

Topics for BWL Bachelor Thesis 2017

Benedikt Kirpes (benedikt.kirpes@uni-mannheim.de)

Topic 1: Incentives for Platooning

Supervisor: Christian Krupitzer

Adaptive Cruise Control (ACC) enables vehicles to drive autonomously. Cooperative Adaptive Cruise Control (CACC) complements ACC by communication capabilities for cooperation. This enables cooperative driving activities, such as platooning. Platooning is a method of grouping vehicles for increasing the capacity of roads.

The position in a platoon is a critical factor as vehicles in mid positions perceive higher benefits in terms of fuel savings. Therefore, vehicles in the front as well as the end of the platoon needs to get compensations. The objective of this Bachelor thesis to analyze how drivers can be incentivized to use platooning and how to achieve compensation for the different positions.

Topic 2: Comparison of Development Methodologies for Self-adaptive Systems

Supervisor: Christian Krupitzer

Self-adaptive Systems (SAS) are an emerging trend in software engineering. These systems modify their behavior at run-time to maintain their performance after changes in the system resources or the environment. This is called adaptation. Therefore, an adaptation logic monitors the system resources and the environment, analyzes the monitored results, develop change plans, and execute changes.

The objective of this Bachelor thesis is to present and compare existing development methodologies and processes for SAS based on a given taxonomy.

Topic 3: A Survey on Distributed Computing

Supervisor: Dominik Schäfer

Distributed Computing augments the computation power of devices. By distributing the workload of a computation intense task to remote machines, applications get access to enormous computation power. Volunteer computing is one flavour of distributed computing which connects heterogeneous hardware to powerful virtual machines.

The objective of this thesis is to display the complete spectrum of distributed computing approaches. This includes a broad literature analysis and a categorization of the findings.

Topic 4: State of the Art in Cryptocurrencies

Supervisor: Dominik Schäfer

Bitcoin is one of many cryptocurrencies that are used for secure payment transactions and for the generation of additional units of those currencies. To realize a cryptocurrency, a couple of mechanisms are necessary to keep integrity and protect the users. Blockchains is one of those technologies.

The objective of this thesis is to describe cryptocurrencies in depth and go in detail about the different technologies that are used. Further, threats and opportunities of cryptocurrencies should be identified.

Topic 5: Survey on Use Cases for Interoperability Approaches in Pervasive Computing

Supervisor: Felix Maximilian Roth

Pervasive systems consist of numerous connected and always available computing devices weaved into our everyday's life, such as smart home systems. They are able to automatically adapt to the context by changing system parameters or altering the context. Many different pervasive middlewares exist which enable pervasive system behavior. However, these pervasive middlewares are usually isolated and not able to work with each other. Different interoperability solutions exist.

Often, these interoperability solutions use different scenarios and use cases in order to show their applicability and feasibility. In this thesis, such use cases should be reviewed and evaluated.

Topic 6: Survey on Privacy Management Approaches in Pervasive Computing

Supervisor: Felix Maximilian Roth

Pervasive systems consist of numerous connected and always available computing devices weaved into our everyday's life, such as smart home systems. They are able to automatically adapt to the context by changing system parameters or altering the context. This requires a lot of information – also about the user. However, users often do not want to share all that information. Therefore, approaches for managing privacy in such systems exist.

In this thesis, approaches for managing privacy in pervasive computing systems should be surveyed and evaluated.

Topic 7: Computation Intensive Applications in Finance

Supervisor: Janick Edinger

Algorithms in computational finance require huge amounts of processing power that exceed the power of single computation devices. Distributed computing makes use of unused computation capacities and can help to increase the amount of available resources for these algorithms.

The objective of this thesis is to find example applications for computation intensive tasks in computational finance and discuss how they can be solved in a distributed computing environment.

Topic 8: State of the Art in High-Throughput Computing

Supervisor: Janick Edinger

High-Throughput Computing (HTC) environments deliver a large amount of computational power over a long period of time. They are used for scientific computations to perform simulations and complex algorithms. The key to HTC is to efficiently harness the use of all available resources.

The objective of this thesis is to discuss the state of the art of HTC, including the application areas, the underlying technologies, and the challenges of these environments.

Topic 9: Survey on multimedia-centric Pervasive Middlewares

Supervisor: Jens Naber

We surround ourselves with an increasing amount of multimedia content and additionally we also produce the content and have the need to share it with other people in our surrounding. This can take place for our pleasure with entertaining videos or pictures of our last holiday trip, as well as in working or learning environments, where we share i.e. presentations.

The goal of this thesis is to identify and categorize different pervasive middlewares, which aim to simplify the distribution of multimedia content.

Topic 10: Decreasing complexity: Visual Programming in working environments

Supervisor: Jens Naber

When working with IT systems untrained employees need to rely on the tools given by the application developers or the systems administrators. Even with a good theoretical understanding of the business processes and the obtainable data, it is for most people impossible to configure the working

environment on their own. With the help of visual programming techniques it is possible to give the end-user more control.

The goal of this thesis is to examine existing visual programming approaches for working environments and their application area.

Topic 11: Overview on Obstacles in Autonomous Driving

Supervisor: Martin Pfannemüller

Autonomous or self-driving cars are the next development step in transportation. For a long time, it seemed to be impossible for cars to drive on today's roads autonomously. Nevertheless, present technology is able to control cars without human intervention. However, there are still many problems and it is not very likely to see completely self-driving cars in the very near future.

The goal of this thesis is to identify and categorize major obstacles in the realization and use of self-driving cars today.

Topic 12: Comparison of Ad Hoc Wireless Networks

Supervisor: Martin Pfannemüller

A mobile ad hoc network (MANET) is an infrastructure-less network for changing environments. Vehicular ad hoc networks are a special kind of MANET focusing on Inter Vehicle Communication (IVC). VANETS are used for the communication of smart cars for making, e.g., vehicular platooning possible.

The goal of this thesis is to compare MANETS and VANETS in terms of their network properties. Additionally, the use cases of VANETS should be identified and discussed.

Topic 13: Legal framework for electromobility in the EU

Supervisor: Benedikt Kirpes

The project ELECTRIFIC fosters the growth of electromobility as part of the energy turnaround in Germany and the EU. A long-term goal is the smooth integration of an increasing number of electric vehicles (EV) into environment, infrastructure and power grid. One major factor, impacting the success of e-mobility is the legal framework in Germany and the EU, framing the e-mobility eco-system.

This thesis should present and consistently structure the relevant legal framework of today and the plans for 2030, both on the level of the EU and for Germany.

Topic 14: Smart Contracts powered by Blockchain technology

Supervisor: Benedikt Kirpes

Blockchain technology currently is one of the most hyped topics in the IT and finance sector. It is intended to disrupt whole businesses. Besides the application for cryptocurrencies, some blockchain technologies offer so called smart contracts, which can be used for all kinds of transactions and contracts. Blockchain promises security without involving a third party institution.

The goal of this thesis is a survey of blockchain technologies that support smart contracts and the possible application for electric vehicle charging.