Lenworth "TJ" Thomas

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EDUCATION

University of Florida – Gainesville, FL ***May 2021***

Bachelor of Science in Mechanical Engineering - GPA: 3.34/4.00

RESEARCH EXPERIENCE

Florida Optics and Computational Sensors Lab, *Undergraduate Researcher*

Gainesville, FL - Supervised by Dr. Sanjeev Koppal and Dr. Huikai Xie

Motion Compensated Movable Scanning LiDAR (Light Detection and Ranging) ***June 2020 – Present***

- Proving the use of a novel motion compensated MEMS (microelectromechanical systems)-based LiDAR scanner through rigorous mechanical and electrical validation to enable environmental awareness for microrobots and robotic insects
- Programmed an autonomous flight path in Python for a DJI Tello drone that can be corrected when the drone senses an object in its path with the LiDAR
- Built a lightweight enclosure for the sensor that can be attached to the drone without affecting the drone's onboard sensors
- Designing and manufacturing packaging hardware and circuitry to enable integration with other micro-robotic platforms such as the Harvard RoboBee
- Rapidly iterating design to test in new conditions like high vibration or quick acceleration to further validate the system
- Investigating the benefits of separating the scanning head from the LiDAR electronics to make the system more viable for robotic insects

Low Power MEMS LiDAR ***October 2019 – May 2020***

- Assisted other researchers in the creation of a low voltage, battery powered, micro-LIDAR that uses a mirror actuated by a MEMS substrate to scan an area of interest, thus eliminating the need for heavy motors in conventional designs
- Integrated hardware peripherals like a passive infrared sensor and relay with the LiDAR that allows the scanning to only begin when a person is present, further decreasing the power usage of the system
- Programmed Arduino to display the result of the LiDAR scan of the environment as a 3D point cloud of the environment on an Organic LED screen
- Designed and manufactured robust packaging hardware and circuitry to enable portability and scalability of the system

Marine and Aerial Robotics Controls Lab, *Research Assistant*

Gainesville, FL - Supervised by Dr. Kamran Mohseni

Submarine Section Separation Robot ***February 2019 – May 2019***

- Automated the separation process of an autonomous submarine with a motorized mechanism designed to reduce wear compared to the manual process
- Wrote software and wired actuation hardware for a separation mechanism that can pull apart sections with 50 lbs. of force driven by stepper motors and lead screws
- Performed torque calculations to select parts based on the specified pulling force

General Hardware Design ***October 2018 – February 2019***

- Supported researchers with laser cut, acrylic brackets for motion capture hardware that resolved experiment's cable management issues
- Assembled a structure out of extruded aluminum to mount a soft ballast imaging experiment for the submarine
- Designed and manufactured an acrylic bracket to house the electronics of a high voltage soft robotics experiment

PUBLICATIONS

D. Wang, **L. Thomas**, H. Xie, S. Koppal "A Miniature LiDAR with a Movable MEMS Scanner for Micro-Robotics," Submitting to OSA Optics Express

D. Wang, Y. Chen, **L. Thomas**, H. Xie, K. Dantu, S. Koppal "Motion Compensated LiDAR Scanning for Small Robots," Submitted to ICRA and RA-L, October 2020

D. Wang, **L. Thomas**, S. Koppal and H. Xie, "A low-voltage, low-current, digital-driven MEMS mirror for low-power LiDAR," in *IEEE Sensors Letters*, doi: 10.1109/LSENS.2020.3006813.

T. Liu, T. Xiong, **L. Thomas** and Y. Liang, "ADS-B Based Wind Speed Vector Inversion Algorithm," in *IEEE Access*, vol. 8, pp. 150186-150198, 2020, doi: 10.1109/ACCESS.2020.3014249.

