Abanob SOLIMAN

ADAS Algorithm Engineer
Ph.D. in Signal & Image Processing

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Professional Experience

May 2023 –
Dec 2023

Algorithm Engineer, *Continental Engineering Services Limited*, Burgess Hill, United Kingdom
- 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.
- Developed a Qt5/C++ plugin for SiL and HiL testing of a Short-Range Radar (SR-Radar) parking solution.
- 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 –
Oct 2023

Doctoral Researcher, *IBISC Laboratory - SIAM Team*, Essonne, France
- Research goal: Solutions for hybridizing multiple sensor modalities: (RGB - Depth - Event) cameras and IMU/GPS.
- 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 –
Sep 2020

Research Assistant - Sensor Fusion, *IBISC Laboratory - MALIN Challenge*, Essonne, France
- 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 –
Aug 2019

Teaching Assistant, *Nile University - Computer Engineering Department*, Giza, Egypt
- Assigned courses: Computer Systems Software, Logic Design, Embedded, Discrete Control Systems, and Computer Security.

Jul 2018 –
Nov 2018

Embedded Systems Intern, *EmbeddedFab Company*, Giza, Egypt
- 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 CI/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

ⓘD 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 Large-scale 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
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