## List of PhD Forum Papers

### Context elements for transportation services

*Dana Popovici*, Universite de Valenciennes - L*

**Abstract:** *People (pedestrians, drivers, passengers in public transport) use different services on small mobile gadgets on a daily basis. So far, mobile applications don't react to context changes. Running services should adapt to the changing environment and new services should be installed and deployed automatically. We propose a classification of context elements that influence the behavior of the mobile services, focusing on the challenges of the transportation domain.*

### Malware Detection on Mobile Devices

*Asaf Shabtai*, Ben-Gurion University, Israel*

**Abstract:** *We present various approaches for mitigating malware on mobile devices which we have implemented and evaluated on Google Android. Our work is divided into the following three segments: a host-based intrusion detection framework; an implementation of SELinux in Android; and static analysis of Android application files.*

### Dynamic Approximative Data Caching in Wireless Sensor Networks

*Nils Hoeller*, IFIS, University of Luebeck*

**Abstract:** *Communication in Wireless Sensor Networks generally is the most energy consuming task. Retrieving query results from deep within the sensor network therefore consumes a lot of energy and hence shortens the network's lifetime. In this work optimizations for processing queries by using adaptive caching structures are discussed. Results can be retrieved from caches that are placed nearer to the query source. As a result the communication demand is reduced and hence energy is saved by using the cached results. To verify cache coherence in networks with non-reliable communication channels, an approximate update policy is presented. A degree of result quality can be defined for a query to find the adequate cache adaptively.*

### Gossip-based Data Fusion Framework for Radio Resource Map

*Jin Yang*, Ilmenau University of Technology*

**Abstract:** *In disaster scenarios, sensor networks are used to detect changes and estimate resource availability to further support the system recovery and rescue process. In this PhD thesis, sensor networks are used to detect available radio resources in order to form a global view of the radio resource map, based on locally sensed and measured data. Data fusion and harvesting techniques are employed for the generation and maintenance of this "radio resource map." In order to guarantee the flexibility and fault tolerance goals of disaster scenarios, a gossip protocol is used to exchange information. The radio propagation field knowledge is closely coupled to harvesting and fusion protocols in order to achieve efficient fusing of radio measurement data. For the evaluation, simulations will be used to measure the efficiency and robustness in relation to time critical applications and various deployment densities. Actual radio data measurements within the Ilmenau area are being collected for further analysis of the map quality and in order to verify simulation results.*

### Dynamic Social Grouping Based Routing in a Mobile Ad-Hoc Network

*Roy Cabaniss*, Missouri S&T*

**Abstract:** *Trotta, University of Missouri, Kansas City, Srinivasa Vulli, Missouri University S&T*
*The patterns of movement used by Mobile Ad-Hoc networks are application specific, in the sense that networks use nodes which travel in different paths. When these nodes are used in experiments involving social patterns, such as wildlife tracking, algorithms which detect and use these patterns can be used to improve routing efficiency. The intent of this paper is to introduce a routing algorithm which forms a series of social groups which accurately indicate a node's regular contact patterns while dynamically shifting to represent changes to the social environment. With the social groups formed, a probabilistic routing schema is used to effectively identify which social groups have consistent contact with the base station, and route accordingly. The algorithm can be implemented dynamically, in the sense that the nodes initially have no awareness of their environment, and works to reduce overhead and message traffic while maintaining high delivery ratio.*

### MobileSOA framework for Context-Aware Mobile Applications

*Aaratee Shrestha*, University of Leipzig*

**Abstract:** *Mobile application development is more challenging when context-awareness is taken into account. This research introduces the benefit of implementing a Mobile Service Oriented Architecture (SOA). A robust mobile SOA framework is designed for building and operating lightweight and flexible Context-Aware Mobile Application (CAMA). We develop a lightweight and flexible CAMA to show dynamic integration of the systems, where all operations run smoothly in response to the rapidly changing environment using local and remote services. Keywords-service oriented architecture (SOA); mobile service; context-awareness; context-aware mobile application (CAMA).*

