

John Brian Roberts Studentship, University of Sussex

Supervisor Interview – Dr. Yanan Li

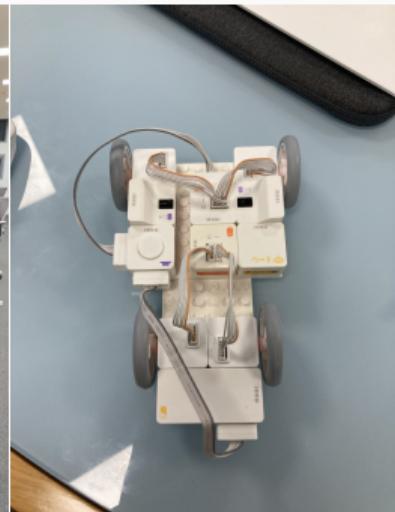
Tye Cameron-Robson

June 11, 2025

Mechanical Engineering Masters graduate, Cardiff University

Academic Background

- First-class Masters, Cardiff University
- Robotics study exchange, KAIST
- Top marks in control & computing

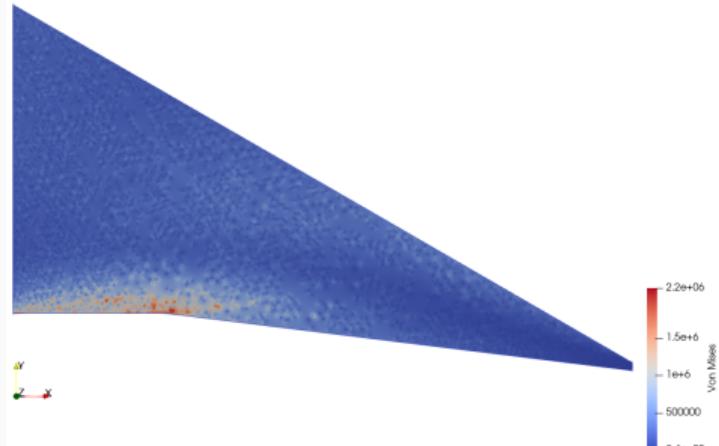


Key Projects and Experience

- WalkAide Navigation System (2024–25)
- Learning-based Quadruped Sumo (2023)
- Finite Element Solver (2024)
- Bosch Internship (2022–23)



Quadruped Sumo Arena



Custom finite element deformation solver

Key Projects and Experience



WEARABLE NAVIGATION SYSTEM

EVALUATION OF HAPTIC FEEDBACK METHODS AND ENVIRONMENTAL IMPACTS

Authors: Tystian Barnett, Tye Cameron-Robson, Samuel Griffin, Oscar Meads, Dylan Williams
Supervisor: Dr. Shou-Han Zhou

DESIGN & INTEGRATION

01 MOTIVATION

Over 2 million people in the UK suffer with sight loss (NHS Wales 2024)

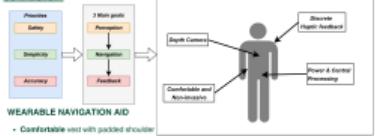


Existing walking aids:

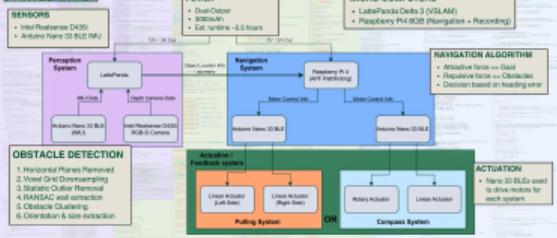
- Constant hand cane (pace, dog)
- Audio Feedback - unreliable in noisy environments
- Vibration Feedback - annoying (Deng and Morell 2012)

The aim: to enhance visually impaired individuals' quality of life

03 DESIGN



04 INTEGRATION



Walkaide Design Poster



RESULTS & PERFORMANCE

05 AUTONOMOUS LIDARBOT

- SLAM Development
 - ROS Understanding
 - API Tuning
- Initially, the autonomous lidarbot was used to understand ROS and SLAM Integration, while trial runs gave insights to the applied potential field navigation algorithm's performance & parameters.

