Abanob SOLIMAN

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Professional Experience

Feb 2025 – Present	 Postdoctoral Researcher, University of Twente – Faculty of Geo-Information Science and Earth Observation (ITC), Enschede, The Netherlands Researcher (Postdoc) in Off-Road SLAM and Advanced Perception. Spearheading a pioneering project in off-road SLAM and advanced perception, focusing on robust sensor fusion (lidar, camera, IMU) and semantic segmentation in forest environments. Designing, implementing, and optimizing deep learning-based perception algorithms using Python, C++, PyTorch, and ROS for autonomous navigation.
May 2023 –	ADAS Algorithm Engineer, Continental Engineering Services, Burgess Hill, United Kingdom
Dec 2024	 Contributed to R&D projects with the Ultrasonics and Low-speed Maneuvering Functions team for major Automotive and Aerospace OEMs.
	 Delivered MLC50/55/60 AUTSOAR C++14 compliant software for an automated parking solution in production at a leading British Automotive OEM.
	 Developed an IMU (Gyro/Accel/Mag) and RTK-GPS optimization-based sensor fusion algorithm for a drone odometry pipeline, supporting a radar mapping solution in an eCAL middleware environment.
	• Created a novel spatio-temporal synchronization scheme for 12 ultrasonic sensors using Genetic Algorithm optimization, and validated it via extensive Monte Carlo simulations.
	\odot Developed a Qt5/C++ plugin for SiL and HiL testing of a Short-Range Radar (SR-Radar) parking solution.
	\odot Implemented and tested a novel adaptation algorithm to interface SRR630 detections with an established parking perception pipeline using Ultrasonic Sensors (USS), as a proof-of-concept for software reusability within a software-defined vehicle architecture, in Embedded C++.
	 Developed a novel collision-free USS firing pattern hashing function using MATLAB/C++ and a Gaussian Mixture Model with MD5, applied to 10K+ vehicles from leading British, Indian, and Japanese Automotive OEMs.
	• Developed a transformer-based method to generate the Ultrasonic sensors firing sequences on-vehicle in real-time.
	• Delivered technical presentations and proposals to major Automotive OEMs, including British, Indian, and American manufacturers.
Oct 2020 –	Doctoral Researcher, IBISC Laboratory - SIAM Team, Essonne, France
Oct 2023	 Research goal: Solutions for hybridizing multiple sensor modalities: (RGB - Depth - Event) cameras and IMU/GPS.
	\circ Teachings: C/C++ for L2, and L3 levels, Electronic Circuits for L2 level, Advanced Artificial Perception, and supervising projects for master students.
	 Additional activities: I was the PhD students' representative at the lab's council and supported the preparation of the PhD students' day of the IBISC lab.
Feb 2020 –	Research Assistant - Sensor Fusion, IBISC Laboratory - MALIN Challenge, Essonne, France
Sep 2020	 The localization system features two phases, a preliminary optimization stage, followed by a multi-sensor (IMU/GPS-camera) fusion process using ES-EKF.
Feb 2019 –	Teaching Assistant, Nile University - Computer Engineering Department, Giza, Egypt
Aug 2019	• Assigned courses: Computer Systems Software, Logic Design, Embedded, Discrete Control Systems, and Computer Security.

Jul 2018 - Embedded Systems Intern, EmbeddedFab Company, Giza, Egypt

- Nov 2018 Training included embedded software development on various architectures and writing usable drivers for industrial sensors and actuators.
 - Valeo (Egypt) Testing Academy participant August 2018.

Academic Qualifications

- Feb 2024 Lecturer Qualification No. 24261392899, French Ministry of Higher Education and Research Section: 61 - Computer Engineering, Automation and Signal Processing.
- Oct 2023 **Doctoral Degree in Signal and Image Processing Sciences**, *Université Paris-Saclay*, France School of Engineering and Systems.
- Sep 2020 Master's in Smart Aerospace and Autonomous Systems, Université Paris-Saclay, France School of Engineering and Systems.

Grade: 16.778 / 20.0 (Très bien - Excellent) - US/CA GPA Equivalency: 4.0/4.0 - Rank: 1st

Jun 2018 Bachelor's in Aerospace Engineering, Cairo University, Giza, Egypt School of Engineering. Grade: 88.89% (Distinction with Honours) - US/CA GPA Equivalency: 4.0/4.0

Funded Projects

Aerospace Autonomous Navigation System, Development: MATLAB, C++ Engineered a stabilization system for a quadrotor and developed collision avoidance and navigation algorithms.

