Chapter 3.11
Device Localization in Ubiquitous Computing Environments

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ABSTRACT

In this chapter, we will study the localization problem in ubiquitous computing environments. In general, localization refers to the problem of obtaining (semi-)accurate physical location of the devices in a dynamic environment in which only a small subset of the devices know their exact location. Using localization techniques, other devices can indirectly derive their own location by means of some measurement data such as distance and angle to their neighbors. Localization is now regarded as an enabling technology for ubiquitous computing environments because it can substantially increase the performance of other fundamental tasks such as routing, energy conservation, and network security. Localization is also a difficult problem because it is computationally intractable. Furthermore, it has to be implemented in a highly dynamic and distributed environment in which measurement data is often subject to noise. In this chapter, we will give an overview of localization in terms of its common applications, its hardware capacities, its algorithms, and its computational complexity.

INTRODUCTION

In a ubiquitous computing environment, devices are often connected to one another on the fly to form an infrastructure-less network that is fre-
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