LEAPBOT BIRDSEYE RECONSTRUCTIONS

- SLAM Development
 - ROS Understanding
 - API Tuning
- Each participant had 10 minutes to train on both feedback systems before 5 trials. Obstacle positions changed every time.

06 EXPERIMENTAL SETUP



07 RESULTS

The following performance indicators were recorded during testing:

- Success Rate (%)**: Reached the goal
- Collision Rate (%)**: Total Obstacles bumping count
- Odometry Losses per Trial (%)**: Losing the ability to locate based on sensor data
- Avg Reaction Time (s)**: Time taken to rotate 90 degrees, post instructions

QUANTITATIVE ANALYSIS

Metric

Success Rate (%)

Collision Rate (%)

Odometry Losses (%)

Avg Reaction Time (s)

COMPASS A

76.75

0.00

0.00

3.43

POLY A

66.58

0.33

0.42

3.87

COMPASS B

58.80

1.17

3.75

4.00

POLY B

3.75

3.75

3.75

4.00

3D RECONSTRUCTIONS



08 DISCUSSION HIGHLIGHTS

Compass system offered clearer and more interpretable feedback.

Poly system lacked enough torque/force to move the robot.

Poly's confusing wall patterns caused ViSLAM failure.

Localization became correlate with system performance & efficiency.

09 LIMITATIONS

Limited sample size of 4 participants.

Polyl system had issues with rapid turns and high torque requirements.

Motors lacked torque for appropriate haptic feedback.

No global to autonomous direct ROS-D cameras.

10 FUTURE WORK

Replace F596 sensor with stronger, more precise accuracies.

Integrate global for camera calibration.

Use better sensors for odometry and collision detection.

Expand trials to more participants and real-world settings.

Implement adaptive haptic intensity based on obstacle proximity.

Autonomous parameter tuning, based on environment.



Cardiff School of Engineering, Mechanical

TYE CAMERON

Walkaide Results Poster

Industrial Placement Poster

Motivation & Alignment

- Engineering systems that advance societal wellbeing
- Motivated by lived experiences and commitment to inclusive technology



Walkaide Testing Video

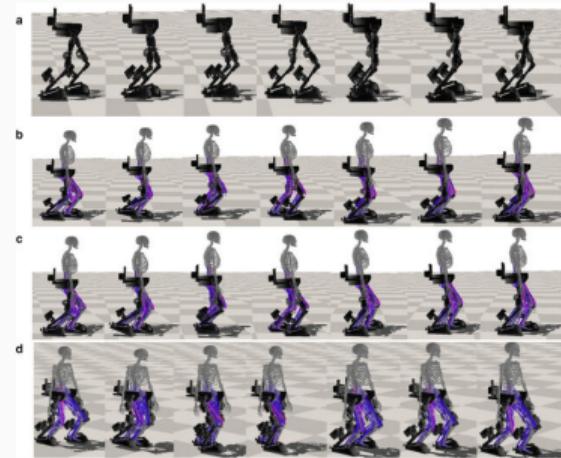


Future Vision

- Uncertainty-aware reinforcement learning
- Lightweight human-robot collaborative robotics
- Innovative & adaptable model-based implementation



Hwangbo, Jemin, et al. "Learning agile and dynamic motor skills for legged robots." *Science Robotics* 4.26 (2019)



Luo, Shuzhen, et al. "Robust walking control of a lower limb rehabilitation exoskeleton coupled with a musculoskeletal model via deep reinforcement learning" (2023)

Thank You

How would I best contribute?

GitHub: github.com/tyecam1

LinkedIn: linkedin.com/in/tye-cameron-866aa2203/