

Ashfaq Farooqui

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EDUCATION

CHALMERS UNIVERSITY OF TECHNOLOGY | PHD STUDENT
October 2015 – Present | Gothenburg, Sweden

CHALMERS UNIVERSITY OF TECHNOLOGY MS IN SYSTEMS, CONTROLS & MECHATRONICS
2013 - 2015 | Gothenburg, Sweden

BMS INSTITUTE OF TECHNOLOGY BE IN ELECTRONICS & COMMUNICATION
2008 - 2012 | Bangalore, India

RESEARCH INTERESTS

- Supervisory Control Theory
- Discrete Control
- Distributed Control
- Formal Methods
- Automation
- Artificial Intelligence

LINKS

Github:// ashfaqfarooqui
LinkedIn:// ashfaqfarooqui

COURSEWORK

FORMAL METHODS

- Logic in Computer Science
- Algorithms
- Formal Verification of Hardware: Why, When, How?
- Formal methods in software development
- Supervisory Control Theory

AUTONOMOUS SYSTEMS

- Autonomous and Cooperative Vehicular Systems
- Humanoid Robotics
- Chalmers Formula Student
- Embedded Control Systems

MANAGEMENT

- Applied Project Management
- Reflecting on Leadership Perspectives and Contexts

EXPERIENCE

NOKIA NETWORKS | SOFTWARE ENGINEER

July 2012 – August 2013 | Bangalore, India

- Development and maintenance of a Telecommunication Management Network software.
- Automated testing using Robot Framework.
- JUnit (Unit testing framework for Java) test case code reviewer.

PROJECTS

MASTER THESIS: INTERFACING A COLLABORATIVE ROBOT AND TRUCK

January 2015 – August 2015 | Gothenburg Sweden

- Building a platform for rapid prototyping and testing of applications.
- Automation platform interfacing a collaborative robot, a truck, and the workshop.
- Built using Robot operating system (ROS) as the middleware component.

CAROLO CUP

September 2014 – February 2015 | Gothenburg, Sweden

- Design and build a 1:10 scaled autonomous car to compete in Carolo Cup.
- Responsible for the system integration and driving algorithm.

CHALMERS FORMULA STUDENT

September 2013 – August 2014 | Gothenburg, Sweden

- Design, implementation and testing of hardware and software systems for a formula style weekend race car to compete in FSUK, and FSG.
- Responsible for data acquisition and logging, safety system, and control algorithm for automated gear-shifting

TEACHING AND SUPERVISION

- Master thesis - Learning EFA models for self-driving cars, Supervisor, Ongoing
- Master Thesis - 3D simulations to validate an algorithm which generates supervisors automatically, Supervisor
- Automatically Learning Formal Models of Systems with Large Alphabets by Reducing the Alphabet Size, (SSY226), Supervisor, Autumn, 2020
- Industrial Automation (SSY066), TA, 2015-2020
- Selecting Active Automata Learning Algorithm Based on Model Characteristics (SSY226), Supervisor, Autumn 2019
- Autonomous Twizy - Simulation using Apollo Auto (EENX15 2018) , Supervisor, 2018
- Handling Unlabelled Event-logs to Discover Process Models in an Automotive Production Line (SSY226), Supervisor, 2017
- Applied Mechatronic Design (SSY261), TA, 2016-2018

SKILLS

PROGRAMMING

Over 5000 lines:

• Scala • Python • Embedded C

Over 1000 lines:

• Java • C++

TOOLS & FRAMEWORKS

- ROS • OpenDaVINCI
- STM32 • AVR-Arduino
- Kicad • Altium
- GNU/Linux • Git

SELECTED TALKS

INVITED TALK

Title: Supervisory Control Theory; A classical AI approach to build reliable systems

Description: Introductory talk about Supervisory Control theory for bachelor students.

