THOMAS LE HURAY

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PROFESSIONAL PROFILE

Mechatronics and robotics engineer specialising in robotic manipulator control, ROS2 system development, and industrial automation. Recently completed first-class BEng dissertation on decentralised control architectures for dual mobile manipulators, currently pursuing MSc in Robotics and Autonomous Systems at University of Bath. Experienced in production-level robotics software development, PLC programming (Siemens S7-1200, TIA Portal), system identification and characterisation, and hardware-software integration. Strong foundation in Python, C++, embedded systems, and agile development practices with demonstrated ability to deliver practical solutions in research, competition, and industrial environments.

EDUCATION

MSc Robotics and Autonomous Systems 2025 – 2026
University of Bath
Modules: Robotic engineering analysis, Autonomy and AI/ML, Robot software, Robo-ethics, Robotics and Autonomous Systems design and integration project, Commercialising new technology, and Consultancy OR Research project.

Activities: Bath Rover Team – *European Rover Challenge (ERC)* – Technical Lead for robotic arm subsystem.

BEng (Hons) Mechatronics Engineering 2022 – 2025
University of Gloucestershire
First Class Honours (73.87%)
Modules: Prinicples of Programming, Engineering Design and Practice, Analogue and Digital Electronics, Engineering Mathematics I, Mechanical Systems Engineering, Sensors and Actuators, Engineering Systems Design, Principles of Electrical Engineering, Engineering Mathematics II, Intra-disciplinary Design Projects, Sustainable and Renewable Energy Systems, Enterprise Entrepreneurship and Innovation, Control Engineering, Mechatronics and Automation Technology, Electrical Rotating Machines, Operations and Engineering Management, Industrial Automation Systems, Mobile Robotics and Mechatronics, Systems Engineering, Real-time Embedded Systems, and Final Year Project.

Dissertation: "Employing a distributed auction algorithm in decentralised mobile manipulators for independent and collaborative assembly tasks" – Developed novel control architecture using ROS2, Python, Docker containerisation, and CUDA-accelerated computations. Involved extensive system identification, characterisation, digital twin development, and real-world hardware validation.

A-Levels & GCSEs 2015 – 2022
Elizabeth College, Guernsey
A-Levels: Mathematics, Physics, Computer Science, Extended Project Qualification (EPQ)
GCSEs: 10 GCSEs including grade 7 in Chemistry, Mathematics, and Physics

TECHNICAL SKILLS

Robotics & Control Systems
Mobile robotics (platform design, navigation, multi-robot coordination), robotic manipulators (kinematics, dynamics, inverse kinematics, motion planning, trajectory generation), control systems (PID tuning, state-space control, decentralised architectures), motor control (brushless motors, stepper/servo control, power electronics), system identification and characterisation, digital twin development.

Programming & Software Development
- **Languages:** Python (advanced: NumPy, SciPy, control libraries), C++ (robotics/embedded, Eigen, real-time systems), Rust (systems programming), MATLAB/Simulink

- **Robotics Frameworks:** ROS2 (extensive experience with modular system development, inter-process communication, sensor integration, distributed architectures)
- **Development Tools:** Git version control, Docker containerisation, CI/CD pipelines, Linux/Unix systems, automated testing
- **PLC Programming:** Siemens S7-1200 with TIA Portal V15.1 (ladder logic, structured text, timer functions, counter implementation, state machines, industrial automation sequences)

Hardware & Integration
Sensor integration (RGB cameras, depth sensors, LiDAR, encoders), embedded systems (Arduino, ARM microcontrollers), PCB design and assembly, pneumatic systems (FESTO components, solenoid valve control), test equipment (oscilloscopes, multimeters, logic analysers), signal conditioning, data acquisition systems.

Design & Manufacturing
SolidWorks, Fusion360 (advanced mechanical design), additive manufacturing, CAM, rapid prototyping, steel fabrication, quality control, custom actuator design.

Research & Documentation
Experimental design and validation, data analysis and visualisation, technical writing (LaTeX, Markdown), project management, Agile methodologies.

WORK EXPERIENCE

R&D Engineering Intern | Vapormatt June 2025 – Sept 2025
- Led refurbishment project of legacy wet blasting machine for automated R&D testing capabilities, integrating automation hardware and developing PLC-based control systems
- Managed project timeline, technical specifications, and stakeholder communications following structured engineering methodologies
- Performed system characterisation and validation testing, developing test procedures and data acquisition systems for process optimisation
- Collaborated with customer partners to implement automated test methodologies, analysing system performance and developing control strategies
- Demonstrated ability to rapidly learn industrial systems, work independently, and deliver practical automation solutions

Mechanical and Electronics Engineering Intern | Polar Instruments June 2024 – Sept 2024
- Developed automated manufacturing jig design system using Python parametric algorithms, reducing setup time by 40% through algorithmic optimisation
- Integrated hardware-software solutions for PCB testing equipment, implementing modular testing frameworks for quality assurance automation
- Performed system testing and validation, characterising equipment performance and implementing quality assurance procedures
- Applied version control (Git) and comprehensive documentation practices for maintainable, production-ready codebase
- Worked at hardware-software interface with oscilloscopes, multimeters, and diagnostic equipment alongside software development

