Y.T.Tsvetkov@sms.ed.ac.uk
+359877111193

Yordan Tsvetkov

linkedin.com/in/y-tsvetkov
y-tsvetkov.github.io

Publications

Undergraduate Researcher **University of Edinburgh** **August 2021 - ongoing**

- Y. Tsvetkov and S. Ramamoorthy, ”A Novel Design and Evaluation of a Dactylus-Equipped Quadruped Robot for Mobile Manipulation,” 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Kyoto, Japan, 2022, pp. 1633-1638, doi: 10.1109/IROS47612.2022.9982229.
- Developed a four-legged robot with manipulators in its front legs, capable of one- and two-limbed manipulation.
- Optimised leg design for FDM 3D-printing, resulting in a 45% weight reduction compared to existing designs.
- Implemented jerk-limited trajectory generation for stable synchronous movement of multiple joints.
- Designed optimal spiral torsion springs using nonlinear constrained optimisation in MATLAB.
- Currently designing an upscaled version of manipulator for ANYbotics ANYmal, a commercial robotics platform.

Experience

Robotics Research Intern **Sony** **June 2023 - July 2023**

- Evaluated and improved the safety of Tachyon, a novel wheeled-legged robot.
- Wrote a Python package for creating, optimising and evaluating safety devices for Tachyon.
- Designed a low-cost, <2 kg underactuated device to make Tachyon fall safely during emergency stops on stairs.
- Mathematically evaluated the feasibility and performance of different mechanism and structure options.
- Reduced roll-over rate on stairs in simulation from 100% to 0% while meeting specs with a safety factor of >1.5.

Robotics Engineer **Konpanion** **May 2021 - ongoing**

- Developed a novel compliant robot for therapeutic use with off-the-shelf parts, 3D-printing and laser cutting.
- Created a ROS simulation stack and trained locomotion strategies using the CMA-ES genetic optimisation algorithm.
- Developed custom PCBs for interfacing a Raspberry Pi with a variety of actuators and sensors.
- We have raised over £120,000 in the past 6 months, sold robots to the National Robotarium and developed partnerships with Scottish Care to distribute our robot in care homes.

Co-founder, Exoskeleton Team Lead **HumanED Robotics Society** **September 2021 - September 2022**

- Managed £2,000 society budget and a team of 5-10 people in the design of a force-amplifying arm exoskeleton.
- Taught the use of FOC-based BLDC motor drivers using CAN-FD for force-sensitive actuation to a team of 5-10 people.
- Recorded a tutorial series and led workshops on CAD in Onshape and simulation in Webots and PyBullet.

Projects

Rough-terrain walking robot **Personal** **October 2019 - August 2021**

- Developed a four-legged robot capable of perturbation-resistant walking using only IMU data.
- Optimised a neural network with novel architecture using CMA-ES, PPO and a custom PyBullet environment.
- Implemented and deployed network on an Arduino microcontroller in real world with no sim-to-real adjustments.
- Project won 2nd Prize and was the highest-ranking engineering project in the EU Contest for Young Scientists 2021.

Anemone **University Of Edinburgh** **March 2023**

- Received £5,000 Edinburgh Futures Institute grant to develop a soft robot for a human-robot dance performance.
- Created a 1.5m continuum manipulator design controlled via Raspberry Pi featuring low cost (< £60), low assembly time (1h) and low material consumption (150g of filament), outperforming existing designs.
- Managed small-scale manufacturing of 10 manipulators for the installation.
- Created a pipeline to control the robot via animating a Blender rig using Python and Blender API.
- Successfully delivered project in a month as part of a multidisciplinary team of dancers and product designers.

Education

BEng Mechanical Engineering **University of Edinburgh** **September 2020 – May 2024**

- Relevant Coursework: Software and Embedded Systems, Engineering Mathematics, Analogue Circuits, Partial Differential Equations

Languages and Technologies

- **Languages**: Python (TensorFlow, PyBullet, ROS, Gazebo); C; C++; MATLAB; Arduino
- **Software**: Siemens NX, Teamcenter PLM, Fusion 360, SOLIDWORKS, Onshape, Webots, KiCad, Blender API, Linux
- **Microcontrollers/microcomputers**: Raspberry Pi (4, Zero, Zero W), Teensy (3.5, 4), STM32 (F4 Series), Arduino