Nilay SHETH

Embedded | Control Systems

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Professional Experience

zepp solutions — Feb2021-current

EMBEDDED SYSTEMS ENGINEER

- Firmware for the Engine Control Units (ECU) of zepp solutions, a hydrogen fuel-cell company.
- Filtering sensor data, control of actuators and detecting failure modes in the fuel cell system.

CANbus | J1939 | IEC61508 | unit testing and modeling | MISRA

MAVLab Delft / AlphaPilot Lockheed Martin — Jan2019-Jan2021

CONTROL AND EMBEDDED TEAM, AEROSPACE FACULTY, TU DELFT

- 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 | C/C++ | ESP32 | PPRZ UAV | HiL | ROS | multithreading | computer vision | linux-preemptRT

Espressif Systems, Shanghai — Jul2016-Aug2017

FIRMWARE DEVELOPER | APPLICATIONS ENGINEERING

- 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 for HMI applications.

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

FIRST Robotics, Sydney — Jan2015-Mar2016

TEAM MENTOR FRC-6024 | CONTROL SYSTEMS

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

NI-RoboRio | labview | C++/java

ABU Robocon, Asia Pacific region — Nov2013-Mar2016

TEAM CAPTAIN ABU-ROBOCON | SECRETARY, ROBOTICS AND AUTOMATION CHAPTER VJTI

- 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.

Embedded C | AtMega1280 | motor driver designs | harness management | motor control

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.
- 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) — 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.
- Product ideas: Hybrid HID ARM Cortex and wrist-watch multimeter at Texas Instruments Challenge.
- Designed a line following and grid solving robot winning at TechFest 2014, IIT-Bombay.
- Undertook workshops on embedded robotics for 300+ students around Mumbai (ARM, AVR, ESP32).
- 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 Business Insider Wired Bloomberg TU Delft BBC.
Sept 2019	Study during M.Sc., Thesis on state estimation and optimal control for racing drones.
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++, FreeRTOS, Keil, MATLAB, Python,Labview, OpenCV, ROS, multi-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).