

Guest Editorial

Smart Cities: Multidisciplinary Approach

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Smart Cities are considered to support the economic growth, human health and wellness, energy efficiency, transportation. Building and improving Smart Cities has been in focus for both scientific and professional community as it is expected to provide new research opportunities and infrastructure for new services.

To make Smart Cities evolve, a strong multidisciplinary approach is required to improve both hardware and software infrastructures. In this Special Issue we solicit various contributions that deals with different concerns that ranges from device-based, to simulation and app-based improvements. Given contributions describe hardware support and its prototypes, supporting software and simulation-based architectures all presented as enabler for Smart Cities. In total, 10 papers were accepted on the given topic.

Paper "A Decentralized Personal Data Store based on Ethereum: Towards GDPR Compliance" authored by M. Alessi, A. Camillò, E. Giangreco, M. Matera, S. Pino, and D. Storelli propose a decentralised approach for personal, sensitive data sharing by taking care of centrality and GDPR. The presented system, given in the form of the prototype, presents novel IoT-ready personal data sharing management systems based on a distributed environment. The developed prototype takes an advantage of distributed technologies: IPFS and Ethereum, therefore assuring the absence of centralized authorities in order to avoid the possibility of illegal exploitation of personal information.

In the paper "Arduino-Based Solution for In-Car-Abandoned Infants' Controlling Remotely Managed by Smartphone Application", authored by P. Visconti, R. de Fazio, P. Costantini, S. Miccoli, and D. Cafagna an V2V/V2I (Vehicle-to-Vehicle and Vehicle-to-Infrastructure) communication systems for smart city applications is presented. The aim is to provide new services and tools for making driving safer and improving the human lifestyle. The considered systems can be supported by suitable software applications for making the services more accessible. In particular, an innovative Arduino-based control system against children abandonment in cars is described for purposes of improving the safety and reliability.

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The system integrates a mobile app, which gives the possibilities of receiving alert or status messages, along with images directly acquired from car cockpit. In addition, the app allows to remotely control several car functionalities, such as horn activation, windows lowering and doors locking/unlocking.

Paper "Simulations for Resource-Allocation Protocol Optimization for MIL-STD-188-186 over a UHF SATCOM Network" authored by E. W. Chandler present a simple simulation tool (Excel spreadsheet-based) to simulate the operation and performance of demand-assigned communication networks having time-varying data traffic patterns. Although commercially available simulation tools could be used for these simulations, Author claims on the disadvantages for its expensiveness and being sometimes complicated to adapt to new and not yet standardized protocols. Given simulator allows a comparison of performance metrics that result when using the existing MIL-STD-188-186 protocol versus using a proposed alternative protocol. The simulator allows examination of performance metrics such as the average number of assigned time slots per frame assigned to a transmitting node that has a specified message generation rate, the percentage of generated messages that are discarded prior to transmission due to being queued for an excessive time, and a histogram showing the percentage of messages transmitted with each possible message delivery time.

Paper "A Hybrid based Distributed Slot Scheduling Approach for WSN MAC", authored by M. R. Lenka, A. R. Swain and B. P. Nayak deals with collision handling in Wireless Sensor Networks (WSNs). For this purposes MAC layer change, named Hybrid based Distributed Slot Scheduling (HDSS) approach, proposes a hybrid approach for slot scheduling that prepares a feasible schedule in a distributed manner and at the same time reduces the number of slots in the feasible schedule to achieve optimality. The proposed HDSS algorithm initially prepares a feasible schedule which is further tuned in quick time to prepare a valid schedule with a reduced number of slots. The reduction of the number of slots in the schedule improves the efficiency of data transmission in terms of latency. The simulation results show that the HDSS algorithm outperforms RD-TDMA with respect to both the number of slots allotted for a feasible schedule as well as the data transmission latency.

Paper "Electronic Interface for Lidar System and Smart Cities Applications" authored by L. Pantoli, G. Barile, A. Leoni, M. Muttillio, V. Stornelli deals with the design of a new readout electronics for silicon photomultipliers sensors. The so-called SiPMs sensors are an emerging technology currently diffusing in many applications and, among them, in the

definition of a new generation of LIDAR systems. The solution here proposed is realized at electronic level with a 150 nm technology process from LFoundry and results provide a feasible demonstration of the capability of the proposed design approach to be employed in practical applications.

Paper "Analysis of Some Mobile Applications for Cycling", authored by M. A. Wister, P. Pancardo, and P. P. Campos provide analysis some available bike mobile applications as an alternative to bike computers. Recorded datasets from different mountain bike were analysed. The contribution of this paper lies in the fact that it reports and compares measurements of cycling workouts using four mobile applications for cycling, while comparing these against a speedometer. The paper is also provided with comparative tables and graphs, and performance evaluation of biking routes in two different bike routes.

Paper "An IoT-oriented Fast Prototyping Platform for BLE-based Star Topology Networks" authored by L. Invidia, S. Oliva, A. Palmieri, L. Patrono, and P. Rametta focus main attention on the Open Development Environment (ODE), a complete suite of hardware and software tools, based mainly on microcontrollers STM32, representing a reference point for end-users willing to create BLE-based star topology networks for a wide range of applications. The manuscript through a simple use case in a smart home context, shows how all provided tools can be used to fast prototype applications addressing all user requirements.

In the paper "An Innovative Face Emotion Recognition-based Platform by using a Mobile Device as a Virtual Tour" authored by L. Patrono, L. Podo, and P. Rametta, an innovative system able to capture human emotions through a face recognition algorithm based on a simple mobile device. It exploits a simple App for mobile devices to analyse emotions and to predict a travel destination based on user's mood and facial expressions to specific visual and auditory trigger to encounter his/her reactions. Face emotion recognition is mainly based on the Azure Face API. The proposed system has been validated both through a functional point of view through a proof-of-concept and a performance analysis.

Paper "Statistical Approach in Analyzing of Advanced Metering Data in Power Distribution Grid", authored by I. Ramljak, and D. Bago presents a powerful tool for analyzing great amount of data from the distribution grid in a simple way. Authors use the results obtained from the statistical analysis of smart meter data in distribution grid analyzing and in maintenance/investment planning. Moreover, it gives an insights on a smart metering system of J.P Elektroprivreda HZ HB d.d, Mostar, Bosnia and Herzegovina.

Finally, the paper "A 10-17 DOF Sensory Gloves with Harvesting Capability for Smart Healthcare" authored by V. Stornelli, A. Leoni, G. Ferri, V. Errico, A. Pallotti, G. Orenzo, G. Saggio deals on the definition of 10-17 Degrees of Freedom (DoF) sensory gloves for Smart Healthcare implementing an energy harvesting architecture, aimed at enhancing the battery lasting when powering the electronics of the two different types of gloves. The harvesting part was built and tested as a prototype discrete element board. Measurement results demonstrated a meaningful improvement in battery operation time up to 25%, considering different operating scenarios.

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