Alanna **Manfredini**, BEng, ATCL

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Education

Duke University, USA BS. Mechanical Engineering & Materials Science — May '24
Minor in Machine Learning and Artificial Intelligence — **GPA: 3.81**
NCEES Fundamentals of Engineering Exam Awardee — Mar '24

Design Experience

Robotics Engineer Hopping *Pixar* Robot — Jan '24 – Pres
- Designed and built a robot which could propel itself to a height of approximately 1cm, and dance and flash LEDs to music
- Performed detailed dynamics, kinematics, torque, current and weight calculations to ensure linkage durability
- Developed highly detailed CAD to improve ease of build with motion simulation, cable paths, screws and heat diffusion

Mechanical Engineer Pinball Machine Design and Fabrication Project — Aug '22 – May '24.
- Performed force, solenoid, circuitry and material calculations to inform component design and selection
- Designed and built a solenoid to better handle abrupt voltage changes due to pulse width modulation
- Wrote and deployed state machine code for Arduino to efficiently actuate mechanical systems from sensor inputs

Robotics Engineer Modular Assembling Robot System — Jan '24 – May '24
- Managed team dynamics to produce a set of robotic modules which can interlock to form a larger, 5 axis, robot system
- Invented interfaces between modules to quickly and accurately connect and disconnect with axial and torsional durability

Mechanical/Controls Engineer Object Mapping Robot Simulation — Aug '23 – Dec '23
- Trained a 7 joint FANUC robot on Pybullet using reinforcement learning to automatically collide with an object
- Designed an algorithm to collect collision data, map the objects in 3D space and then identify the object with PointNet++

Chassis Designer Duke Motorsports — Mar '21 – Dec '22
- Designed testing rig for car chassis to ensure it can withstand torsion from suspension at 80mph
- Reduced pit-stop maintenance time by 75% by designing and fabricating cheap and durable jigs

Lead Engineer - Winner of ASME Creativity Award Shutters of Life — Apr '22
- Created a window shutter planter with self watering system and a cantilever able to elegantly support soil and water
- Coordinated team to make force models to inform designs with minimal stress in weaker joints

Designer Emona Instruments — Dec '20 – Jan '21
- Developed a manufacturable, ergonomic solution for optical plugs on the Emona Instruments ELVIS board
- Supported client through casting and injection moulding of product, which is now used in hundreds of kits around the world

Work Experience

Software Engineer *Protect3D*, Durham, NC — Aug '23 – Pres
- Working to reduce data processing time by 10 minutes, by automating with a Pointcloud classification Neural Network
- Simplified Pointnet++ algorithm for specific application to single object classification rather than using pre-labeled sets

Material Flow (Manufacturing) Intern *Tesla Motors*, Austin, TX — May '23 – Aug '23
- Reduced design time from >3 weeks to 1 minute and eliminated all initial vendor costs with python autogenerating CAD
- Designed cleaning equipment to automatically clean ASRS racking and maintain ISO cleanroom standard
- Prevented $1000s of part damage by determining coefficient of friction on forks from first principles and FEA
- Managed million dollar installation by coordinating vendors & construction teams, and doing vehicle tracking simulations

Manufacturing Intern *Aptera Motors' Solar Team*, Carlsbad, CA — May '22 – Feb '23.
- Negotiated $200,000 in cost savings for AGVs and conveyance systems using first principles costing approach
- Reduced floor space & cycle time by 50% by creating line layout that included buffers, rework and quality stations
- Led team of vendors to design an automated Pick'n'Place/soldering gantry from SOW through conceptualisation
- Improved OEE by running testing during FAT and developing controls plan to ensure quality and for future MES part tracking

Lead Engineer *LowCostomy Bag*, Durham, NC — Aug '20 – Aug '22
- Reduced the price of a colostomy bag by 95% for low income countries by designing with entirely recycled materials
- Won $28,750 from NIH to support current IRB testing and subsequent manufacturing
- Managed team to develop a design manufacturable locally in Tanzania by balancing labour and machinery costs
- Performed qualitative and quantitative tests on material properties to improve longevity and reduce skin irritation

Mechanical Engineering Intern *Tiller Design*, Sydney, Aus — Jun – Jul '21
- Improved plumbers' labour time by 75% by designing attachment for nail gun to automatically fasten clips on nail
- Sourced low cost stands able to withstand forces from rough, everyday use of a MRI brain scanning device
- Created designs and concepts to improve profits of Defense Force "Kord" tool and branch into the consumer market

Lab Technician *Duke University Innovation Colab*, Durham, NC — Aug '23 – Pres
- Maintained 75 3D printers. Taught clients how to use tools, including laser cutters, CNC mills, water-jet cutters, and Adobe