Dependable Usage Of Wireless Body Sensors

Introduction

Mobile computing has expanded to encompass as many industries and markets as possible, making its' entrance in different and changing settings, and the health care market,which is composed of hospitals, specialty practice, physician practice, and home care services is no exception. With recent developments in the field of wireless networks new and innovative medical applications based on these technologies and applications are being developed in the research sector as well as commercial sectors. The industrys interest in mobile health care has been fueled by needs for cost efficiency,increased competition as well as providing better lifestyle for patients by cutting down health care costs and increasing accessibility for them. The mobile applications and wireless networks are going to become an integrated part of medical solutions due to its benefits.

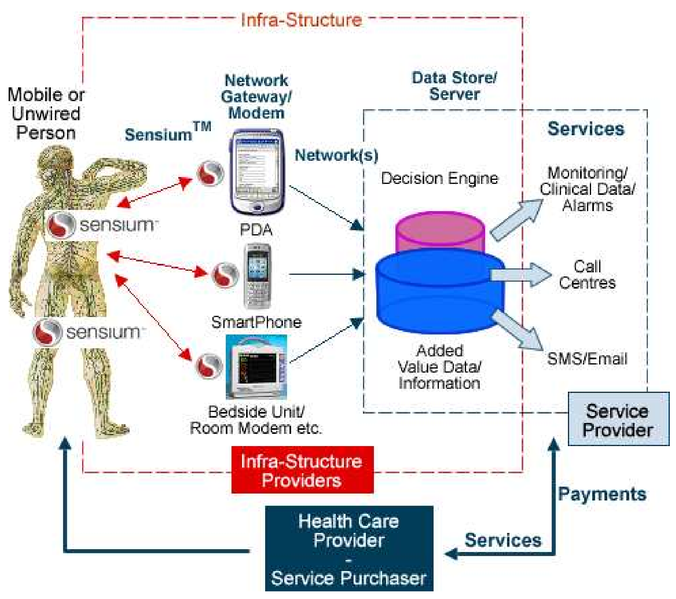


Figure 1: The connection between wireless body sensor and the network.

Current State Of Wireless Sensor Networks In Health Care

Advances in computing systems have led to the possibility of wireless sensor network(WSN) that consist of small integrated battery-powered sensors with the capability for computation and radio communication. Sensor networks have the potential to impact many aspects of medical care these can include tele-monitoring of human physiological data, tracking and monitoring of doctors and patients, drug administration in and outside of the hospital and even in artificial organs.In the health care field, issues such as long-term patient care, support for elderly people and smart homes are being discussed in the realm of wireless networks. There is also research being done on creating tele-trauma systems using the wireless channel. In an emergency or disaster scenario, WSN is used to continuously monitor the status of a large number of injured parties. In the near future homes can be designed in a way that can take care of patients or people with disabilities without the presence of a health care provider. Another new issue in the wireless networks field is implantable devices.Patients can wear sensors that monitor vital signs and report them in realtime to their physicians. The division of Engineering and Applied Sciences of the University of Harvard together with the Boston Medical Center explore applications of wireless sensor network technology to pre-hospital and in-hospital emergency care. Code blue a wireless sensor network infrastructure is currently being developed. A more recent event is the Digital Plaster,which is delivered by Toumaz.It is an ultra low power wearable module enabling wireless monitoring of ECG and temperature and other vital signs.

Research Question

With the increase in the population of senior citizens, the existing medical care system requires dramatic changes.

