MUHAMMAD FARHAN AHMED

Ph.D candidate interested in Robotics research with practical experience in design and development of Embedded systems for Industrial automation.

itsfarhan@outlook.com +33 xx xx xx xx 15 Nantes, France
MFA Muhammad Farhan Ahmed MF-Ahmed
Pakistani (with Schengen visa)

WORK EXPERIENCE

Principal Engineer (Plant Automation Group)

Smart PCBs

December 2019 – July 2021 Islamabad, Pakistan

- **Team leader** for plant automation group. Supervised and guided a team of 2 automation engineers and 4 technicians. Mentored team members, providing training and support to enhance their technical and professional skills.
- **Implementation** of QMS and 5S (ISO-9001) methodology to improve workplace organization, efficiency, and safety. Conducted regular 5S audits and training sessions to ensure adherence to standards.
- **Development** of project plans, timelines, and efficient resource allocation. Monitoring of project progress, ensuring milestones, and adjusting plans as necessary. Preparation and presentation of regular status reports to senior management.

Senior Engineer (Design and Development)

December 2012 – November 2019 Islamabad, Pakistan

- **Designed and developed** hardware and firmware for PIC32 series Microcontroller-based embedded systems, enabling industrial plant control and real-time monitoring of pneumatic valves, temperature, and pressure sensors.
- **Developed** control system testing strategies for value interlock testing and verification aligned with control philosophy to ensure reliable/robust plant operations.
- **Supervision and training** of control systems operator personnel.
- **Monitored and diagnosed** control system issues, implemented solutions to minimize downtime, and conducted rigorous testing and validation of embedded systems to ensure compliance with industry standards and regulations.
- **Designed and developed** an inverter power distribution system to ensure efficient load switching for HVAC, CNC, and welding machines.
- Designed a 30-channel HVAC chiller and pump remote status monitoring and logging system for efficient plant operation.
- **Designed and implemented** a remote diesel-level monitoring and logging system for four 1000L fuel storage tanks used for backup generators.

Assistant Engineer (Maintenance)

July 2007 – November 2012 Islamabad, Pakistan

- **Develop and implement** preventive maintenance schedules of plant process control systems and conduct regular inspections for identification and removal of faulty equipment.
- **Ensure** all maintenance activities comply with safety standards and regulations. Conduct safety inspections and risk assessments to identify and mitigate potential hazards.
- **Maintain** detailed records of all maintenance activities, including inspections, repairs, and replacements. Keep technical documentation, such as equipment manuals and maintenance procedures, up to date.
- **Identify** opportunities for improving maintenance processes and implement best practices to enhance efficiency. Provide training and development for junior maintenance personnel to enhance their skills and knowledge.
- **Commissioning and installation** of CNC machines.

TECHNICAL EXPERIENCE

Design, development and maintenance of microcontroller based embedded systems for data acquisition, control, monitoring and automation applications of industrial plant process using Microchip PIC/Atmel AVR Series microcontrollers. Summarized as follows

- Instrumentation, monitoring, control and status logging of temperature and pressure sensors, pneumatic valves, chiller status, pumps and servo/stepper motors with reference to industrial plant control philosophy.

EDUCATION

Ph.D. in Robotics (Expected November 2024)

École Centrale de Nantes, LS2N, France

Nov 2021 – Nov 2024 Nantes, France

Thesis title: Collaborative active SLAM and distributive navigation strategies for high precision relative localization in heterogeneous fleets of ground and aerial vehicles.

Masters in Advance Robotics - ROBA

École Centrale de Nantes, France

Sept 2014 – Aug 2015 Nantes, France

EMARO (European Master on Advanced Robotics)

Masters in Robotics Engineering

University Of Genoa, Italy

Sept 2013 – July 2014 Genoa, Italy

EMARO (European Master on Advanced Robotics)

B.E (Electronics Engineering)

Mehran University, Pakistan

Sept 2002 – July 2006 Karachi, Pakistan

SKILLS

- Programming
  Python | C++ | Embedded C/C++/Assembly | PyQT5 | ROS1/2 | MatLab/Octave | Ubuntu
- Robotics
  Mobile Robots | Aerial Robots | SLAM | Mapping | Path Planning | Autonomous Navigation | Graph Theory | Graph Optimization | Computer Vision
- Embedded Systems
  PIC32 | PIC24 | Atmega2560 | I^2C | SPI | USART | ADC | DAC | Timers | Interrupts | Driver Programming | MPLABX | AVR Studio
- Electronics Engineering
  instrumentation | Sensor interfacing | Motor control | Digital Logic design | Maintenance

SUPERVISION & TEACHING

Undergraduate Project Supervision

Comparative study of ORBSLAM2 and CCM SLAM

March-April 2024 ECN, LS2N, Nantes, France

- A comprehensive comparative study was performed between ORBSALM2 and CCM SLAM, two popular single and multi-agent visual SLAM methods.