### Performance Analysis of Secure Hierarchical Data Aggregation in Wireless Sensor Networks

*Vimal Kumar*, Missouri S&T*

**Abstract:** *Data aggregation is a technique used to conserve battery power in wireless sensor networks (WSN). While providing security in such a scenario it is also important that we minimize the number of security operations as they are computationally expensive, without compromising on the security. In this paper we evaluate the performance of such an end to end security algorithm. We provide our results from the implementation of the algorithm on mica2 motes and conclude how it is better than traditional hop by hop security.*

### A Communication Efficient Framework for Finding Outliers in Wireless Sensor Networks

*Dylan McDonald*, MS&T*

**Abstract:** *Outlier detection is a well studied problem in various fields. The unique challenges of wireless sensor networks make this problem especially challenging. Sensors can detect outliers for a plethora of reasons and these reasons need to be inferred in real time. Here, we present a new communication technique to find outliers in a wireless sensor network. Communication is minimized through controlling sensor when sensors are allowed to communicate. At the same time, minimal assumptions are made about the nature of the data set as to minimize the loss of generality in the architecture.*

### Self Synchronization of Mobile Objects

*Amol Khedkar\*, University of Missouri-Kansas City*

***Abstract:*** *Moving objects share space for managing their mobility. For example, vehicles share roads, airplanes and UAVs share the sky or under-water space, etc. The problem then can be stated as "how moving objects can self-synchronize over the use of common resource (space, intersections, etc.) to maintain a conflict-free movement without the aid of a third party?" In this paper we describe our self-synchronization scheme for traffic movement through intersections. We claim that our scheme will be able to introduce fairness, reduce or eliminate the accidents (conflicts), and significantly reduce the cost of traffic management by eliminating the traffic lights that have very little intelligent and other traffic signs such as stop, give way, etc. Our scheme not only implements traffic-light logic but also human drivers' discretion to some extent. We present a simulation model to illustrate the working of our mechanism using simulated mobile cars.*

### Security in Pervasive Health Care Networks: Current R&D and Future Challenges

*Debargh Acharya\*, University of Missouri-Kansas City*

***Abstract:*** *Remote health monitoring has tremendous potential to improve quality of health care services in modern and ubiquitous medical environments. It helps to cut the cost in modern healthcare by avoiding unnecessary hospital visits for frequent checkups. In this context, security and protection of sensitive medical data and measurements such as Electronic Health Records (EHR), data integrity and confidentiality and protection of patient's privacy to be monitored are important aspects in order to increase user's acceptance of these new technologies. This paper presents an overview of current security threats in pervasive healthcare applications and analyzes the outstanding issues and future challenges.*

### Real-Time Data Compression in Wireless Sensor Networks - Extended Abstract

*Tommy Szalapski\*, Missouri S&T*

***Abstract:*** *Wireless sensor networks possess significant limitations in storage, bandwidth, and power. Additionally, real-time sensor networks cannot tolerate high latency. While some good compression algorithms exist specific to sensor networks, there remains a need for methods that do not introduce additional latency. This paper introduces a compression scheme which reduces storage, bandwidth, and power while also minimizing latency. Our Huffman style compression scheme exploits temporal locality and delta compression to provide better bandwidth utilization, thus reducing latency for real time applications.*

### A Peer to Peer based Information Sharing Scheme in Vehicular AdHoc Networks

*Neelanjana Dutta\*, Missouri S&T*

***Abstract:*** *Information sharing among vehicles is one of the emergent services required in Vehicular Ad Hoc Networks (VANETs). Considering the mobility and limited connectivity of the nodes, designing a secure scalable architecture for information sharing is a significant and challenging problem. In this paper, we propose a peer-to-peer (P2P) based architecture for the same. We split the entire network into zones based on zip code and use a distributed consistent hashing method to map the zones to unique numerical identifiers. Based on the location of the data item requested by a particular node, the query is migrated to the node possessing the data through intermediate nodes. These intermediate nodes maintain the hash table to determine next node to transfer the query. Upon receiving the query, the node containing the data transfers the content to the requesting node through intermediate nodes. The proposed approach also aims to optimize the latency during the information sharing.*