L. Thomas (2017, September/October). Innovating for the Real World: The Conrad Spirit of Innovation Challenge. John's Hopkins Center for Talented Youth - Imagine Magazine, 25(1), 12-15. Retrieved from https://cty.jhu.edu/imagine/back_issues.html

RESEARCH PRESENTATIONS

University of Maryland Baltimore County McNair Scholars Research Conference ***September 2020***

Illinois TRIO McNair Scholars Research Symposium (Won President's Award for Best Presentation in Session) ***July 2020***

Conrad Spirit of Innovation Finals ***May 2017***

SCHOLARSHIPS, AWARDS, AND HONORABLE RECOGNITION

2020 McNair Scholars Inductee	2019 – O'Reilly TensorFlow Conference Scholarship	2017 – Florida Bright Futures
2020 – Horatio Alger Academic Scholarship	2019 – Dr. Pepper Tuition Scholarship	2017 – Florida Academic Scholar
2020 – President's Award, Illinois TRIO McNair Scholars Research Symposium	2019 – Most Professional Organization (NSBE)	2017 – Johns Hopkins Talented Youth
2019 Chevron Scholar	2017 – Machen Florida Opportunity Scholarship – Full Ride	2016 – Hamilton Scholars Inductee

INTERNSHIP EXPERIENCE

Uber Advanced Technologies Group-Autonomous Vehicles Division, *Hardware Engineering Intern* ***Postponed to May 2021***
Pittsburgh, PA

Hamilton Scholars Organization, *Independent Internship Fellow* ***May 2020 – August 2020***
Remote

- Performed personal development endeavors such as technical personal projects and summer coursework after the postponement of the Uber summer internship

Fiat Chrysler Automobiles, *Interior Feasibility Product Development Intern* ***May 2019 – August 2019***
Auburn Hills, MI

- Performed cross sections on future vehicle soft trim CAD and reported 11 unintentional part intersections that saved the company around $30,000 in manufacturing costs per issue
- Led efforts to resolve major carpet design problems and coordinated physical and VR mockups that accelerated an official design change by management
- Developed a mechatronic test mechanism to create 3D map of light intensity for interior LEDs that will be a standard test for all interior lighting

Caterpillar, *Validation Engineering Intern* ***May 2018 – August 2018***
Peoria, IL

- Validated prototype 13L engine by troubleshooting error codes and performing engine teardowns ultimately solving a manufacturing flaw
- Aided development of a single cylinder engine test cell by gathering parts, analyzing documents, and taking measurements
- Proposed self-driving solution for intra-facility travel to reduce fatigue among older employees and provided insight on cost, implementation strategies, and routes to management

Deltamaker 3D Printers, *Product Founder and Hardware Design Intern* ***June 2016 – June 2017***
Orlando, FL

- Designed and manufactured an aluminum bracket on the extruder that gives the 3D printers the capability to print with flexible materials
- Developed new auto-leveling system that reduced wear on extruder tip and increased measurement accuracy
- Represented company at multiple trade shows to market to new customers and students

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TEACHING EXPERIENCE & NOTABLE WORKSHOPS

Engineering Design and Society (EGN2020C), *Head Teaching Assistant* ***May 2019 – Present***

- Filmed 10 educational tutorial videos about writing Arduino software to make programming less intimidating to first year students
- Assisting over 300 students with their technical design projects in class and in office hours
- Holding office hours for students to ask questions and work on personal projects
- Setting up a makerspace in the new Herbert Wertheim Center for Excellence building on campus

InnoGators Workshops ***May 2019 – Present***

Hosted the following workshops through the InnoGators design team to teach the members about various relevant topics to increase their background knowledge to aid project development.

- Internet of Things, Design Thinking, 3D Printing 101, Professional Development, Intro to Python

National Society of Black Engineers Workshops ***August 2018 – May 2019***

Gator Creators Workshop Series

- Hosted a series of technical hands-on workshops to teach NSBE members and students how to program, 3D model, and build circuits
- The attendees built projects such as a robotic soccer game, 3D printed plant pot, a motion activated LED jar, and other technical projects

Professional and Technical Development Workshops

These workshops were aimed at teaching NSBE members things they might not have learned in class. Such as finding research, starting a business, designing a product, and sustainability.

