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Special Issue on Internet of Things: Intelligent Networks, Communication and Mobility (AdHocNets 2020)

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The traditional focus of ad-hoc networking technologies and their applications is no longer satisfying the evolving of next-generation networks. An ad-hoc network is a wireless system, in which nodes (Mobile or static) are connected using wireless links and cooperate to self-organize into a network without the requirement for any infrastructure such as access points or base stations. In recent years, the advancements in the intelligent network, 5G, IoT, and the huge dependency on Artificial Intelligence (AI) technology have shifted the interest of ad-hoc networks which attracted increased attention from the research and industrial communities.

The aim of the Special Issue of Next-Generation Intelligent Networks (co-located with AdHocNets 2020 conference) is to extend the best technical papers accepted in AdHocNets2020 and provide a forum that brings together researchers, industry, and government to discuss future directions on all aspects of next-generation networks focusing on ad-hoc networks. The list of interest of topics are:

- Internet of Things (IoT)
- MANET and VANET technology
- Unmanned aerial vehicle (UAV) networks
- Wireless sensor networks
- Airborne networks
- Underwater and Underground networks
- Personal, Body, and Home area networks
- Network architectural and protocol design
- MAC, routing, and transport protocols
- Resource allocation and management
- Network management Power, Topology control and management
- QoS provisioning and Service discovery
- Data Fusion
- Reliability and fault tolerance
- Security and privacy
- Machine learning (or AI) for ad hoc networks
- Blockchain and Ad-Hoc Networks
- Massive machine connections for IoT
- Middleware for ad hoc networks
- Cross-layer design for ad hoc networks
- SDN for ad hoc networks
- NFV for ad-hoc networks
- Edge computing for ad-hoc networks
- Performance modeling and analysis for ad hoc networks
- Tools to design, implement and evaluate ad hoc network protocols

The review process of this issue has been thorough with technical comments from experts. After several rounds of peer-reviews, four articles have been accepted. The article selection was merely based on the extended scientific quality of the submitted papers. The papers main contributions are as follows:

- "*Markov Chain Mobility Model for Multi-lane Highways*", by O. EL Joubari, J. B. Othman, V. Veque. In this paper, the authors have developed a traffic model based on Markov chain to tackle the congestion issue in a highway environment. Based on traffic data collected from vehicles through V2X technology, the model studies the evolution of traffic flow along a multiple-lane divided highway and locally calculates estimates of the expected number of vehicles traveling on a highway segment. Performance measures are then inferred to detect

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possible congestion and then prevent it from happening. The numerical results presented in this study validate the accuracy of the model and show its ability to reproduce the fundamental mobility aspects in a highway environment.

- "*An Intelligent IoT Monitoring and Prediction System for Health Critical Conditions*", by Omar Alfandi. In this paper, the author has proposed an optimum solution to real-time health monitoring by adopting the Wireless Sensor Network (WSN)-based non-invasive strategies. Near-Infrared (NIR)-as an optical method of the non-invasive technique - has been adopted to help diabetic patients continuously monitor their blood without pain. The proposed solution will alert the patients' parents or guardians of their situation when they are about to reach critical conditions, especially at night by sending alarms and notifications by Short Messages (SMS) along with the patient's current location to up to three people. Machine Learning (ML) model is implemented to predict future events where the patient might have serious issues. This model prediction is best practice in this chronic health domain as it has never been implemented to predict a future forecast of the patient chart. Multivariate Time-Series data set (i.e. AIM '94) has been used to train the proposed ML model. The collected data shows a high level of accuracy when predicting serious critical conditions in Glucose levels.
- "*Controller Placement in Software-Defined Multihop Wireless Networks: Optimal Solution and GA-based Approximation*", by A. Zahmatkesh, C. Lung, and T. Kunz. In this paper, the authors have minimized the control overhead exchanged in software-defined multihop wireless networks (SDMWN), by solving using a nonlinear optimization model, and via a heuristic algorithm. The proposed heuristic approach is based on the genetic algorithm (GA). The results show the impact of different metrics, including the number of controllers, the arrival rate of new flows and the capacity limit of wireless links on the control overhead, and the average number of controller devices and inter-controller hops. In addition, the GA-based heuristic approach can derive the same optimal solution for a small network with much less computational overhead and can solve larger networks in a short period, making it feasible for non-trivial network sizes.
- "*Segmented OTA Platform Over ICN Vehicular Networks*" by M. Safwat, A. Elgammal, E. G. AbdAllah, and M. A. Azer. In this paper, the authors proposed a technique that updates the software of Electronic Control Units (ECUs) in vehicles using segmented Over The Air (OTA) platform over Information-Centric Network (ICN) architecture. In VANET, the amount of time for active vehicles' connectivity varies due to the vehicular network's dynamic topologies. Through our experiments, we apply mobility on vehicles and we compare the introduced FOTA over ICN and the newly introduced segmented OTA platform over ICN.

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