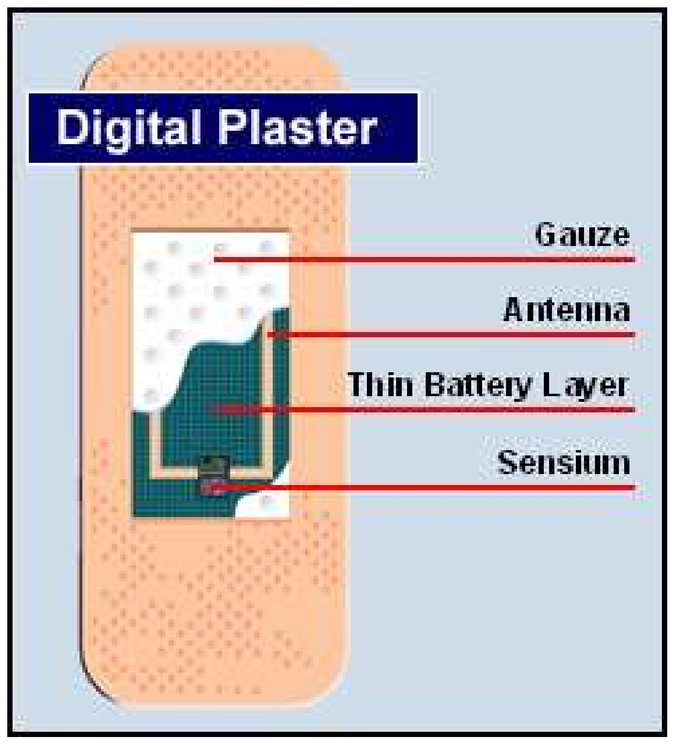


Figure 2: Digital Plaster.

Under the current system a patient has to wait for a heart monitoring at the doctor,depending the region he/she lives in , between 1 to 26 weeks in Norway. This and several other numbers show the need for more proactive health care technologies that can put more control in the hands of the people. The communication between sensors, mobiles devices ,and computers in a wireless sensor network is surpassing many traditional devices because of advantages like multi-hop capability,mobility, adaptability,cost,etc. With recent progress in mobile phones,wireless sensors and other wireless technologies,it is possible to extend the work of monitoring patients.The mobile and wireless communications potentially growing, enables the physician to access information anywhere and anytime,saving in costs,time and lives.We see the necessity for mobile health care systems and the advantages that it brings along with itself, but are they reliable?Never the less the question of safety and accuracy of these wireless body sensors remains.The reliability of the received data by the wireless body sensors,the security around the data transformation,the safety in storing the data, are some of the critical areas in these kinds of applications.The rules and regulations regarding these applications, is another area which has to be taken under consideration as well. The goal of this research is to look deeper into these applications,considering their dependability and safety, trying to make these applications more safe and reliable to use.

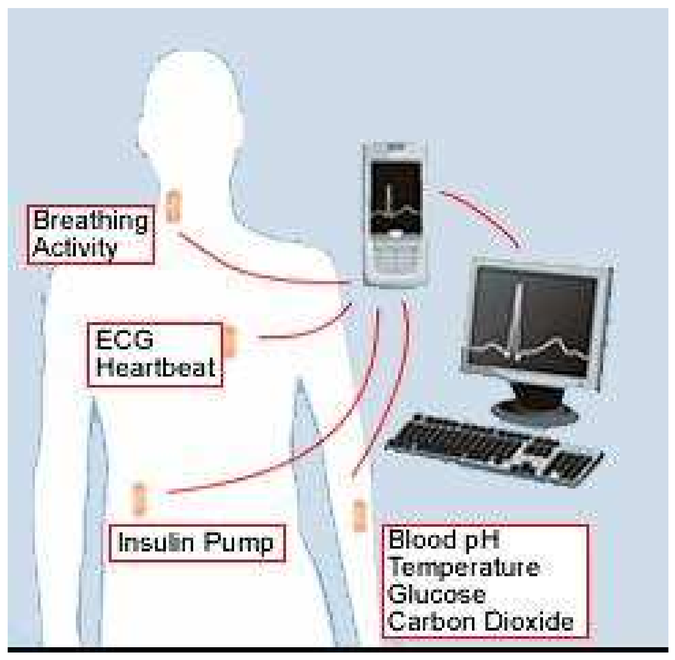


Figure 3: Wireless Body area Network.

Project details

This research has been done by Arezou Sadeghi as part of a master degree in informatics at Østfold university college. The master thesis has been supervised by Dr. Rune Winther.