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Special track

AISMS: Adaptivity in Intelligent and Secure Mobile Systems

Marc Kurz, Erik Sonnleitner
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Contact

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Research Interests
- Distributed & Autonomic Computing
- Mobile Software Systems & Frameworks
- Adaptive & Self-Adaptive Systems
- Activity & Context Recognition
- Internet of Things

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Research Interests
- Mobile device security
- System security & exploitation
- Blockchains & distributed ledger technology
- Web security
- Steganography & information hiding
- Forensics

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AISMS Special Track :: Summary

*By applying approaches that can be classified within the topic "**artificial intelligence**", mobile systems strive to provide some kind of "**intelligent behavior**" adapting to the **current user's contextual state**. Additionally, security aspects concerning **personal and sensitive data** are becoming more and more relevant.*

*These two important factors might be diametrically opposed, since usually "intelligence" needs a lot of data to sense the current context of users, but data might be sensitive in terms of privacy and security concerns. Nevertheless, **security in mobile systems** needs to be considered as a critical factor.*

*Therefore, this special track aims at **discussing the hybridity of intelligence and security** with respect to the (self-) adaptation of mobile systems according to the actual contextual state.*

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AISMS Special Track :: Topics of Interests

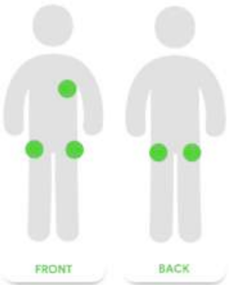
- Artificial Intelligence
- Ambient Intelligence
- Security aspects for mobile systems
- Internet of Things (IoT)
- Adaptive behavior of mobile systems
- Adaptive and self-adaptive behavior
- Adaptivity in wearable and mobile systems
- Self-adaptation in mobile environments
- Context-awareness and context-aware adaptation
- Adaptive artificial intelligence
- Privacy and Security in mobile adaptive systems

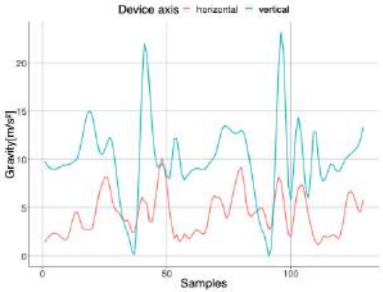
Summary of Contributions 1/4

Title What Are You Doing? Real-Time Activity Recognition using Mobile Phone Sensors

Authors Bernhard Hiesl, Marc Kurz, Erik Sonnleitner

- recognizing different activities of people by utilizing the smart-phone as sensor delivering unit
- phone is placed on the body of the subjects dynamically and orientation independent
- different classifiers are evaluated (i.e. (i) k-nearest neighbours (KNN), (ii) Naive Bayes, (iii) Decision Trees and (iv) Random Forest).

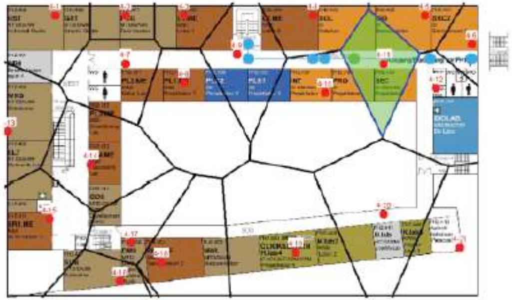




Summary of Contributions 2/4

Title A Context-enhanced Sector-based Indoor Positioning Library
Authors Alexander Stelzhammer and Jens Krösche

- evaluation of the position of an entity in an indoor environment
- trades accuracy for robustness and environmental flexibility by neglecting concrete position coordinates and concentrating on sector-based positioning
  > Utilizing Voronoi-based cells



		Pressure	*Graph* ($n = 1$)	*Graph* ($n = 2$)
Scenario A:	NCES (td = 0)	0.640	0.680	0.640
Change of Direction	NCES (td = 1)	0.980	1.000	0.980
Scenario B:	NCES (td = 0)	0.479	0.352	0.479
Change of Floors	NCES (td = 1)	0.930	0.634	0.986
Scenario C:	NCES (td = 0)	0.718	0.205	0.744
Standing Still	NCES (td = 1)	0.974	0.359	1.000
Scenario D:	NCES (td = 0)	0.580	0.420	0.470
Roundtrip	NCES (td = 1)	0.960	0.710	0.950

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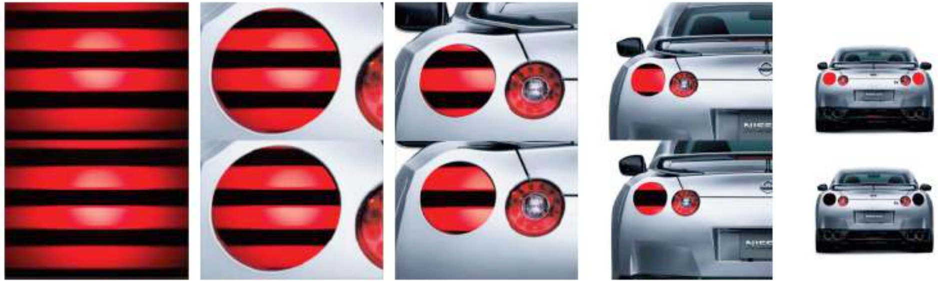
Summary of Contributions 3/4

Title A Visible Light Vehicle-to-Vehicle Communication System Using Modulated Taillights

Authors Michael Plattner and Gerald Ostermayer

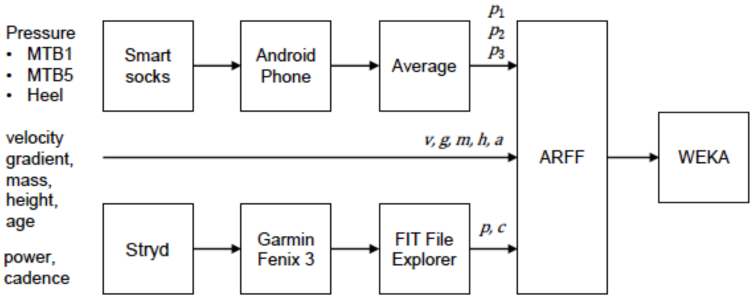
- visible light vehicle-to-vehicle communication system by modulating the taillights of a car and receiving the signal with a camera
- Transmission of 60 bit/s via the optical channel with an average BER of 3.46%
- takes ~5 sec to receive the transmitted code word containing a 128-bit key



Summary of Contributions 4/4

Title Estimating Internal Power in Walking and Running with a Smart Sock
Authors Dicle Yilmaz and Stephan Selinger

- investigate whether it is possible to estimate internal power in walking and running with a smart sock which is equipped with textile pressure sensors
- usage of regression algorithms (linear regr., M5P, random forest, KNN) to predict power
- correlation coefficients between 0.75 and 0.99 and a mean absolute error between 1.5 and 21.8 Watt could be achieved



Future Challenges

- Focusing more on the aspect regarding **“intelligence” vs “security”**
  - > Are those two aspects really diametrically opposed?
- Discussing different machine learning models in terms of data, security and adaptivity
  - > Also considering “**deep learning**”, “**neural networks**” and other novel approaches
- Developing/collecting comprehensive **datasets**
  - > How much data needed?
  - > How should this data be efficiently annotated?

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