

# Seyed Amir Alavi | Embedded Systems Engineer

Location: London, UK

Mobile: +44 (0)7741087775

Email: [s.alavi@qmul.ac.uk](mailto:s.alavi@qmul.ac.uk)

Website: <http://samiralavi.github.io>

LinkedIn: <http://www.linkedin.com/in/seyed-amir-alavi>

## Personal Profile

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As an embedded systems engineer, I have designed different types of embedded systems in several areas such as the Internet of Things (IoT), industrial control systems, and communication networks. I try to employ the latest technologies for software and hardware development, from embedded Linux to different real-time operating systems (RTOSs), and agile software development processes. Model-based embedded system design and implementation is my main expertise, which I have done during the last several years. During my doctoral study at Queen Mary University of London (QMUL), I have worked on the development of multi-agent embedded systems for distributed control power systems, which operate over IoT wireless communications protocols with different objectives. I have published several papers in high impact engineering journals and presented my research in top rank conferences around the world.

## Skills

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|-------------------------------|----------------------------|-------------------------|
| ➤ C, C++, OOP                 | ➤ Embedded Linux           | ➤ AVR 8 Bit and Arduino |
| ➤ Python                      | ➤ Qt/QML C++, JavaScript   | ➤ ARM Cortex M3/M4      |
| ➤ MATLAB/SIMULINK             | ➤ RTOS (FreeRTOS, RIOT OS) | ➤ Altium PCB Designer   |
| ➤ IoT Communication Protocols | ➤ Industrial HMI Design    | ➤ Linux Device Driver   |
| ➤ PLC Programming (FBD, STL)  | ➤ CI/CD (Gitlab)           | ➤ Git VCS               |

## Career summary

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**May 2018– Present, Firmware Engineer, Contract**  
**Voltaware, London, United Kingdom**

Power disaggregation and residential energy monitoring are the main services of Voltaware. Voltaware's mission is to use electricity data to make homes more efficient, greener, reliable, and secure. Credit-card sized, the patented Voltaware smart meter can be installed in any fuse box. Voltaware meters collect high-resolution data and monitor energy usage in real-time. Voltaware uses AI to track energy consumption down to the appliance level. My role at Voltaware is the development of the firmware for different variations of smart meters such as single-phase, three-phase, cellular, and WiFi/BT models.

### *Key responsibilities*

- Introduction of agile development to the firmware to support CI/CD
- Product owner in the firmware development team
- Development of support for communication protocols such as MQTT, TLS, etc.
- Data collection and primary analysis for device signature recognition
- Development of test bench for performance validation of DSP algorithms

**December 2017– Present, Research Assistant, Teaching Fellow, Contract**  
**Queen Mary University of London, London, United Kingdom**

As a Ph.D. candidate at QMUL, I was involved in several research projects and teaching responsibilities. The following titles, describe briefly the research projects and teaching responsibilities I have finished so far during my Ph.D. study:

- Aged Lithium-Ion batteries as a low-cost solution for rural microgrids
- Stabilization of DC microgrids under uncertainties of renewable sources generation
- Hyperuniform positioning of wireless access points for optimized coverage
- Teaching: Advanced Control Systems, Power Electronics, and Electrical Machines Modules

**Jul 2015 – Sep 2017, Embedded System Designer, Permanent**  
**Gostaresh Hararat Matboe Nour (GHMN), Tehran, Iran**

At GHMN, I was responsible for the analysis of requirements, product design, and development. The main products were IoT-based remote controllers, smart home automation, and HVAC control systems. I employed the latest technologies to develop reliable embedded systems with minimum time-to-market using embedded Linux, Qt, and IoT communication protocols such as MQTT and CoAP.

*Key responsibilities*

- Product features analysis based on customer requirements
- Coordinating team of engineers for hardware design and firmware development
- Development of HMI software and UX based on Qt/QML
- Hardware architecture design based on 8-bit AVR and 32-bit ARM microcontrollers
- The representative of the company in conferences and seminars
- Academic coordinator of the company with several universities for joint industrial projects

*Key achievement*

- I designed the required technology core for the company in order to design new products. This basis enabled the company to further release new products in the area of IoT and Smart City.