Flight Simulator Platform Funded by BOEING, Development: C/C++, Matlab/Simulink Created a motion cueing algorithm for a 6 DOF platform simulator, improving realism in pilot training. (Video simulation)

Technical Skills

Proficient Embedded C/C++, Python, MATLAB/Simulink, Scientific/Embedded RUST
Experienced Helix QAC, Git Cl/CD, GoogleTest C++, Qt5, eCAL, ROS1, ROS2
Familiar JAVA, AutoSAR, DL/ML, JTAG, ARM Microcontroller SW/HW Flashing & Debugging
Libraries OpenCV, Scipy, scikit-learn, PCL, Ceres, GTSAM, G2O, ORB-SLAM, CARLA
Platforms Confluence, Docker, Linux, JIRA, AutoSAR Builder, DOORS Requirement Management Tool

Highlighted Scientific & Technical Contributions

G https://scholar.google.com/citations?user=dN49z7MAAAAJ&hl=en

https://orcid.org/0000-0003-4956-8580

Peer-reviewed Publications

2024 GPS-Enhanced RGB-D-IMU Calibration for Accurate Pose Estimation Journal: Part of the book series Communications in Computer and Information Science Link: https://link.springer.com/chapter/10.1007/978-3-031-66743-5_14 Role: First author, Theoretical Conception & Practical Implementation, Extensive Evaluation. 2024 DH-PTAM: A Deep Hybrid Stereo Events-Frames Parallel Tracking And Mapping System

Journal: IEEE Transactions on Intelligent Vehicles Link: https://ieeexplore.ieee.org/document/10553268 Code: github.com/AbanobSoliman/DH-PTAM Role: First author, Theoretical Conception & Practical Implementation, Extensive Evaluation.

2023 Visual Odometry Using Heterogeneous Cameras for Simultaneous Localization and Mapping for Autonomous Vehicles

Defense date: October 5th, 2023 NNT: 2023UPAST119 Speciality: Signal and Image Processing Sciences Link (Online PDF): https://theses.fr/2023UPAST119 Role: My PhD Thesis.

2023 IBISCape: A Simulated Benchmark for multi-modal SLAM Systems Evaluation in Largescale Dynamic Environments

Journal: Journal of Intelligent & Robotic Systems Link: springer.com/article/10.1007/s10846-022-01753-7 Code: github.com/AbanobSoliman/IBISCape Role: First author, Theoretical Conception & Practical Implementation, Extensive Evaluation.

2023 MAV Localization in Large-Scale Environments: A Decoupled Optimization/Filtering Approach

Journal: Sensors - MDPI, Basel, Switzerland Link: mdpi.com/1424-8220/23/1/516 Code 1: github.com/AbanobSoliman/VIO_RGB_IMU Code 2: github.com/AbanobSoliman/B-splines Role: First author, Theoretical Conception & Practical Implementation, Extensive Evaluation.

2023 Flow-Based Visual-Inertial Odometry for Neuromorphic Vision Sensors Using Non-Linear Optimization with Online Calibration

Conference: 18th International Conference on Computer Vision Theory and Applications Location: Lisbon, Portugal Role: Contributing author, Optimization Software Development in C++, Extensive Evaluation.

2023 Robust RGB-D-IMU Calibration Method Applied to GPS-aided Pose Estimation Conference: 18th International Conference on Computer Vision Theory and Applications Location: Lisbon, Portugal Code: github.com/AbanobSoliman/HCALIB Role: First author, Theoretical Conception & Practical Implementation, Extensive Evaluation.

Seminars (Contributing Talk)

- 2022 **Towards an Event-based Color-encoded Vision for Robotics** Event: Emerging visual sensors for robotics, GdR Meeting - 10/11/2022 Location: SORBONNE UNIVERSITY, Paris, France Link: gdr-iasis.cnrs.fr/reunion/484
- 2022 Heterogeneous sensors... Fusion and odometry! Event: IBISC laboratory PhD students annual day - 23/03/2022 Location: IBISC LABORATORY, Pelvoux, France Link: ibisc.univ-evry.fr/journee-des-doctorants-du-laboratoire

References

Alexandre Durand, Head of Business Center, Continental Engineering Services Ltd mailto:alexandre.durand@conti-engineering.com

Hayley Scanlon, Recruitment Business Partner, Continental Engineering Services Ltd ✓ mailto:au_lx_sm_ces.uk.hr@conti-engineering.com

Samia Bouchafa-Bruneau, Professor, Director of UFR-ST, Université Paris-Saclay ■ mailto:samia.bouchafa@univ-evry.fr

Désiré Sidibé, Professor, IBISC Laboratory, Université Paris-Saclay ☑ mailto:drodesire.sidibe@univ-evry.fr