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Federated sensor clouds and spatial ambient intelligence

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Modern enabling technologies like the Internet of Things (IoT) and Cloud Computing have opened up more doors for emphasizing the importance of the field of wireless sensor network. Research and development of concepts related to sensor networks are considering various modes of communication including cognitive networking, opportunistic connectivity and machine-to-machine communication. Areas like data and reality mining, cyber-physical systems and others with emphasis on spatiotemporal coverage started contributing to the analysis, monitoring and management of highly complex dynamic systems. With the need for integrating the multiple subspaces and multiple phenomena, these systems are centered round federation of atomic sensor clouds over the internet. These systems are driving towards the smart cities and what has been referred to as the planet nervous system. While elements of the concept have started taking shape, there are significant operational and optimization challenges that need to be addressed. The talk will provide key highlights to the large scale systems organization and the role of key acting elements in facilitating efficient services. The roles of sensor clouds and related big data, the internet and related IoT architecture and the virtual clouds and related services will be discussed. Examples taken from the experience of AUT SeNSE Research Laboratory and related collaborators will be used for demonstrating the various aspects of the system architecture. Furthermore, the talk will shed light on the future directions of these technologies as it contributes to the fabrics of Smart Cities.

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Brushless DC motor controlled by neural network

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The aim of this proposal is to design a Simulink MATLAB (simulation) model as well as mathematical model of brushless DC (BLDC) motor and to control its position and its reference currents that feed the inverter. In the developed model, the characteristics of the speed, torque, back EMF, voltages as well as currents are effectively monitored and analyzed. The neural network controller will be used to control the position of brushless DC motor by changing the currents flow to controlling the average voltage line to line voltage and thereby the average line current. This technique will be most useful for many applications such as controlling of nano-CNC machine. Recently, BLDC becomes one of the popular types of motors which are being used in many applications especially in the locations which are far from the center of cities and town where we could not have the power lines grid, but we still have the natural sun light source and the solar cells. Generally, the DC power generated by the clean solar cells has a small current and does not have the capability to operate AC induction motor (three-phase). That is why the BLDC motor becomes popular today, because we can amplify the DC generator and inert it to generate AC energy which is enough to operate any type of three-phase motor.

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