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Motivated by research questions, engineering problems or simply out of curiosity, I design, implement and evaluate systems. Each of these steps requires a comprehensive view of the system at hand: from the user experience to the technology that powers it. Throughout my past experience I have enjoyed this holisitic view - during my previous time at Bosch, projects at University and in every part of my post-graduate research.

Now that my PhD comes to a close, I am looking for new opportunities to apply my broad skillset and excitement for creating technology in a commercial context.

- **2015** Specialist System Architecture, Bosch Connected Devices and Solutions
- **2015** PhD graduation
- **2015** Intern at Microsoft Research, Redmond, USA
- **2012** PhD student/research associate at Lancster University
- **2010** Intern at Mercedes-Benz Research and Development, Palo Alto, CA, USA
- **2008** Working student at Vector Informatik GmbH
- **2008** Computer Science student at Hochschule Furtwangen University
- **2007** University entrance entitlement at Technischen Oberschule Stuttgart
- **2005** Software Developer at Robert Bosch GmbH
- **2002** Apprenticeship as an IT specialist at Robert Bosch GmbH, Stuttgart

Skills and Qualifications (excerpt)

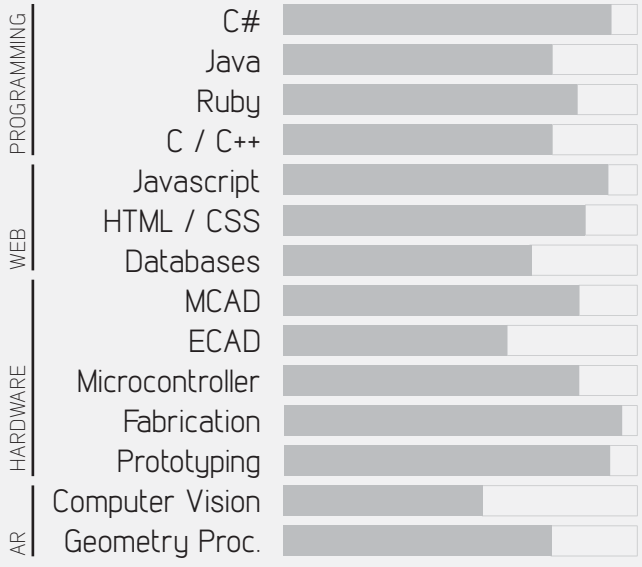
Systems Engineering: from the user experience to the bare metal that powers it. Working with a strong software-engineering background, I have extensive experience with heterogenous component integration in a variety of contexts (augmented reality, electro-mechanical systems, embedded and distributed systems), as well as the user-centered design and evaluation of such systems.

Prototyping: as method for exploring and developing new ideas in a product and resarch setting. Such prototypes range from low fidelity video prototypes to fully functional electro-mechanical, connected and integrated devices.

Presentation: through many public presentations, written papers, blog posts, YouTube videos and internal demonstrations in an enterprise setting. I have learned how to present work-results in an engaging fashion to a given audience.

International work experience: as member of a European research network, based in the United Kingdom, and through multiple internships in the United States.

Technologies (excerpt)



PhD student at Lancaster Unversity

topic area: Human Computer Interaction / Digital Fabrication

from **2012**
until **now**

Skills and Qualifications

Systems Engineering: Due to the systems research nature of my PhD I've practiced structural decomposition of complex systems into components, developed these and integrated them into a coherent system. This affects the whole technology stack: from the user experience to the bare metal it runs on.

User Centered Design: I have acquired system requirements through elicitation studies, focus groups, ethnography or semi-structured interviews; and have extensive experience in evaluating systems through user-studies (particularly designing, planning, describing and executing such studies).

Rapid Prototyping: Fast production of prototypes of varying levels of detail and functionality depending on the state of the process. Ranging from paper and video prototypes to functional, highly integrated, electro-mechanical and connected devices.

Flexible project planning and execution: We align our work on submission deadlines which requires planning, collaboration and synchronization with other researchers and research labs, progress monitoring and integration. Methods employed are typically agile i.e., standups and KANBAN.

Work in an international team: Our research group is highly international with collaborators from Europe, USA, Asia and Africa. The Marie Currie research network I was embedded in was designed to foster inter-European exchange and collaboration.

Work-result presentation: through extensive paper writing, producing video material and websites, presenting at international conferences, as well as at University events.

Technologies

Digital fabrication: Experience with additive and subtractive manufacturing. Additively using 3D printers across the technological spectrum (MakerBot, Ultimaker, UP!, Objet Connex, as well as custom-built 3D printer). Subtractively using laser-cutting and water-jet cutting and five-axis CNC machining.

