Wireless Sensor Networks

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Wireless sensor networks are emerging as a the next major technological thrust in human sensory extension. They are being designed for biological, chemical, seismic, acoustic, infrared, telematic and other applications. Sensors range from simple video cameras to silicon micro- and nano-structures, hyper-spectral optical sensors and sophisticated scientific instruments. These sensors are being embedded in both ad-hoc and static networks that, in turn, exploit existing network infrastructure. The technical and scientific challenges fall into three broad categories: the physics and engineering of the sensors themselves; the development of robust, secure, ad-hoc networks to deliver the data to the users; and the signal processing, data fusion, and information processing required to detect and identify specific agents, events and phenomena. To optimize performance one must assess trade-offs among signal processing capability, power consumption, bandwidth and other operational requirements. This talk will review the state of the art using specific examples and outline the research and development challenges that lie ahead.