TARUN SUBRAMANIAN

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EXPERIENCE

Mechatronics Engineer, PedalCell, mHub Chicago, USA *June 2018 – Present*

An early-stage start-up that develops energy solution to enable smart technology on the bike

- Developed an automated bicycle rider and outdoor condition testing rig designed to withstand 10,000-mile sprints controlled by a custom MATLAB interface to capture 1 year's worth of product performance datasets in 30 days.
- Co-developed the power filtering electronics & energy storage circuitry using EAGLE and Atmel Studio to process the fluctuating electricity obtained from a bicycle into a steady and continuous stream of power via a mixed A/D circuit design.
- Improved overall efficiency of the product by 10% by analyzing complex data obtained from quantitative testing datasets and user interviews, subsequently engineering product design revisions.
- Prototyped product design revisions using custom 3D printing techniques, improving overall quality and strength of the print.
- Designed IPx5 weatherproofing and bicycle mounting modules for product enclosures using SolidWorks.
- Managed a small-scale 30-unit production run including sourcing of mechanical and electrical components.
- Co-Created product pitches and connected with seed investors to spur the firm's bicycle brand customer pipeline worth $500K.

Graduate Student Researcher, NxR Haptics Lab, Northwestern University, USA *Oct 2017 – Dec 2018*

- Captured the impulse response of over 15 natural materials that vary in frequency response by using a piezoelectric plate.
- Analyzed impulse responses and combined it with a square wave friction profile using MATLAB.
- Conducted psychophysical experiments on 10 subjects to identify the key parameters of the convoluted signals to map natural texture on an electrostatic friction modulation device.
- Developed a custom MATLAB interface used to display over 100 friction profiles on an electrostatic friction modulation device.

Summer Research Intern, Indian Institute of Technology, Kanpur, India *June 2016 – Aug 2016*

Design of De-Spinning Mechanisms for Dual Spin Ballistic Projectiles

- Calculated a 6 Degrees of Freedom dynamic model to predict altitude and range trajectory of projectile on MATLAB.
- Designed a canard on SolidWorks based on roll-moment requirement for various velocities of the projectile.
- Determined a Roll isolation bearing based on axial and thrust loads of the projectile.

PROJECTS

Autonomous Mobile Robot, Northwestern University, USA *Mar 2018 – May 2018*

- Fabricated a three-wheeled robot controlled by a PIC32 microcontroller. PCB's were designed using EAGLE.
- Developed and Programmed an android application used to detect the line on the map that exchanges information via USB CDC with the PIC32 microcontroller.

Webcam Design, Northwestern University, USA *January 2018 –March 2018*

- Created a wireless webcam which included sourcing components, designing the PCB using EAGLE (Footprint design, schematic capture, signal routing), assembling and soldering the components onto the board.
- This Webcam features an Atmel SAMS48B microcontroller, AMW136 Zentri Wi-Fi Chip and Omni vision OV2640 camera, communicated through UART and SPI protocol.

Motor Control, Northwestern University, USA *Jan 2018 –Mar 2018*

- Developed a position controller algorithm implementing PID for a motor following a user generated trajectory.
- Created a user interface using MATLAB providing user with 15 options: from reading the encoder values, setting current and position gains to plotting trajectories. The hardware consists of a PIC32 microcontroller, MAX9918 current sensor and DRV8835 H-Bridge.

Robot Simulator Algorithm, Northwestern University, USA *November 2017 – December 2017*

- Created a robot simulator algorithm using Mathematica for a KUKA youBot to test the kinematic task space feedforward plus feedback control law, tracking the end-effector trajectory defined by a path and time scale.
- Simulated the algorithm using V-REP robot simulator and optimized the PID control loop ensuring settling time of 2% less than 2 seconds.

Design and Fabrication of Go-Kart, Go-Kart Design Challenge 2016 (GKDC), India *April 2015 - Feb 2016*

- Modeled the chassis of the Go Kart using SolidWorks.
- Developed an auto engine cutoff system modeled for brake failure.

PUBLICATIONS

'Power Generation System for High Power Generation, Regulation, and Flexible Backup Power Supply' *September 29th, 2017*

- Provisional Patent: 62565908

*'**Wood Plastic Composite**', National Conference for Mechanical Engineering Research Scholars* *March 31st, 2017*

- Developed WPC from waste pine wood flour compounded with Polypropylene and talc powder
- Characterized the mechanical properties of the material, aimed at developing a material feasible for 3D printing.
- Recipient of the SSN student research grant (March 2015), at SSNCE, Chennai

EDUCATION

Northwestern University – The Graduate School *Sept 2017 – Dec 2018*
Master of Science in Mechanical Engineering - Specialization in Mechatronics GPA: 3.94/4

Anna University – SSN College of Engineering *July 2013 – June 2017*
Bachelor of Engineering in Mechanical Engineering GPA: 3.9/4

SKILLS

- **MCAD**: SolidWorks, Fusion 360, Onshape
- **ECAD**: EAGLE (Schematic Capture and PCB layout)
- **Software/Programming:** Atmel Studio (C/C++), CCS Cloud
- **Fabrication/3D Printing:** Simplify3D, Cura
- **Numerical Computing:** MATLAB, Mathematica
- **Project Management/Version Control:** GitHub

PORTFOLIO

- https://tarun0917.github.io/

REFERENCES

Gar Waterman, CTO***,*** PedalCell, Colleague, 203-858-7011, gar.waterman@gmail.com
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