

# Chapter I

## Pervasive Computing: A Conceptual Framework

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### ABSTRACT

*Pervasive computing is trying to make the dreams of the science fiction writers come true—where you think of some type of convenience and you have it. It appears that pervasive computing is allowing tiny computers, sensors, networking technologies, and human imagination to blend and mould into new products and services. This chapter introduces pervasive computing, grid computing, and ambient intelligence with explanation of how these technologies are merging to create sensor embedded smart environments. Along with description and scope of e-business and m-business, different views of p-business are illustrated. Finally, different smart environments including smart consumer-to-consumer, smart value systems, smart p-education, p-governance, and so forth, are explained.*

### INTRODUCTION

If you are too busy to check your e-mails and buy movie tickets online on a PC sitting on your table; if laptop is too heavy for you to carry and stay connected; if every time you forget to take your shopping list; if you don't get time to look for tourist attractions before going for holidays;

if you are scared of getting stuck in traffic; if you want to quickly verify the information provided by the person you are dating; then you are just right for pervasive computing.

This means no more worrying about writing a grocery list because your cupboard or refrigerator would do that for you and your PDA or mobile phone would remind you to buy groceries as

when, for example, you are travelling back from your friend's place or from daughter's school after dropping her off. You would also get your mobile device flooded with information regarding the nearest tourist destinations, accommodations, and restaurants when you are on holidays even in a foreign country. You can even select your preferences of coffee, food, people, sports, cars, and so forth. Your car would read the speed signs on the highway, alert you, and could even adjust the speed for you. Your home electric system would turn the lights and air conditioner on and off whenever you come in and go out of a room — no more switching the lights off when you go out. You can carry multiple smart everyday devices that will recognize each other, and know each is accompanying you. The devices will know the context and location, thus provide you the services with the assistance of other smart devices embedded in the environment.

Here the dreams of the science fiction writers come true; you think of some type of convenience and you have it. It appears that pervasive computing is allowing computers, networking technologies, and human imagination to blend and mould into new products and services. Pervasive computing is also known as ubiquitous computing, a term first used by Mark Weiser in 1988 at Xerox PARC. Weiser used the term in an attempt to understand how to integrate computation with the physical world in a way that blends in so completely that it becomes unnoticeable (Weiser, 1999). Businesses cannot ignore this new development, which is penetrating every sphere of human life, elderly care, games, construction, entertainment, work, banking, bills payment, food, household, shopping, and health services.

## **What is Pervasive Computing?**

Pervasive computing may be defined as the smart computing environments in which tiny, invisible, wireless and/or mobile computing devices are

embedded in objects like pens, clothing, toys, sunglasses, chairs, cars, electronic appliances, and so forth; communicating and coordinating with each other anywhere and at anytime to make human life easier. Although the applications of pervasive computing are in the infant stage but are growing very fast with the technological developments and improvements. The networked embedded devices are leaving the concept of personal computers far behind. Devices are now offering new opportunities for businesses, hospitals, educational institutes, governments and other organisations to avail and to offer to their stakeholders—(including customers), suppliers, employees, students, patients, citizens, and so forth.

Opportunity starts with tracking traffic by means of a cell phone, a smart coffee mug with preferences, seamless mobile and car audio system integration, a robot that moves on a ball, a tiny self-contained wireless memory chip, podcasting for education or politics, e-ICUs, cell phones as study guides, a printing mailbox, and microprocessor-based encryption for mobile devices; the list is endless. The idea of pervasive computing is to use simple wearable and handheld devices which need no manual to start like sub notebooks, PDAs, smart phones, screen phones, and so forth, bring entertainment, education, shopping, politics, preferences, work, friends, news and all controls near you—wherever you go and whenever you need. These devices are intended to be very tiny, simple, networked, and diffused in the environment.

The fortitude of the pervasive computing lies in the fact that people want an environment in which technology is dissolved naturally and no one feels it exists. "MIT's Oxygen project also sees the future of computing to be human-centred. It envisions computing to be freely available everywhere, like batteries and power sockets, or oxygen in the air we breathe. Configurable generic devices, either handheld or embedded in the environment, will respect human desires for privacy and security in such an environment. People will not have to

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