LICENTIATE SEMINAR

Title: Towards Automatic Generation of Formal Models for Highly Automated Manufacturing Systems

Supervisor: Martin Fabian

Description: The manufacturing industry is undergoing a digital revolution, often referred to as Industry 4.0. The aim of this revolution is to transform the factories into, so called, smart factories. The need for having digitalized tools that support operators and engineers was identified in a survey that was conducted to understand the problems faced during maintenance of manufacturing systems. This talk presents an architecture that can be applied on old legacy systems as well as new state-of-the-art systems to collect data from the factory floor. The data obtained can be visualized in the form of Gantt charts to help operators keep track of the execution of the station. Furthermore, the talk describes a method to learn a behaviour model of the system by actively interacting with its simulation.

MASTER THESIS

Title: Interfacing a Collaborative Robot and Truck

Supervisor: Petter Falkman

Description: This talk presents a generic application platform capable of interfacing a collaborative robot with a truck, technician, and other external systems as a proof of concept. This platform can then be used to create autonomous applications that perform specific tasks on the truck. To be able to make this platform expandable, it is designed as a distributed system using the Robot Operating System as the middleware and building an application-specific layer above it. The application can be modeled as a discrete event system using the available model generator.

PUBLICATIONS

- [1] Ashfaq Farooqui. *On Supervisor Synthesis via Active Automata Learning*. PhD thesis, Chalmers University of Technology, 2021.
- [2] Ashfaq Farooqui, Ramon Tijssen Claase, and Martin Fabian. On Plant-Free Active Learning of Supervisors. 2021. Submitted to Transactions on Automation Science and Engineering.
- [3] Yuvaraj Selvaraj, Ashfaq Farooqui, Ghazaleh Panahandeh, Wolfgang Ahrendt, and Martin Fabian. Automatically Learning Formal Models from Autonomous Driving Software. 2021. Submitted to JASE Special Issue on Recent Trends in Model-based Engineering of Automotive Systems.
- [4] Ashfaq Farooqui and Martin Fabian. Mides: A tool for supervisory synthesis via model inference. IEEE, 2021. Submitted to 2021 IEEE 17th International Conference on Automation Science and Engineering (CASE).
- [5] Yuvaraj Selvaraj, Ashfaq Farooqui, Ghazaleh Panahandeh, and Martin Fabian. Automatically learning formal models: An industrial case from autonomous driving development. In *ACM/IEEE 23rd International Conference on Model Driven Engineering Languages and Systems (MODELS '20 Companion)*, 2020.
- [6] Ashfaq Farooqui, Fredrik Hagebring, and Martin Fabian. Active learning of modular plant models. In *In Proceedings of Workshop on Discrete Event Systems, 2020, Rio, Brazil, 2020*.
- [7] Fredrik Hagebring, Ashfaq Farooqui, and Martin Fabian. Modular supervisory synthesis for unknown plant models using active learning. In *In Proceedings of Workshop on Discrete Event Systems, 2020, Rio, Brazil, 2020*.
- [8] Ashfaq Farooqui, Kristofer Bengtsson, Petter Falkman, and Martin Fabian. Towards data-driven approaches in manufacturing; an architecture to collect sequences of operations. *International Journal of Production Research*, 2019.
- [9] Ashfaq Farooqui and Martin Fabian. Synthesis of supervisors for unknown plant models using active learning. In *2019 IEEE 15th International Conference on Automation Science and Engineering (CASE)*. IEEE, 2019.
- [10] Ashfaq Farooqui. Towards automatic generation of formal models for highly automated manufacturing systems. 2018. Licentiate Thesis.
- [11] Ashfaq Farooqui, Kristofer Bengtsson, Petter Falkman, and Martin Fabian. From factory floor to process models: A data gathering approach to generate, transform, and visualize manufacturing processes. *CIRP Journal of Manufacturing Science and Technology*, 2018.

- [12] Ashfaq Farooqui, Petter Falkman, and Martin Fabian. Towards automatic learning of discrete-event models from simulations. In *2018 IEEE 14th International Conference on Automation Science and Engineering (CASE)*, 2018.
- [13] Ashfaq Farooqui, Kristofer Bengtsson, Petter Falkman, and Martin Fabian. Real-time visualization of robot operation sequences. In *16th IFAC Symposium on Information Control Problems in Manufacturing*, volume 51, pages 576–581, 2018.