

Sensor Networks – Promise and Challenges

Pradeep K. Khosla

Electrical and Computer Engineering,
Carnegie Mellon,
Pittsburgh, PA 15213, USA
`pkk@ece.cmu.edu`

Abstract. Imagine a world in which there exist hundreds of thousands sensors. These sensors monitor a range of parameters – from the mundane such as temperature to more complex such as video imagery. These sensors may be either static or could be mounted on mobile bases. And further, these sensors could be deployed inside or outside and in small or very large numbers. It is anticipated that some of these sensors will not work either due to hardware or software failures. However, it is expected that the system that comprises of these sensors will work all the time – it will be perpetually available. When some of the sensors or their components have to be replaced, this would have to be done in the “hot” mode. And in the ideal situation, once deployed a system such as the one described above will never have to be rebooted.

The world that you have imagined above is entirely within the realm of possibility. However, it is not without significant challenges – both technical and societal – that we will be able to build, deploy, and utilize such a system of sensor networks. A system like the above will be a consequence of the convergence of many technologies and many areas. For the above system to be realized, the areas of networking (wired and wireless), distributed computing, distributed sensing and decision making, distributed robotics, software systems, and signal processing, for example, will have to converge.

In this talk we will describe a vision for a system of sensor networks, we will identify the challenges, and we will show some simple examples of working systems such as the Millibot project at Carnegie Mellon – examples that give hope but are very far from the above described system.