

BRADLEY HOBBS

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SUMMARY

- Patented inventor, mechanical designer, and software developer for robot and vehicle projects
- Thrives in hands-on environments that include product development from concept to production
- Deeply understands both mathematical design principles and practical design for manufacturing
- Experienced with software integration of multiple sensing and actuation components
- Proven strong communication skills with ability to lead teams in high-stress, deadline-driven projects

EDUCATION

- Ph.D. in Mechanical Engineering GPA: 3.479
University of Delaware (UD), Newark, DE Aug 2019 - July 2024
Arizona State University (ASU), Tempe, AZ (Coursework Only) Aug 2018 - July 2019
- B.S. in Mechatronics Engineering; Minor: Mathematics GPA: 3.454
Middle Tennessee State University (MTSU), Murfreesboro, TN Aug 2014 - May 2018

PATENTS & SELECT PUBLICATIONS

- U.S. Patent Application Serial No.: 63/584,762 (Provisional) *Sep 2023*
P. Artemiadis, Z. Thè, **B. Hobbs**, V. Chambers, W. Gaither
- **B. Hobbs** and P. Artemiadis. A review of robot-assisted lower-limb stroke therapy: unexplored paths and future directions in gait rehabilitation. *Frontiers in Neurorobotics*, page 19, 2020
- M. Drolet, E. Q. Yumbla, **B. Hobbs**, and P. Artemiadis. On the effects of visual anticipation of floor compliance changes on human gait: Towards model-based robot-assisted rehabilitation. In *IEEE International Conference on Robotics and Automation (ICRA)*, 2020

RESEARCH EXPERIENCE

Graduate Research Associate UD/ASU

Aug 2018 - Present

- Advisor: Dr. Panagiotis Artemiadis
- Dissertation title: "The Effects of Stiffness Changes and Visual Feedback on Ground Reaction Forces: Towards Robot-Assisted Gait Therapy"
- Designed and built a Variable Stiffness Treadmill (VST) for experimental gait therapy
- Performed human subject experiments using motion capture, surface EMG, and forceplates
- Applied for provisional patent for VST (63/584,762)
- Co-developed the complete software architecture for the VST in C++, C# and python
- Integrated several different hardware components into a live ROS-like architecture in Windows
- Developed a virtual reality environment for VST in Unreal Engine 4 and C++
- Developed algorithms for processing and analysis of gait data in Matlab and python
- Authored a journal review on robot-assisted gait therapy, cited by 135+ papers
- Peer Reviewer of IEEE & ASME scientific journals & conferences including ICRA, IROS, TNSRE, JMR

Undergraduate Research Assistant MTSU

May 2016 - Jul 2018

- Advisor: Dr. Brian Slaboch
- Published and presented work at ASME-IDETC and presented multiple posters on results of research
- Developed mechanism design software in Matlab for a new class of planar mechanisms
- Received the competitive URECA research grant to design, build and control a robot manipulator
- Designed and built an umbrella holder mechanism for a disabled student to integrate into a walker
- Dynamically modelled in Simulink & built a physical RP robot for classroom instruction on controls

PROFESSIONAL EXPERIENCE

- Integrated advanced IMU sensors into Matlab for data analysis
- Implemented human arm kinematics for control of bio-mimetic robotic arm
- Implemented Python and C++ for sensor data integration into bio-mimetic robotic arm ML algorithm

- Designed and built electrical & pneumatic panels for 6ft x 6ft electrical panel for an All-Tec blanking Press
- Designed and built an automated chemical extraction system
- Designed and built 3 electrical and pneumatic panels for Nissan nitrogen control system
- Designed robot end effector cell in CAD for pallet box flipper implementation for Owens Corning
- Integrated 200 gallon automated centrifuge system for Onsite Environmental with PID water level control
- Performed PLC control design & service for 50+ manufacturers including Coca-Cola, Nissan, Purity Dairy
- Designed and integrated milk height sensing controls to improve production time & cost for Dean Foods

TECHNICAL SKILLS

- **Programming:** Matlab, C++, C#, Python, Unreal Engine 4, Git, Github, Visual Studio Code
- **Software:** SolidWorks Simulation, OpenSim, Vicon Nexus, MS Office, Linux
- **Hardware:** CNC Mill, Lathe, Plasma & laser cutting, 3D Printing, Soldering, Oscilloscope
- **Other:** Motion Capture, Surface EMG, Forceplates, Gait Analysis, TCP/IP

PROJECTS

- Designed & built 3 human powered quad tandem recumbent vehicles for rigorous obstacle course
- Led team to multiple top 10 finishes out of 100 international teams
- Best Drivetrain Design Award: Designed drivetrain with unique integration of belts & planetary gears
- Designed and built all suspension, steering, braking, and drivetrain components
- Performed stress analysis calculations & FEA in SolidWorks Simulation for frame design
- Calculated gear ratio model required to successfully climb most difficult obstacle
- Designed and performed extensive testing for all components in real-world conditions

- Designed in Solidworks and built suspension kinematics and transmission-engine integration to the frame
- Designed and built all electrical components using specification standards
- Performed various machine tooling within specific design tolerances as low as 0.0001"
- Designed and performed extensive testing for all components in real-world conditions
- Designed in Solidworks and built braking components for MTSU's first SAE Formula Hybrid racecar

- SME Battle Bots: Designed & machined blade component for competition spinning wheeled robot
- SME Sumo: 1st place Regional: robot to push others out of a ring using spin and find algorithm
- Paid tutor & guest lecturer for several engineering courses; mentor to several grad student projects
- Co-Founder & Organizer of ASU Robotics Student Organization & UD Dynamics, Donuts, Coffee, Controls
- MEEG 304a: TA Manager for Undergraduate Junior Design Team 5 & Team 6: Autonomous Pill Bottling
- MEEG 671: Modeling, simulation, and control of 7-axis KUKA manipulator tested on physical robot
- ENGR 4590: Senior Design Award: *Technical Lead*: Autonomous robot to pour, flip, and stack pancakes
- ENGR 4530: Line following robot using PID algorithm in embedded C and Arduino
- ENGR 4530: 2-wheeled balance robot that follows orange color using PID algorithm and Arduino
- COMM 2020: Best Semester Presentation titled: "On nanotechnology and its applications"
- ENGR 1100: Best Project: Fire extinguisher by only lighting a match
- ENGR 3590: 19 link, 1 DOF "Perfect Beer Pour Mechanism" to simultaneously pour and receive drink
- MAE 547: Simulation of SCARA trajectory following in Matlab using inverse kinematics
- CHE 598: System Identification modeling of a fluidized bed calciner

- ELEG 845: Machine learning model to determine handwritten number classification
- MEEG 687: Autonomous vehicle lane change & collision avoidance using image processing in simulation

HOBBIES

- Engine/Transmission Rebuilds • Ultimate Frisbee Team Captain • 1600+ Chess ELO • Battle Bots Judge
- V8, 5.12a Rock Climbing • Coaching • Table Tennis • Lifting science • Cuisine • Rock skipping/collecting