Augmented Reality: Using commercial products (Vuzix STAR 1200 XLD) and custom built devices based on rear-projection and half-mirror/display assemblies (using a custom gesture recognition pipeline, motion-parallax compensation and feature-based object tracking).

Embedded and Physical Computing: Primarily based on MSP430 or Atmel AVR platforms. Either through the integration of development boards (TI Launchpad or Arduino) or through custom circuit boards I designed. Mechanical systems, including densely integrated actuator arrays, a custom CNC machine or novel use of actuator solutions.

CAD/CAM/Geometric Processing: Use and integration of commercial tools (Autodesk Inventor and SOLIDWORKS), as well as Open-Source software (Blender, OpenSCAD). Custom geometry processing algorithms based on constructive-solid-geometry and spectral geometry processing.

Various programming languages: Depending on the given situation I employed C#, Java, Ruby, Python, R, Javascript (Web and Node.JS), C or C++.

Projects

ReForm

is a digital design system which synchronizes a digital model (of a thing being designed) and its physical counterpart through a combination of 3D scanning as well as additive and subtractive fabrication. Users interact through directly manipulating the physical object or through a rear-projected, physically aligned augmented reality interface.

Responsibilities: Project lead, software, mechanical and electrical engineering, toolpath generation algorithms, augmented reality UI, software integration and paper writing.

Collaboration: with a fellow PhD student (on-site), a lecturer and my supervisor.

Evaluation: application scenarios

Presentation: paper, video (not yet published)

SPATA

explores the integration of connected, bi-directional measurement tools into the digital design process. We built an actuated caliper and protractor, both including a color display and five-way button. They were integrated in a mechanical CAD environment (Autodesk Inventor), a mesh-based modeling environment (Blender) and a 2D design environment (Adobe Illustrator).

Responsibilities: Project lead, software, mechanical and electrical engineering, hard- and software integration, writing.

Collaboration: with two lecturers, my supervisor, and the Universities engineering department

Evaluation: application scenarios

Presentation: paper, IEEE article, video, conference presentation, commercialization in progress

MixFab

situates a digital design environment in physical space through augmented reality. This enables direct manipulation of 3D models through gestures and the seamless integration of existing objects into the design process. We used gestures from our user-defined gesture study and designed a custom software pipeline to recognize these.

Responsibilities: Project Lead, software and mechanical engineering, hard- and software integration, user-studies, paper writing.

Collaboration: with a lecturer, my supervisor, and Microsoft Research Cambridge

Evaluation: user study, application scenarios

Presentation: paper, video and conference presentation

Busfahrn / SenseLamp

is a home-automation system requiring no permanent modifications of the environment during installation. At the core are custom lamp-shades (SenseLamps) which are based on a Linux powered WiFi router for communication, a custom MSP430 sensor board including a light sensor, temperature and humidity sensor, and a relay for switching the a light-bulb. These lamp-shades and out-of-the-box remote controlled power-switches were integrated into a custom Node.JS/Redis based middleware called Busfarhn.

Evaluation: one-year deployment and daily use of five SenseLamps and three remote power-switches.

Presentation: blog entries, Hackaday, GitHub

BSc at Hochschule Furtwangen University

topic area: Computer Science with focus on software engineering (Allgemeine Informatik)

from **2008**
until **2012**

Skills and Qualifications

Formal methods: lectures on first and second order logic, linear algebra, graph theory, numerical methods, complexity theory and model verification (linear temporal logic).

Software engineering methods: requirements engineering, software testing, project management methods

Computer networking: wireless and Ethernet based networks, mobile networks (GSM, 3G)

International contacts and integration: as volunteer in the international student community, the student dorm network administration and student bar organization

Technologies

Embedded platforms: primarily ARM Cortex M3 (Luminary Micro and mbed) and Atmel AVRs (ATTiny and ATmega/Arduino). One term of MIPS assembly.

Various web technologies: PHP integrated with Unix and HP networking systems, Java/JSP/EJB for a commercial website prototype.

Machine learning: Support Vector Machines, Reinforcement Learning and Self-Organizing Maps (resulting in a peer-reviewed "publication").

Miscellaneous

Final grade:	1.4
Thesis grade:	1.0
Scholarship:	German National Academic Foundation (Studienstiftung des Deutschen Volkes)
Awards:	Aesculap Award for Bachelor Thesis
Functions:	Member of the student council Head of the computer society Member of the network operations team

Projects

A day in the life of our eyes

was my Bachelor thesis. I ported the protocol stack of an eye-tracking sensor to Android. Using this system I collected data to train a support vector machine (SVM). Based on eye-movement we recognized if a person is indoors, physically active, concentrated, and talking to another person.

