ASHISH **UPADHYAY**

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Professional Summary

Electrical and Electronic Engineer with 5+ years of Experience in **designing Electronics sub-systems & Firmware Development**, Hardware Validation, spanning across multiple Industries (**Research, Healthcare and Consumer Electronics**). Expertise in providing one stop solutions from Architecture Development, PCB designing, Automating Hardware, with firsthand experience with **FCC, UL and ATEX** requirements

- Embedded Software Design & Hardware Development
- Simulations (Multi-Physics, SPICE)
- Wireless Protocol (BLE, TCP & UDP based)
- PCB designing (Schematic Capture & Component sourcing)
- Signal Processing (Filter, Buffer, Converter, Amplifier)
- Scripting for Gang Programming and Automated Testing

Professional Experience

L&T Technology, **California, US**
Sr. Electrical Engineer, supporting Reality Labs @ Meta AUG 2022 – Present

- Establish **hardware validation** procedure for **internal SOC** & its sub-cores, MCU, DDR & Flash Memory, Peripheral subsystem, for consumer **AR/VR products**
- **Automate** the testing procedure for Manufacturer, write the firmware for SOC and MCU
- **Automated benchtop equipment** (**Oscilloscope, Logic Analyzer, Multimeter**) for Power Validation, and generate automated report for over **300,000 devices**
- Provide **Ok2Fab** for everything SOC, MCU and Memory for entire product line

Perigon Health 360, (formally TESPO), **Michigan, US**
Embedded Engineer NOV 2020 – AUG 2022

Develop Embedded Ecosystem for IoT connected **Prescription Dispenser**, that facilitates, **Tracks, Logs and Notifies** user about the **Regiment,** Increasing General Adherence and Compliance of these medication.

- Developed the Hardware, Design the **PCB & Firmware** base for a Wireless (**WIFI, BLE & LTE**) Dispenser
- Establish the **AWS base cloud architecture** for said dispenser (IoT Core, Dynamo DB, API, Cognito, S3, Lambda, Alexa Skill)
- Establish production process for these **10,000+ dispensers**, with gang Programming 3 ICs, Automating Testing and Calibration of each PCB

New York University, New York, US
Research Assistant, Power Lab, and Medical Robotics Lab SEPT 2018 – AUG 2020

Both the labs required Hardware development, **Firmware Design & APIs Development** for peer-to-peer wireless communication,

- Devising a scheme for Quasi Dynamic **Wireless Charging** of Vehicles, using a **Class E power Amplifier** & achieved approx. 80%. efficiency
- Researching the Physics & Economics of **Inductive and Resonant charging** for commercial vehicle

- Design a Wearable for Covid detection (**NSF Funded**), for Disease marker Analysis
- Designing PCB (Rigid & Flex), Troubleshooting & Debugging products using Development tools like Oscilloscope, **N/W Analyzers, Function Generators, JTAGs & Logic Analyzer** for Performance Analysis
- **Hardware & Firmware Integration** for Filtering and Digital Signal Processing Algorithm on low amplitude signals (Such as EMG)

Technical Skills

ELECTRICAL:
P/LT-Spice • Multi-Layer Printed Circuit (PCB) Board Designing, ALTIUM • Ansys Maxwell & HFSS

ELECTRONICS:
Circuit Design • Schematic Capture • Signal Processing & Filtering • Wired & Wireless Communication Protocols

PROGRAMMING:
C • C++ • Python • Real-Time Operating Systems (RTOS) • AWS suite

WORKING KNOWLEDGE:
Ladder Logic for PLC • MATLAB & Simulink • Windows Embedded & C# • HTML, CSS, and Java Script • Machine Learning • Verilog & VHDL • GAMS

Projects

Medication Dispenser

- Design the Electronics ‘and PCB for a prescription-based online Dispenser
- Establish the IoT backend, ensuring the data encryption, Production flow & OTA updates
- Write cloud-based logics (AWS Lambda) for Physical & Backend automation
- Write Free RTOS base, Firmware to establish BLE, Wi-Fi, LTE Connection alongside Sensor, and Motor Control
- Write Alexa Skill for Automated Dispensing and prescription status
- Design UI for Customer Service team for getting the dispenser status and debug it
- Solve EMI (conductive & emitted radiation) problem in the Alpha Build, to meet UL & Class B requirements