R&D Engineering Intern | Vapormatt June 2023 – Sept 2023
- Conducted systematic materials testing for edge-case failure analysis, developing rigorous experimental procedures for system characterisation
- Developed test methodologies for surface finish quality assessment and designed custom testing apparatus
- Implemented root cause analysis techniques for customer issue resolution and product improvement
- Applied engineering documentation standards and iterative testing methodologies in industrial R&D environment

KEY PROJECTS & RESEARCH

Bath Rover Team – European Rover Challenge (ERC) **2025 – Present**
Technical Lead - Robotic Arm

- Leading design, development, and integration of robotic manipulator for international Mars rover competition

- Managing arm subsystem including mechanical design, motor control, inverse kinematics implementation, and ROS2 integration
- Coordinating with electrical and software teams for sensor integration, power management, and autonomous manipulation capabilities
- Contributing to autonomous rover development for complex manipulation and sample collection tasks in Mars-analogue environments
- Working in Agile team environment with sprint planning, task tracking, and iterative development cycles

Open-Source Low-Cost Rover Platform **2025 – Present**

- Developing accessible, modular rover platform for robotics education and research with production-quality code practices
- Implementing ROS2 navigation stack with sensor fusion (RGB cameras, depth sensors) for autonomous operation
- Utilising Git version control with feature branching workflow and code review practices for collaborative development
- Emphasising comprehensive documentation and maintainable architecture for community contribution

Decentralised Control Architecture for Dual Mobile Manipulators (BEng Dissertation) **2024 – 2025**

- Researched and developed novel decentralised control architecture for coordinating dual mobile manipulators in collaborative assembly scenarios
- Implemented ROS2-based distributed system enabling real-time inter-robot communication and task coordination without centralised control
- Performed extensive system identification: developed empirical test procedures, characterised motor dynamics, measured kinematic parameters, tuned control parameters
- Leveraged CUDA for GPU-accelerated pathfinding and motion planning, achieving near real-time performance
- Built digital twin models for simulation-based development and validated complete transfer from simulation to hardware deployment
- Containerised entire system using Docker for reproducible experiments and rapid deployment across different hardware configurations

Sensor-Feedback Pneumatic Control System **2025**

- Designed and implemented sensor-feedback pneumatic control system using Siemens S7-1200 PLC with FESTO components
- Developed 8-network ladder logic control architecture in TIA Portal, implementing timer-based sequencing, counter logic, state machine control
- Integrated position sensors for precise cylinder control, achieving strong correlation between simulation and physical system
- Implemented safety interlocking logic, emergency stop functionality, and reset mechanisms following industrial automation best practices
- Performed complete lifecycle from design through assembly, commissioning, and validation testing

Custom Quasi-Direct Drive Actuator Development **2024 – 2025**

- Designed quasi-direct drive actuator for robotics applications, balancing torque density with backdrivability for safe human-robot interaction
- Performed system identification to develop accurate motor and transmission models through empirical characterisation
- Developed C++ embedded control firmware implementing closed-loop position, velocity, and torque control with real-time performance
- Integrated absolute position encoders, implemented PID control tuning, thermal management, and comprehensive system testing

6-Axis Robotic Arm Design (Extended Project Qualification) **2020 – 2022**

- Earned A* grade for designing 6-DOF robotic arm, managing full project lifecycle from conception through documentation
- Developed four iterative design revisions using Fusion360 CAD, demonstrating systematic design optimisation
- Applied forward and inverse kinematics analysis, joint torque calculations, and mechanical design principles
- Developed custom strain wave gear reduction system optimised for 3D printing constraints

Additional Engineering Projects

- **3-DOF Robotic Arm with Rolling Contact Joint:** Experimental platform testing novel joint mechanisms with stepper motor control
- **Train Platform Safety System:** Computer vision and sensor fusion for safety monitoring, contributed mechanical design and control logic
- **Internal Pipe Climbing Robot:** Load-adaptive control system for autonomous climbing (IMechE competition)
- **Smart Waste Management System:** Embedded control with sensor fusion, signal processing algorithms, and power management

ADDITIONAL EXPERIENCE & ATTRIBUTES

Leadership & Communication
RAF Cadet (CCF) reaching Cadet Sergeant rank, responsible for training cadets and leading field exercises. Experienced presenting technical work through video presentations, live demonstrations, and comprehensive documentation. Strong written communication skills (LaTeX, Markdown, Typst, technical reports).

Languages
Native English speaker with active study of German (technical/academic focus) and French. Additional experience with Guernésiais, demonstrating strong language acquisition abilities.

Technical Projects
Self-hosted infrastructure management (personal development server), custom computer systems design and build, demonstrating Linux system administration and networking skills.

Personal Development
Long-distance running with regular participation in charity events, structured fitness training program, self-teaching piano and music theory.

Key Attributes
Autonomous learning (rapidly acquiring new technologies from industrial PLC systems to novel control methodologies), problem-solving enthusiasm for multifaceted hardware-software challenges, persistence in exploring multiple solutions, strong teamwork and collaboration skills, customer focus from industrial internship experience.