Nilay SHETH

Embedded | Control Systems

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Embedded & Control at fuel cell tech
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Professional Experience

zepp solutions — Feb2021-current

Embedded Software engineer | Control and Software team

- Embedded software for Engine Control Units (ECU) of zepp solutions, a hydrogen fuel-cell company.
- Architecture for safety critical ISO26262 compliant software, adding the J1939 communication stack.
- Filtering/fusing 30 onboard sensors, adding Kalman observers, control for 15 pumps/motors/valves.
- Pipeline for unit tests (pytest), static (MISRA), docs checks (doxygen) over our local CI/CD (jenkins).
- 4G telemetry pipeline for on field vehicles, data analysis tools, build tools for embedded firmware.
- Expanding zepp's fuel cell test bench system, system integration testing, factory acceptance testing.
- Onboarding zepp's firmware team to the V-model, build processes and software architectures.

C | python | linting | 4G telemetry | Jenkins | J1939/CAN | Infineon Aurix | V-model | automotive grade C

MAVLab Delft, AlphaPilot, Lockheed Martin — Jan2019-Jan2021

Control and Embedded engineer | drone lab, TU Delft Aerospace

- Finished as world champions at AIRR 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.
- Designed the race drone's state estimation, control and trajectory planning pipeline.
- Firmware for PercEvite, Sense-and-Avoid air traffic control (European Single-Skies initiative).

Matlab | Python | object oriented C++ | ESP32 | UAV | HiL | ROS | threading | computer-vision | linux-preemptive RT

Espressif Systems, Shanghai — Jul2016-Aug2017

Firmware Developer | Applications Engineering

- Developed parts of the esp-idf alongwith Amazon Web Services for embedded platforms.
- Speech analysis using FFT and LAPACK in C on ESP32's tensilica Processor.
- Motor control drivers: BLDC/brushed/servo and I2C/SPI/UART drivers for LCDs for HMI applications.

Embedded C | FreeRTOS | ESP32 | ESP8266 | esp-idf | Matlab | git | AWS

SRA, VJTI Society of Robotics and Automation, Mumbai — Nov2013-Mar2016

Control and Embedded lead | Secretary | Robotics chapter, VJTI

- Finalist at Robocon 2014 & 2016: taking our local chapter international and winning the Panasonic Award for Innovation. Robocon proposes novel semi-autonomous challenges for robotics in Asia.
- Mentored India's debut FIRST Robotics FRC6026 to finish in the top 10 of Australian regionals.
- Undertook workshops on embedded robotics for 300+ students around Mumbai (ARM, AVR, ESP32).
- Designed the fastest grid solving robot at TechFest 2014, IIT-Bombay.

C/C++ | STM32 | AtMega1280 | motor driver | harness management | NI Rio

Academics and Co-curriculars

TU Delft, Netherlands — Aug 2017-Sep2019

Masters in Control and Embedded Systems

- 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.
- Networked & Distributed Control: convex optimization, sampling + synchronization algorithms.
- Vehicle Dynamics: ABS, path planning algorithms, localization with Particle Filters.

Veermata Jijabai Technological Institute (VJTI) — Aug2012-May2016

Bachelor of Technology in Electronics Engineering

- Graded 'A+' on Bachelor thesis on Swarm Robots in Closed Loop Visual Odometry system, using Li-Fi.
- Courses on numerical techniques, applied math, digital signal processing, op-amps and filters, wireless communication, electromagnetic wave theory, VLSI design, control systems.
- MIT Media Labs: wrist watch camera, Texas Instruments Challenge: wrist watch multimeter

Publications

Dec 2019	Research in drone racing featured at Business Insider Nature Wired Bloomberg BBC.
Sept 2019	Thesis on state estimation and optimal control for racing drones.
Sept 2017	Advances in Intelligent Systems and Computing (Springer, Germany) on LiFi Swarm Robots.
Dec 2015	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	C/C++, SafeRTOS, FreeRTOS, PxROS, MATLAB, Python, OpenCV, ROS, multi-threading.
Controls	LAPACK for uCs, HiL tests, Adaptive control laws, Kalman and RANSAC filtering, system identification.
Embedded	Infineon Aurix, STM32, ESP32, NI-Rio, MQTT, PCB design, oscilloscope, closed loop motor-control.
Languages	English (fluent), Hindi (fluent), Gujarati (fluent), Dutch (A2).