

Abstract

The wireless sensor networks (WSN) are very fast evolving technology, whose possible applications are in industry, medical and home environment. The motes of the sensor networks can sense many environmental factors.

In this thesis I would like to realize the acoustic monitoring of human activity with WSN. The monitoring system requires to build a data acquisition network from the sensor nodes, which measures the ambient noises. The aim of the monitoring system is to give an estimation of the possible position of noise source.

The position of the voice source is estimated using Time Difference of Arrival principle. To perform an accurate estimation, we need the synchronization of the nodes, and we should also know their positions. The estimation needs large computing capacity, so the localization algorithm is implemented on a PC with Matlab. I have investigated the proper operation and limitations.

As a part of the work I have got to know the Berkeley MICAz motes, their operation system, programming language and network topologies. Besides I meet and study synchronization methods, voice detection and recognition possibilities, the theory of the acoustic positioning, then the implementation. After completing the design of the network, I have tested the capabilities of the real system by performing measurements under different conditions. Measurement results and possible ways of further developments are also summarized in my thesis.