Aadiv Shah

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Education

Veermata Jijabai Technological Institute Mumbai, India

Bachelor of Technology in Electronics and Telecommunication | CGPA: 8.38/10 *Aug, 2017 – May, 2021 (Expected)*

Experience

Technical Consultant Intern May – July, 2020

PricewaterhouseCoopers (PwC) *Mumbai, India*

- Developed a *Demand Driven Material Replenishment Planning (DDMRP)* system combining concepts of Control Theory and Supply Chain Management to reduce cascading and compounding disruptions of the bullwhip effect.

Research Project Intern May – July, 2019

Mahindra and Mahindra Ltd. *Mahindra Research Valley, Chennai, India*

- Designed and developed Robot Odometry and Control algorithms of an *Autonomous Agricultural All Wheel Steered Ackerman Holonomic Drive* robot (Unmanned Ground Vehicle).
- Developed Path Planning Algorithms facilitating the robot to translate and rotate simultaneously while moving from node to node along straight or curved paths.
- Manufactured 3D printed disc cams using *Fused Deposition Modelling* Technology to locate the azimuthal home position of drive wheels.
- Developed *Deep Learning Based Classifier* for an autonomous cotton de-weeding implement.

Patents and Publications

- Assignee: Mahindra and Mahindra Ltd. 2020. *Methods and Systems for Controlling Agricultural Implement for Removing Weeds.* Indian Patent Application No. 202041048166. Filed Nov 4, 2020. Patent Pending.
- Assignee: Mahindra and Mahindra Ltd. 2020. *Methods and Systems for Identification of Plant(s).* Indian Patent Application No. 202041048169. Filed Nov 4, 2020. Patent Pending.
- Revathi Prasad, Hari Nair, **Aadiv Shah** et al. Co- Author. *"Autonomous Weeder for Cotton Crop."* Symposium on International Automotive Technology (SIAT), 2021 by SAE International. [Accepted]

Projects

Defect Detection in PMR Yoke | Center of Excellence, VJTI August, 2020 – Present

- Industry project to identify and classify types of defects in *"yokes"* using Computer Vision and Deep Learning techniques to achieve a classification accuracy of 99% with a cycle time of 6 seconds.
- Developed image pre-processing and morphological algorithms using MATLAB Image Processing Toolbox to extract and enhance features of the image for superior classification accuracy.
- Developing a Convolutional Neural Network to categorize pre-processed images as "non-defective" vs "defective" and classify defective images into 7 specific types of defects.

Path Planning for UAV's in Constrained Environments | Final Year Project June, 2020 – Present

- Developing Shortest Path algorithms to build a Path Planning model for point-to-point optimization for UAVs to solve the Travelling Salesman Problem.
- Developing an algorithm to find the most optimized path for a drone to spray pesticide in an agricultural field to prevent locust formation – using soil parameters like *NDVI, ECa* as extracted from multispectral satellite images.
- Developing a *Reinforced Learning Model* to incorporate obstacles, variable target zone areas and external factors.

RFID Servo Metro Gate | Term Project November, 2019

- Constructed a Metro Gate token validation system using *RFID* tags (13.56 MHz), MFRC522 to read RF Tokens and 6-volt, 13.5 kg-cm servo motors to control opening of gates.

Harnessing Energy from Flowing Water in Canals | Google Science Fair – Top 100 May, 2014

- Device to harness the potential energy from flowing water in canals using Bernoulli's Principle in a U-Tube, producing Simple Harmonic Motion to generate an Electromotive Force.

Achievements

Robots to Solve Complex Problem Statements | *FIRST* Global Challenge | Team India [Link] July, 2017
- Represented India at the *Olympics of Robotics* at Washington, D.C.
- Ranked 1st in Engineering Design and 3rd in Robot Game amongst 163 countries.
- Designed and constructed a robot to manipulate and segregate different balls with a 3-channel color sensor ball sorting mechanism - 6 ball per second using linear retractable arms to lift the bot onto a rod 2.5 feet off the ground.

Confederation of Indian Industry and i4C | Youngest Innovator Award [Link] February, 2014
- Presented and demonstrated a working prototype of *SHRAVAN an Intelligent Staircase Climbing Mechanism* using ultrasonic and touch sensor feedback to negotiate a variety of staircases. A unique climbing algorithm keeps the user upright at all times while maintaining a low center of gravity.

Mentoring and Volunteering

Robots to Solve Citywide Problems | PTC Onshape | 1st Place [Link] May, 2020
- Mentored FRC #6024 (15 students) to conceptualize and design a robot to autonomously detect and repair potholes on asphalt roads by analyzing data from Camera feeds and an Inertial Measurement Unit.

Technical Mentor | *FIRST* Robotics Competition | FRC #6024 2017 – Present
- Construction mentor to 70+ students with 47+ international awards and 1000+ hours of CAD Training
- Designed mechanisms: West Coast Chassis, Multi Stage Pneumatic Dog Shifting Gearboxes, High Speed Cascading Multi-Stage Elevators, Full Body Roller Intake, Turreted Shooter Mechanisms.

Technical Mentor | *FIRST* Lego League | NGO - Sankalp Shiksha Sanstha August, 2018 – Jan, 2019
- Imbibed concepts of physics and mechanics through LEGO-based Robots, to 18 speech and hearing-impaired students.

Technical Mentor | *FIRST* Global Challenge | India All Girls Team August – October, 2019
- Construction Mentor to an all-girls team representing India, placing 6^{th} amongst 193 countries.
- Constructed a robot to manipulate different sized game elements while traversing uneven terrain.

Technical Volunteer | *FIRST* Global Challenge | Dubai October, 2019
- *Robot Clinic for REV Robotics:* inspected, helped in repairing robots for 190+ international teams.

Chief Sponsorship Officer | VJTI's Technical Festival | Mumbai 2018 – 2019
- Invited Hanson Robotics and SOPHIA to a 3-day Tech-Expo featuring the *Indian Space Research Organization (ISRO)* and *Bhabha Atomic Research Center (BARC)* witnessing a footfall of over 80,000 people.

Relevant Coursework

Mathematics: Calculus, Linear Equations, Fourier Analysis, Numerical Techniques, Statistical Theory of Communication
Physics: Engineering Mechanics, Electromagnetic Wave Theory, Microwave Engineering, Antenna Theory, Applied Physics
Control: Control Systems, Signals and Systems
Signal Processing: Digital Image Processing, Digital Signal Processing, Digital Communication Systems
Electronics: Electronic Circuit Analysis and Design, Integrated Circuits, Digital Logic Design, Microprocessor and Micro-controllers

Technical Skills

Mathematical Packages: MATLAB, Simulink, Scilab
CAD Software: Autodesk Fusion 360, PTC Onshape, Solidworks, ZWCAD, Multisim
Programming Languages: C++, Java, Python

Certifications

CSWP: Certified Solidworks Professional - Mechanical Design [Link]
CSWA: Certified Solidworks Associate - Mechanical Design [Link]
CSWA-AM: Certified Solidworks Associate - Additive Manufacturing [Link]
CSWA-SD: Certified Solidworks Associate - Sustainable Design [Link]