

Hamze Hammami

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Dubai, UAE

RESEARCH & PUBLICATIONS

- SUSHI: A Vision System for Reactive, Uninformed ASV Navigation via Multi-Field Path Planning and Visual Exploration**
Journal of Intelligent & Robotic Systems *Published*
 - Authors: **Hamze Hammami**, Muhammad Abban, Abdul Maajid Aga, Laith Mohamed, Saif Alsaad, Nidhal Abdulaziz
 - DOI: 10.1007/s10846-026-02379-9
- Why Evolve When You Can Adapt? Post-Evolution Adaptation of Genetic Memory for On-the-Fly Control**
2025 Conference on Artificial Life (ALIFE 2025), SONI Track *Published / Presented*
 - Authors: **Hamze Hammami**, Eva Denisa Barbulescu, Talal Shaikh, Mouayad Aldada, Muhammad Saad Munawar
 - DOI: isal2025/37/15/134065
- BeeBetter: A Multi-modal Beehive System for Honeybee Health Monitoring and Hazard Detection**
2024 International Conference on Signal Processing and Information Systems (ICSPIS 2024) *Published / Presented*
 - Authors: **Hamze Hammami**, Nidhal Abdulaziz
 - DOI: 10.1109/ICSPIS63676.2024.10812634
- BeeVE: Unsupervised Acoustic State Discovery in Honey Bee Buzzing**
arxiv *Preprint / Under review*
 - Authors: **Hamze Hammami**
 - Preprint: arXiv:2605.07903
- Robot Single Sound Source Localization with ITD Binaural Cue Processing Using Limited Microphone Sensors**
Preprint – TechRxiv *Preprint*
 - Contributors: **Hamze Hammami**, Morteza Varasteh
 - DOI: 10.36227/techrxiv.175355484.45273307/v1
- Enhancing Creativity and Efficiency in Furniture Design through Human-AI Collaboration**
AAAI-SuS-2025 Symposium on Human-AI Collaboration (HAIC 2025) *Published*
 - Authors: Nidhal Abdulaziz, Mohamed Al Musleh, Vrushali Mhatre, **Hamze Hammami**
 - DOI: 10.1609/aaai.ss25.36048
- Carbide Volume Fraction in Cobalt-based Alloys using ML Techniques**
International Conference on AI and Materials for Sustainability (AIMS 2025) *Poster, Dec 2025*
 - Authors: Vishakh Kumar, **Hamze Hammami**, Rehan Ahmed, Nidhal Abdulaziz

EDUCATION

- Heriot-Watt University** Dubai, UAE
MSc Robotics; Part-time *Jan 2024 – Nov 2026*
 - Predicted Grade: Merit; MSc thesis in progress.
 - School of Engineering and Physical Sciences
- University of Essex** Colchester, UK
BEng Computer Systems Engineering with Honors *Sep 2019 – Jul 2022*
 - Grade: Second Class (Division 1)
 - Computer Science and Electronic Engineering

PROFESSIONAL & TEACHING EXPERIENCE

- Heriot-Watt School of Mathematics and Computer Science** Dubai, UAE
Laboratory Assistant *Aug 2025 – Dec 2025*
 - Support postgraduate lab sessions for the F21RO - Intelligent Robotics course through lab support, tutorials, coding support, and supervision over assessment tasks.
- Heriot-Watt School of Engineering and Physical Sciences** Dubai, UAE
Teaching Assistant *Jan 2025 – June 2026*
 - Provide teaching support through lab demonstrations and tutorials for robotics, machine vision, programming, and electronics modules.
 - Modules: B31MV - Machine Vision, B31SE - Image Processing, B31YS - Robotics System Sciences, B37VA - Praxis Electronic Design, B37VB - Praxis Electronic Practice.
- Vee Tech** Cairo, Egypt
Embedded Systems and ML Engineer *Jul 2023 – Dec 2023*
 - Developed intelligent systems for automatic number plate recognition and facial recognition with liveness security checks.
 - Collected and processed computer vision datasets, implemented embedded AI components, and created APIs for web and mobile integration.