The Feinstein Institute for Medical Research, Northwell Health, **New York, US**

Research Assistant, Bioelectronics & Sensing JUN 2019 – MAY 2020

For Two semesters JUN 2019 – AUG 2019 & JAN 2020 – MAY 2020 Performed benchtop and **in vitro/in vivo** experimental studies on **neurological implants** Creating a prototype device that provides single-channel, constant-current monophasic stimulation to vagus nerves. While charging the implant inside the Host's body (Mice)

- Designed and Evaluated Implantable micro-electronic devices developed for **neuro-stimulation and recording**.
- Developed Script to extract data from live animals, working within acceptable Thermal and SAR threshold

Compac Industries India Limited, **New Delhi, India**

Engineer Automation, Research and Development JAN 2018 – AUG 2018

Developed custom solution as per every customer specs, study the Contract for Functional Specifications and produce the most viable solution for the reported demand or problem

- Engineered three **intrinsically safe** Products for Data Acquisition & Processing and dynamic Control from Concept Development to End Product
- Developed a central Server for storage of Live Data & Dynamic Control of all the installed equipment, Using TCP/IP, MQTT and WebSocket's protocols

Curie Labs (Start Up), **Gurgaon, India**

Engineer R&D and Operations, Start Up AUG 2017 – JAN 2018

Managed the operation of a Commercial space and Read the **Electrical and Thermal Dynamics** of the space live, and design the kill switch to control the HVAC system to conserve the energy based on Weather forecast based live scheduling

- Programming the Embedded Systems to talk to **PLC** for DATA Collection, Analysis & Control, For **Power Saving of HVAC system**
- Running the Optimization problem on large amount of collected data (24*7/Minute * Month) to perform scheduling.
- Using Machine Learning and **Forced Scheduling**, reduced 20% Electrical Consumption (Sept 2016 vs Sept 2017)

Education

New York University, Tandon School of Engineering, New York MAY 2020

Master of Science, Electrical Engineering

ABES Engineering College, APJAKTU, NCR, India JUNE 2016

Bachelor of Technology, Electrical and Electronics Engineering

SCADA for CNG dispensing Station over WAN (per ATEX guideline)

- Module to Update & Monitor Data on **MODBUS over RS-485, I2C, SPI, UART for 100+** CNG dispenser already deployed
- Full Duplex Transmission over **Web Wi-Fi (802.11bgn) and LAN**
- Scripting Wireless Networking & Display Driver Schemes to update Live changes and increase web Stability with LTE
- Code Software Applications to enable remote printing, Email or Whats app/Message using **SMTP and developer API**, with Vehicle Plate Snap using Onboard Camera

Wireless High-Power Transfer System (for Moving Vehicle)

- Designing of **Class E Amplifiers, Class D Amplifiers** & **H-Bridge** configuration, with operating frequency of 13Mhz (**International Automatic Control Conference, CACS Doi: 10.1109/ CACS47674.2019.9024729**)
- Control Circuits Design for Power Management & Conversion, Dynamic Charging, and Isolation
- Pre analysis using **COMSOL and Ansys Maxwell** + HFSS +SI Wave for Coil Design

Neuromodulator

- Use MIT 4 Coil system to power up an implant of **size 15X18X1.4mm**
- Design a Class E Amplifier for Debug the Hardware to ensure the Modulator (**Analog Current Pump** controlled by Interrupts), Sensors (**SPI I2C & Analog Scaling**) and Communication (**RF/NFC**)
- Ensuring the communication and Wireless power are within the threshold with **Multi-physics Simulation**
- Test design of each PCB for the Stress conditions of Rx Power, Communication Output & EMC Immunity

Wireless Rehab Module

- Develop Hardware & Software to read **IMU, Stereo Mic, temperature Heart rate and blood O2**, in a form factor **smaller than Quarter dollar**
- Send out the data remotely over **Wi-Fi & classic Bluetooth**
- Design the firmware so that the compute module displayed and **Hosted data with live plot on a webserver**

Real Time Video Processing

- To **recognize gestures** in the form of hand symbols Rock, Paper, and Scissor, via Webcam and wrote a game play script as per the rules of ROCK PAPER SCISSOR
- Sent the data over web to an embedded controller controlling six stepper motors of **a Bionic Arm** enabling remote gesture mimicking

Real time Audio Processing

- Recreation of plucked string, Drum and other membrane-based sound using Interrupt based **Karplus Strong Algo**
- Record Audio Over **I2S** using MEMS microphone in Stereo configuration (PCM) and Send Amplified raw data via Bluetooth (**44100Hz,32bit sample**) on ESP32 controller
- Python Script to log the data, Plot the samples live & concatenate Wave header for user playback