Geoffrey Clark

PhD Researcher - Machine Learning for Robot Prediction and Control - Interactive Robotics Lab

@ clark.m.geoffrey@gmail.com +1 480-200-8290 geoffrey-m-clark/ clark-ai.com

Experience

Research Associate
August 2018 – December 2023

Interactive Robotics Lab - Arizona State University

- Built data pipeline to connect inertial, force, and vision data to Machine Learning models for fast (500Hz) inference and control.
- Train and test probabilistic Machine Learning models for prediction and control of powered robotic ankle prosthetics. ***Papers:*** ICRA '20.
- Learn adaptive policies that predict users actions and adjust to produce predictable, safe, and ergonomic interactions. ***Papers:*** Corl '20.
- Create adaptable policies with reinforcement learning on simulated legged robots with domain randomization for sim-to-real transfer.
- Develop and publish open source libraries and tutorials on my research topics to aid in independent use and evaluation. ***Repo:*** IntPrim

Skills: **Python, C++, ROS, Statistical ML, Imitation and Reinforcement Learning, Optimal Control, Deep Learning, Tensorflow, PyTorch, git**

Human-Robot Collaboration Intern
May 2021 – August 2021

Honda Research Institute

- Defined data requirements for both synthetic and robot experiments.
- Formulate a perception library to collect and process camera, tactile, and human motion data for human-robot interaction experiments.
- Generate a neural network architecture to perform model predictive control (MPC) to generate trustworthy and interactive control.
- Submit patent application for methods relating to novel MPC.

Skills: **Tensorflow, Variational Deep Learning, ROS, Inverse Kinematics, Data Analysis & Visualization**

Engineering Consultant
May 2019 – April 2021

SpringActive inc.

- Develop, prototype, evaluate, and iterate control software and mechatronic hardware for novel quasi-passive prosthetic ankle which detects and accommodates changes in stride and terrain.
- Lead interaction with university partners to design EMG sensor and conditioning board from conception to implementation.

Bioforce

- Engineer hardware and software ecosystem to aid in processing samples for a novel cancer screening solution. My solution increased accuracy by 3x, and speed by 12x by automating the process.

Skills: **MATLAB, Microchip Embeded Coder, CANopen, FreeRTOS**

Mechatronics Engineer
January 2013 – May 2018

SpringActive inc.

- Designed controls and electronics for the Ruggedized Odyssey Ankle, which is the only prosthetic ankle to demonstrate fully powered walking and running while completely submerged in water, over uneven terrain, and in unconstrained environments. ***Video:*** here
- Influenced major electrical engineering and controls decisions on the development of powered prosthetics and exoskeletons. Directly drove state of the art controls and mechatronics research.
- Managed production on various sensor packages including inertial, magnetic encoder, capacitive touch, temperature, force, and current.

Skills: **MATLAB/Simulink, Embeded C, MPLAB, Mechatronics, Control Theory, Board Design, Sensor Design, Soldering, Machine Tools, git**

Education/Degrees

Electrical Engineering (PhD)

Ira A. Fulton Schools of Engineering - ASU

August 2018 – Ongoing

- Graduate Research: Machine learning for human-robot prediction and safe control.

Electrical Engineering (Masters)

Ira A. Fulton Schools of Engineering - ASU

August 2016 – July 2018

- ***Dissertation:*** Learning Interaction Primitives for Biomechanical Prediction.

Engineering-Robotics (BSE)

Ira A. Fulton Schools of Engineering - ASU

August 2009 – May 2013

Publications

Safe Robot Learning in Assistive Devices through Neural Network Repair
Conference on Robot Learning (CoRL)

Learning Ergonomic Control in Human-Robot Symbiotic Walking
Transactions on Robotics (TRO)

Learning Predictive Models for Ergonomic Control of Prosthetic Devices
Conference on Robot Learning (CoRL)

Predictive Modeling of Periodic Behavior for Human-Robot Symbiotic Walking
International Conference on Robotics and Automation (ICRA)

Awards

Deans Fellowship
Ira A. Fulton School of Electrical Computer and Energy Engineering
2018 - 2022

Arizona Graduate Scholar Award
Deans Office School of Engineering
2016 - 2018

Extracurriculars

Robotics Mentor - Machine Learning/Vision
Desert WAVE - Women in Autonomous Vehicle Engineering
2020 - Ongoing

Piano Film Photography Dogs
Motorcycle Repair Woodworking