-RoboCon 2014.

Skills

Programming	Embedded C, C++, Amazon FreeRTOS, Keil, MATLAB, Python, Labview, OpenCV, ROS, threading.
Controls	LAPACK for uCs, HiL tests, Adaptive control laws, Kalman and RANSAC filtering, system identification.
Embedded	STM32, MSP432, ESP32, closed loop motor-control, NI-Rio, Multisim, KiCad, oscilloscope, soldering.
Softwares	Git-scm, Eclipse, Photoshop, CorelDraw, Latex.
Languages	English (fluent), Hindi (fluent), Mandarin (limited proficiency).

References

Dr. Guido de Croon
Associate Professor,
Aerospace Engineering
TU Delft

Dr. Faruk Kazi
Professor and HoD,
Electrical Dept, VJTI
Mumbai

Jeroen Domburg
Software Lead,
Espressif Systems
Shanghai