- Access Academia, EntrepreneurU, Make3D, DIY Water Filter, Boeing Flight Competition Prep, Upperclassmen Advice Panel

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RELEVANT PROJECTS & DESIGN TEAM EXPERIENCE

Autonomous Robot Quadruped Docking Station, Senior Design, *Mechatronics Engineer* ***August 2020 – Present***

- Developing an intelligent housing structure to charge and protect a surveillance robotic dog for Florida Power and Light substations
- Learning the operation of the Ghost Robotics Vision 60 robot to develop autonomous routines in ROS for the robot to locate the housing structure after a mission
- Designing a mechatronic charging mechanism inspired by 3D printers that can locate the charging port of the robot and autonomously dock with it

Implementation of Remote-Controlled 3D Printers, Department of Engineering Education ***June 2020 – Present***

- Created a strategy to retrofit an on-campus makerspace's 3D printers with Raspberry Pi's so they can be operated remotely by students and TA's through the software, OctoPrint

- Using the Raspberry Pi with an external camera to make time lapses of each student's print
- Investigating a method to create a livestream of the makerspace so students can remotely view all the printers

IoT Self Watering Planters, Personal Projects ***January 2020 – May 2020***

- Developed a self-watering planter using an Arduino Uno that waters a plant depending on soil moisture and displays sensor data on an LCD
- Used lessons learned from indoor system and created an internet-connected drip irrigation system for a raised bed using an ESP8266 microcontroller

Design and Manufacturing Lab, *Student/Team Member* ***May 2019 – August 2019***

- Built a robot from scratch to navigate a predefined course, pick up and sort balls, and deliver them to their respective buckets
- Wrote meticulous design reports with team of four detailing every aspect of the robot's design, competition strategies, and desired functionality
- Manufactured robot wheel hubs using an engine lathe, column and knee mill, and a bandsaw

Gatorloop – SpaceX Hyperloop Pod Competition, *Propulsion Systems Member* ***May 2019 – August 2019***

- Built a high-speed electric pod for the SpaceX Hyperloop Pod Competition
- Designed pod chassis in Solidworks and learning Ansys to perform dynamic and vibrational analysis
- Performed 3D model assembly organization and bracket design for the 2018 final design report

BattleBots, *Mechanical Team Member* ***May 2019 – August 2019***

- Designed and built a first of its kind, body-on-frame, defensive drum BattleBot to compete against other teams
- Machined the aluminum inner frame based on parts modeled in Solidworks
- Controlled robot in competition resulting in a third place standing

LEADERSHIP EXPERIENCE

InnoGators Design Team, *President & Founder* ***May 2019 – Present***

- Started a non-profit organization to make room for minorities and underrepresented students in the maker/design team space
- Managing mechanical and electrical teams to develop an automated filament processor that grinds waste 3D printed parts into 3 mm granules
- Supervising the software team to create an autonomous drone that can find radiation plumes in the air funded from a $10,000 grant from the Department of Defense
- Recently created a new business operations team to develop new workflow strategies and to analyze demographic data to find ways to reach new populations and to increase member retention
- Communicating with other minority engineering organizations and companies to build a diverse talent pool of innovators

National Society of Black Engineers, *Chapter Development Chair & Mentor* ***August 2018 – May 2019***

- Facilitated workshops for academic excellence, entrepreneurship, and 3D printing for the development of the chapter
- Assisted with community outreach and the engagement of the next generation of engineers
- Implemented in-house design team, Gator Creators, where marginalized students learn practical engineering skills through hands on projects

R3D Prosthetics, *Team Lead* ***August 2016 – June 2017***

- Led team of five to develop 3D printed prosthetic arm accompanied with a therapeutic game simulation
- 3D printed and assembled arm and electronic components to create a prototype of the arm
- Entered project into international Conrad Awards Spirit of Innovation competition and became 2017 Finalists

SKILLS

Software

SolidWorks	LabVIEW	ROS	Adobe Premiere Pro
OnShape	ABAQUS	Simulink	Adobe Illustrator
Autodesk Inventor	Overleaf	Simplify3D	TinkerCAD Circuits
NX	Cura	Creo	Altium PCB Designer

Equipment/Technique

3D Printing (FDM and SLA)	Waterjet Cutting	Soldering	Sheetmetal Cutting and Bending
Laser Cutting	3D Printer Manufacturing	Breadboarding	Acrylic Bending
CNC Milling	Bandsaws	Fastener Selection for Assembly	
Polishing and Finishing	Drill Press	TIG Welding	

Programming

Arduino - Advanced	C++ - Intermediate
Python - Novice	G-Code - Intermediate
MATLAB - Advanced	Java - Intermediate
G-Code - Novice	

Certifications – White Belt Six Sigma, Solidworks CWSA, Autodesk Inventor Certified User