Master M2 Thesis co-supervision

Synchronous and Asynchronous Coordination in Collaborative Active SLAM

April-July 2023 ECN, LS2N, Nantes, France

- Programming in C/C++, Python, and Assembly on MPLABX, AVR studio, MikroC and Keil IDEs using compilers from Microchip C16/C18/C30/C32, CCS C, WinAVR, HI-TECH_PICC_Compiler.
- GUI, software simulators and MIMIC deign for data acquisition, logging and reporting for industrial process automation systems.

RESEARCH INTERESTS

Ph.D Candidate/Researcher

Laboratoire des Sciences du Numérique de Nantes (LS2N)
École Centrale de Nantes, France

December 2021 – Ongoing Nantes, France

Research Interests

- Multi-robot active autonomous navigation and mapping (Active SLAM) for environment exploration and mapping.
- Mobile robot environment exploration exploiting frontiers and entropy.

PEER REVIEWED PUBLICATIONS

Journal Articles

- **M. F. Ahmed**, K. Masood, V. Fremont, and I. Fantoni, "Active slam: A review on last decade," *Sensors*, vol. 23, no. 19, 2023, ISSN: 1424-8220. DOI: 10.3390/s23198097.

Conference Proceedings

- **M. F. Ahmed**, V. Frémont, and I. Fantoni, "Active slam utility function exploiting path entropy," in *2023 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI)*, **Best student paper award**, 2023, pp. 1–7. DOI: 10.1109/SOLI60636.2023.10425063.

COURSES AND WORKSHOPS

- Basic Management Course (BMC) at PIEAS, Islamabad, Pakistan Nov-Dec 2017.
- Attended "innorobo" robots exhibition/workshop at Lyon, France July 2015.
- Course on"FPGA based Chip Designing Using Verilog HDL" March-May 2012 form Skill Development Council (SDC) Islamabad, Pakistan.
- Workshop on "Engineers as Managers" Nov 2009 at CASE Islamabad, Pakistan.
- Workshop on "FPGA Chip Design" Nov 2008 at NUST Rawalpindi, Pakistan.
- Course on "Microcontroller (MCS-51 Family)" Jan-Mar 2005. Karachi, Pakistan.

OTHER ACTIVITIES

Invited Presentations

"Entropy-Based Multirobot Active SLAM"

October, 2023 Moliets dans les Landes, France

Journées Nationales de la Recherche en Robotique

Collaborative Active SLAM

April, 2023 Vannes, France

SIS doctoral school seminar

"Active SLAM and MPC and DRL formulation"

February, 2023 Nantes, France

ARMEN Team seminar

"Visual Odometry And Its Application to SLAM"

November, 2022 Nantes, France

Student seminar

- Organiser monthly student seminar of ARMEN team from November 2022 to September 2023.
- Two navigation strategies along-with efficient frontier sharing strategies are proposed which enhance active exploration and mapping by a team of ground robots.

Master M1 Project supervision

Deep learning-based Distributed UAV Target Detection over Multi-sensor Network

March-May 2022 ECN, LS2N, Nantes, France

- UAV target detection based on CenterNet (CNN) and sensor fusion using weighted average consensus.

Master M2 Lab teaching

Implementation of ICP on nuScenes dataset for AUVE subject

Nov 2022 ECN, Nantes, France

- Application of ICP algorithm for localization and Occupancy Grid Mapping on real driving data from NuScenes dataset.

LANGUAGES

English
French

REFEREES

To respect privacy of references, the contact details will be provided upon request.

Vincent FRÉMONT
Full Professor, École Centrale de Nantes, NU
Ph.D Thesis Supervisor
xxxx@xxxx.fr
+33 xx xx xx xx xx

Isabelle FANTONI
CNRS Director of Research,LS2N
Ph.D Thesis Co-Supervisor
xxxx@xxxx.fr
+33 xx xx xx xx xx