KEY PROJECTS

- **AISV – Autonomous Surface Vessel:** Team and autonomy lead for an autonomous surface vessel development for water-debris collection. Built SUSHI, the ROS2 integrated vision-based navigation system fusing object detection, U-Net water segmentation, and monocular depth into camera-centric navigation grids, with a multi-field path-planning algorithm (a hybrid of APF and wavefront propagation), mask-based exploration, fuzzy path following, and DWA-based emergency avoidance. The AISV project also included the development of the BURGER robot, a seabin inspired mechanism for mobile trash collection, and the TOAST simulation in which SUSHI was developed and tested on, development was supervised by me and led by other team members while I led SUSHI's development, this project was granted 12,000 AED in funding through the Mubadala competition. Related paper: SUSHI, Journal of Intelligent & Robotic Systems.
- **Post-Evolution Adaptation of Genetic Memory:** The project discovers the concept of runtime adaptation of evolved robot controllers, robot trained via genetic algorithms in Webots, then adapted to novel obstacles and environmental changes using Hebbian plasticity, without retraining. Related paper: ALIFE 2025.
- **Master's Thesis: BeeBetter / BeeVE:** This project revolves around BeeBetter towards a multimodal beehive monitoring pipeline combining vision, sensors, and audio analysis, focusing on adapting beekeeping to newer technology, BeeVE is an extended version of the acoustic module with PaSST embeddings and a VQ-VAE discrete codebook to discover non-semantic honeybee acoustic states, work inspired by the Earth Species Project Lab, as it fits their mission narrative I was invited to also present the work in their ESP May Community Deep Dive. Related papers: BeeBetter (ICSPIS 2024); BeeVE (arXiv preprint).
- **Bachelor's Capstone: Robot Sound Localization:** A simple robot audition system for sound azimuth localization using interaural time difference (ITD) and a two-microphone binaural setup on an Arduino-based EMoRo platform, which utilises a two-step to multi-step ITD approach in order to account for Y-dimensional uncertainty. Related paper: ITD Binaural Cue Processing (TechRxiv preprint).
- **Eye Tracking Camera:** Designed and implemented a two-axis embedded camera mechanism for real-time facial tracking and servo control using Google Coral TPU and TensorFlow Lite, the project was led by me to create an accurate face tracking camera through 360 servo motors and gear ratio calculations.
- **Franka Panda Path Planning:** An interactive path planning system for the Franka Emika Panda robot in PyBullet simulation, with RRT, A*, STOMP and polynomial interpolation from scratch, path smoothing, and live 3D trajectory visualization, plus an Actor-Critic reinforcement learning controller through the Hugging Face RL course.
- **Facial Recognition Pipeline:** Facial recognition database using Redis for user verification with liveness detection, deployed across private residence security systems.
- **Automatic Number Plate Recognition:** Multi-detection system for extracting vehicle colour and license plate information through YOLO-based detection and OCR plate number extraction, deployed on compound gates for automatic user plate entry.

TECHNICAL SKILLS

- **Robotics:** ROS2, RViz, MoveIt, SLAM, DWA, APF, D* Lite, multi-field path planning, behaviour control, fuzzy logic, differential-drive robots, ASVs, robot simulation
- **AI and Perception:** PyTorch, TensorFlow, YOLO, U-Net, SAM2 distillation, monocular depth, VQ-VAE, PaSST embeddings, CRNN, representation learning, computer vision, signal processing
- **Embedded AI and Hardware:** Jetson Orin/Nano, TensorRT, CUDA, JetPack 6, DeepStream, OAK-D/DepthAI, Coral TPU, Raspberry Pi, Arduino, ESP32, LiDAR, IMU, IoT sensors
- **Programming and Tools:** Python, C++, C, MATLAB, C#, Node.js, Linux, Git, Conda, Redis, L^AT_EX, Webots, Gazebo, Isaac Sim, PyBullet, OpenCV

LANGUAGES

- Arabic (native)
- English (advanced proficiency)