Responsibilities: Project lead, software development, data analysis, SVM feature design, user studies

Collaboration: my supervisors and a lecturer at the University of Cambridge

Evaluation: n-fold cross validation for the machine learning and application scenarios

Presentation: bachelor thesis, video, short paper and conference presentation

Robot arm control interface

was a semester project. We built a networking interface for an old educational six degrees of freedom robot arm. It was based on an ARM Cortex-M3 development board (Luminary Micro), including a custom driver PCB. We additionally integrated an ez430 Chronos (wrist-worn, wireless MSP430 based development platform from TI).

Responsibilities: embedded software, documentation and project planning

Collaboration: four other students and our supervisor

Evaluation: expert review by our supervisor

Presentation: public demonstration, video (> 11k hits on YouTube), and blog entries

Quadrocopter from scratch

was a spare-time project driven by curiosity. We developed a quad-rotor drone from ground up. We built our own IMU and control board (based on ADXL accelerometers and the mbed ARM Cortex-M3 development board), wrote custom firmware for the electronic speed controllers (ESCs) and PID control loop and built our own flight frame.

Responsibilities: embedded software and systems control

Collaboration: with a fellow computer engineering student (in our spare time)

Evaluation and Presentation: public maiden flight

Intern at Mercedes-Benz Research and Development North America, Palo Alto, CA, USA

topic area: automated software testing, platform integration

from **2010**
until **2011**

Skills and Qualifications

UML for requirements engineering: used UML to capture the requirements of the new test environment, and transformed the so created model into the basis for generating for future software tests.

Working with various stakeholders: this project brought together a variety of different roles (engineers, tester, developer). Their expectations and requirements had to be captured and reflected in the system.

Technologies

Eclipse Modeling Framework and Ruby: developed a platform independent environment generator based on a model description of the environments capabilities.

Project

Develop a unified testing framework to enable automated software tests of headunit services on a simulator, staging environment and in the car.

Working student at Vector Informatik GmbH

topic area: Refactoring and prototyping of enterprise applications

from **2008**
until **2010**

Skills and Qualifications

Refactoring of large, complex software systems: I was prescribed guidelines and conventions as to how the system should look like after the refactoring, but was given free reign within my domain. Changes were subject to code review.

Fast prototyping of technology demonstrators: thoroughly investigating the suitability and benefits of technology can present a substantial investment. Quick and low-effort prototypes can help deciding if such effort is justified.

Technologies

Eclipse Rich Client Platform: is a basis software for developing desktop applications, based on Java and OSGi. The Eclipse Rich Application platform provides the same basis for the web.

Task

Refactor and port a large Java-based enterprise application to a new Eclipse-based architecture. Create a prototype to explore the feasibility of the Eclipse Rich Application Platform as new platform.

University entrance entitlement at Technischen Oberschule Stuttgart

topic area: high school level math, physics, mechanics and electronics

from **2007**
until **2008**

Final grade: 1.0

Award: Best in Class

Software Developer at Robert Bosch GmbH

topic area: Platform project for a new product-data management system

from **2005**
until **2007**

Skills and Qualifications

Living platform organization structures: developing, deploying and enforcing common processes, platform technologies and conventions within a project organization is difficult. I learned that this requires close integration of all stakeholders, as well as enough conviction & resolution to establish a decision/idea throughout the organization.

Task

Design, develop and maintain an integrated development environment for the PDM platform development and subsequent projects. This required the definition of the development process (conventions, deployment stages, unit and regression tests), development of the desktop IDE and server side infrastructure.

Technologies

Eclipse IDE: the client-side IDE was based on Eclipse / Java Development Toolkit. I introduced custom tooling and deployment processes, and integrated the JDT debugger into the eMatrix based PDM system.

eMatrix PDM (now 3DS ENOVIA): the Java-centric PDM system we introduced as a platform. This included a C-based runtime deployed on SUN Solaris server, Linux server and Windows developer machines.

IBM Rational ClearCase: custom, automated deployment processes based on ClearCase implemented in Apache ANT supported the development throughout the process

Continuous Integration: I introduced continuous integration, including an "extreme feedback device" (a monitor showing red/yellow/green depending on the build-state) in the hallway.

Apprenticeship as an IT specialist at Robert Bosch GmbH

topic area: third level support, systems integration, model-driven development

from **2002**
until **2005**

Skills and Qualifications

Specification driven development: the conventions for the transformation, as well as the model itself were specified by third parties and had to be implemented exactly to be compatible with data received from third-party systems.

Large-scale system deployment: developing PEACY packages as well as deploying XSLT pipelines that process Bosch-wide PDM data thought me to test such systems in isolation, yet at scale before "going live".

Technologies

IBM Rational Rose: UML modeling tool used for specifying a Product-Data-Management exchange format that was then transformed to an XML schema.

Task

In-company training was first at the CI third-level support in Schwieberdingen, then at CI Feuerbach developing a UML to XML Schema model-to-text transformation.