Guest Editorial
Smart Systems and Architectures

Petar Šolić, Toni Perković, Ivan Marasović, Diego López-de-Ipiña, and Luigi Patrono

Smart systems and related supporting architectures both from hardware and software perspective are a vital part for future infrastructure deployment. To cope with further advancements, a series of integrations/compatibility issues still needs to be properly compensated while new advancements are presented. The aim of this Special issue is to gather different contributions that can be used in future smart systems architectures.

The paper "A Deep Learning Approach for Real-Time Analysis of Attendees' Engagement in Public Events" authored by Sujith Samuel Mathew, Manar AlKhatib, and May El Barachi presents a deep learning model enabling the accurate emotion analysis of crowded scenes containing complete and partially occluded faces, with different angles, aiming at improving smart city analytics. The proposed model was successfully tested using 3,750 images containing 22,563 faces, collected from a large consumer electronics trade show. It achieved an average accuracy of 90.6% when distinguishing between seven emotions (Happiness, smiling, laughter, neutral, sadness, anger, and surprise) in complete faces, and 86.16% accuracy in partially occluded faces.

The paper "Early Detection of External Neurological Symptoms through a Wearable Smart-Glasses Prototype", authored by Andrea Sciarrone, Igor Bisio, Chiara Garibotto, Fabio Lavagetto, Mehrnaz Hamedani, Valeria Prada, Angelo Schenone, Federico Boero, Gianluca Gambari, Marco Cereia, and Michele Jurilli contributes to the smart systems for medical sciences and healthcare. In particular, given the extreme diffusion of Alzheimer's disease (AD) and Parkinson's disease (PD), the demand for a solution to early detect neurological symptoms of such diseases strongly arose. This paper presents a prototype of wearable smart glasses able to detect the presence of Essential Tremor (ET) of the head and to count the number of Eye Blinks (EB) at the same time, in a transparent way with respect to the final user and used for purposes of eary detection of AD and PD. Numerical results demonstrate the reliability of the proposed approach: the proposed algorithms are able to i) correctly recognize the ET with an overall accuracy above 97% and ii) count the number of EBs with an overall error around 9%.

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The paper "Fast-prototyping Approach to Design and Validate Architectures for Smart Home", authored by Teodoro Montanaro, Ilaria Sergi, Giovanni Marco Bisanti, Alessandro Cambò, and Luigi Patrono presents a solution that demonstrates how well-known fast-prototyping technologies like Node-RED, IBM Watson, Telegram, Raspberry Pi 4, and secured MQTT can contribute to develop complex systems facing the challenge of identifying platforms to fast prototype solutions satisfying new growing needs in IoT. The selected tools are used within a smart home context to support features inspired by people needs, and allow users to: a) consult real-time conditions (i.e., temperature, humidity, gas), b) remotely manage lights, c) save energy through a light management system based on user movements, d) remotely monitor the house through dedicated webcams, e) generate warning notifications in case of danger. Users can interact with the system through a web Node-RED dashboard and a Telegram bot. Differently from existing works, the feasibility of the implemented system and the efficacy of the exploited platforms are demonstrated through a running scenario extracted from a consolidated study on user needs in smart homes.

The paper "Demand Forecasting Tool For Inventory Control Smart Systems" authored by Fatima Zohra Benhamida, Ouahiba Kaddouri, Tahar Ouhrouche, Mohammed Benaichouche, Diego Casado-Mansilla, and Diego Lopez-de-Ipina presents an extensive literature review about demand forecasting methods for time-series data aiming at implementation of smart inventory management systems. Based on analysis results and findings, a new demand forecasting tool for inventory control is proposed. At first, a forecasting pipeline is designed to allow selecting the most accurate demand forecasting method. The validation of the proposed solution is executed on Stock&Buy case study, a growing online retail platform. The evaluation process showed that the proposed tool achieves good forecasting accuracy by making the most appropriate choice while defining the forecasting method to apply for each product selection.

The paper "Observation of Enhanced Network Performance in IoT Process Control and Data Sensing with RINA", authlred by Bhushana Samyuel Neelam, and Benjamin A Shimray presents a prototype of IoT devices communicating on a new internet architecture i.e. recursive inter-networking architecture (RINA) which has eliminated hard-state handshaking procedures. The impact of RINA on the network performance in process control and data acquisition is observed in terms of latency variations, network jitter, and throughput.

The results were compared with the network performance when the proposed prototype was communicating on TCP/IP. A Comparative analysis was provided to identify the improved network performance in RINA.

The paper "Optimized method for locating the source of voltage sags" authored by Jose Lima Filho, Fabbio Anderson da Silva Borges, Ricardo de Andrade Lira Rabelo, Ivan Saraiva Silva and Antonio Oseas de Carvalho Filho, is dealing with monitoring in smart grids. This monitoring generates a large volume of data (Big data) and as a result, multiple challenges arise due to the properties of this data such as volume, variety, and velocity. This work presents an optimization through genetic algorithm to select meters which already exist in the smart grid, using a voltage sag location method to reduce the data obtained and analyzed throughout the localization process. Optimization was evaluated through a comparison with a non-optimized localization method, this comparison showed a difference between the hit rates of less than 1%.

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