

An Infrastructure for Pervasive Access to Clinical Data in eHospitals

Massimo Esposito, Luigi Gallo, Antonio Coronato, and Gennaro Della Vecchia

Abstract Ubiquitous computing technologies are being applied in many fields of business and institutions, varying from small intelligent spaces to large virtual enterprises. In particular, such technologies can be successfully used in health care facilities in order to reduce medical costs and improve quality of service. This paper presents an infrastructure for pervasively accessing Electronic Health Records (EHR) in a hospital. It relies on services which integrate Radio Frequency Identification (RFID) and photosensor technologies for identifying, locating and tracking doctors and patients equipped with mobile devices and RFID tags, with the final aim of granting ubiquitous and transparent access to medical data stored into standard EHRs.

Massimo Esposito

Institute for High Performance Computing and Networking (ICAR) - Italian National Research Council (CNR),

Via Pietro Castellino 111, 80131, Naples, Italy

e-mail: massimo.esposito@na.icar.cnr.it

University of Naples "Parthenope", Centro Direzionale, Isola C4, 80143, Naples, Italy

e-mail: massimo.esposito@uniparthenope.it

Luigi Gallo

Institute for High Performance Computing and Networking (ICAR) - Italian National Research Council (CNR),

Via Pietro Castellino 111, 80131, Naples, Italy

e-mail: luigi.gallo@na.icar.cnr.it

University of Naples "Parthenope", Centro Direzionale, Isola C4, 80143, Naples, Italy

e-mail: luigi.gallo@uniparthenope.it

Antonio Coronato

Institute for High Performance Computing and Networking (ICAR) - Italian National Research Council (CNR),

Via Pietro Castellino 111, 80131, Naples, Italy

e-mail: antonio.coronato@na.icar.cnr.it

Gennaro Della Vecchia

Institute for High Performance Computing and Networking (ICAR) - Italian National Research Council (CNR),

Via Pietro Castellino 111, 80131, Naples, Italy

e-mail: gennaro.dellavecchia@na.icar.cnr.it

1 Introduction

The ultimate goal of Ubiquitous Computing is the development of environments where highly heterogeneous hardware and software components can seamlessly and spontaneously interoperate, in order to provide a range of services to users independently of the specific characteristics of the environment and of the client devices [8]. The widespread availability of new sensor technologies makes it possible to enhance existing environments with pro-active features -the capability of a system to “foresee” beforehand resources and services requests- by adding context-aware services. This is the case of the Radio Frequency IDentification (RFID) technology [4], which relies on the use of RFID tags (or transponders) and antennas. Healthcare institutions constitute very suitable settings for deploying ubiquitous services, where wireless technologies can dramatically reduce medical costs and improve quality of service [12]. In this paper we propose an infrastructure which integrates RFID and photosensor technologies to identify, locate and track patients and doctors in a hospital department with the final aim of granting ubiquitous and transparent access to medical data gathered into standard Electronic Health Records. Using RFID alone in health facilities is not a novel idea, since in recent years several pilot research projects, investigating the feasibility of RFID for tracking patients, assets, pharmaceuticals and personnel, have been conducted in hospitals [1, 2]. Furthermore, some commercial solutions to identify and locate patients and doctors have already been presented [11]. Notwithstanding, it is a matter of fact that integrating turnkey RFID-based healthcare solutions into a real, fully operating hospital environment is a thorny issue, mainly because of the scarce, if any, compatibility with the existing software. For this reason, our research efforts have been primarily focused on the design of a framework that was open-source and cross-platform, hence capable to easily interoperate with legacy software and databases usually present in hospitals. This paper is organized as follows. Section 2 discusses some motivations and related works. Section 3 describes the infrastructure architecture. Section 4 describes a running scenario. Finally, in Section 5 some conclusions are drawn and the Reference section ends the paper.

2 Motivations and Related Works

Over the years, the scientific community has been making a remarkable effort to introduce information technologies in hospitals and clinical environments. Most work focused on the electronic version of the patient’s medical file. In particular, the term *Electronic Health Record* (EHR) has been coined, meaning a computer-based record