**March 2015 – July 2015, Embedded Hardware Designer, Contract**  
**Integrated Electronics Industries, Tehran, Iran**

Here my role was about designing the hardware for communication modules which were integrated as plugins for network switches. Fiber optic SFP modules and Fast-Ethernet modules were the main products.

*Key responsibilities*

- Hardware engineering with impedance controlled stack up in Altium Designer
- Features test and quality control

**Sep 2014– May 2015, Embedded Software Developer, Contract**  
**Pouyesh Samtech Fartak, Tehran, Iran**

As an embedded software developer, my role was about the analysis and development of several communication protocols for layer three managed Ethernet switches.

*Key responsibilities*

- Analysis of managed Ethernet switch security features
- Development of software stack for packet sniffing and analysis
- Implementation of security functions such as DHCP Snooping, Dynamic ARP Inspection, MAC filtering, and UDLD (Unidirectional Link Detection)

## Projects

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**Jun 2016 – Oct 2016, 3D Printer Product Development**  
**Ahvans Consultation, Tehran, Iran**

In this contract project, I was coordinating the team consisting of a mechanical engineer, an electronic engineer, and a software engineer to design a new 3D printer prototype with a customized user interface.

**Mar 2013 – Sep 2013, Real-Time Substation Distributed Control System (DCS) Simulator Development**  
**Based on IEC 61850 Communication Standard**  
**Shahid Beheshti University, Tehran, Iran**

In this project, a DCS simulator for substation operator training was developed. The substation model was implemented in MATLAB/SIMULINK and the network system was implemented in the OMNeT++ network simulator. The HMI was developed in C#.NET to resemble the real HMI used in the field. This project won the best project prize in the control engineering department. My role in this teamwork was the development of the HMI and interfacing it with the mentioned real-time simulators.

**Dec 2011 – Mar 2012, Development of a transmission line design computational software titled “TLineM”**  
**based on IEEE standards**  
**Shahid Beheshti University, Tehran, Iran**

This educational tool helped students and researchers to select the correct cable size and pattern for the transmission lines, based on the specified requirements. The software development was done in C#.NET using Windows Forms framework.

## Education

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- **Ph.D. *Electronics Engineering (Scholarship)*** – Queen Mary University of London, UK  
(Current Status: Thesis Submission)
- **MSc. *Control Systems Engineering, 3.50/4*** – Shahid Beheshti University, Tehran, Iran – 2017
- **BSc. *Electrical Engineering, 3.05/4*** – Power & Water University of Technology, Tehran, Iran – 2013

## Publications

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My most recent publications are listed as follows. For a complete list of my publications please refer to my [Google Scholar profile](#).

- "Optimal Observer Synthesis for Microgrids With Adaptive Send-on-Delta Sampling Over IoT Communication Networks" IEEE Transactions on Industrial Electronics, 2020.
- "A distributed event-triggered control strategy for DC microgrids based on publish-subscribe model over industrial wireless sensor networks." IEEE Transactions on Smart Grid, 2019.
- "Microgrid Optimal State Estimation Over IoT Wireless Sensor Networks With Event-Based Measurements." IECON 2019-45th Annual Conference of the IEEE Industrial Electronics Society, IEEE, 2019.
- "A Distributed Control Strategy with Fractional Order PI Controller for DC Microgrid" 2019 Smart Grid Conference (SGC), IEEE, 2019.
- "Voltage control in LV networks using electric springs with coordination." 2018 IEEE Canadian Conference on Electrical & Computer Engineering (CCECE). IEEE, 2018.
- "An IoT-based data collection platform for situational awareness-centric microgrids." 2018 IEEE Canadian conference on electrical & computer engineering. IEEE, 2018.

## Languages

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English (Professional proficiency): IELTS Academic, Overall: 7  
Persian (Native)