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Adaption of Wireless Comunication For Haze Monitoring In Hospitals

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Abstract:
We have developed an Android based mobile data acquisition (DAQ) solution, which collects personalized health information of the end-user, store analyze and visualize it on the smart device and optionally sends it towards to the datacenter for further processing. The smart mobile device is capable to collect information from a large
set of various wireless (Bluetooth, and Wi-Fi) and wired (USB) sensors. Embedded sensors of the mobile device provide additional useful status information (such as: user location, magnetic or noise level, acceleration, temperature, etc.). The user interface of our software solution is suitable for different skilled users, highly configurable and provides diary functionality to store information (about sleep problems, can act as a diet log, or even can be used as a pain diary). The software enables correlation analysis between the various sensor data sets. The developed system is tested successfully within our Living Lab facility. Sensor data acquisition on the personal mobile device enables both endusers and care givers to provide better and more effective health monitoring and facilitate prevention. The paper describes the internal architecture of the software solution and its main functionalities.
Keywords: *Microcontroller,* Smart mobile device, Bluetooth, Wi-Fi, Sensors, Pulse Sensor

I. Introduction

The aging population of industrialized countries grows and this increases also among other things the health care costs. Transparently embedded remote health care can become a new cost effective paradigm, which can solve most of the problems primarily centralized Health Care system's have. Currently, there is a large number of enabling technologies to measure the patient's physiological signals remotely. With handheld and PC devices used as data acquisition (DAQ) systems we are able to collect vital information about the (elderly and demented) patients remotely. Due to the different - in most cases proprietary and incompatible- sensor technologies and solutions, it is a hard task to create generic, user friendly DAQ systems. There are already remote patient monitoring solutions available such as the Android based MyFitness Companion, which is able to support the following therapy fields: Fitness, Diabetes, Asthma, Obesity, Hypertension, CHD, or the ICare[which provides medical guidance, emergency alarm functionality and collects personal health information. Other example is the Microsoft Health Vault which supports care of elderly persons (e.g.: neurodegenerative diseases, stroke etc.), additionally it provides online web interface to manage (process and share) health information. Biotech Lab at Obuda University is involved in AALAMSRK (a national R&D project), specialized both on Android based (we call this Mobile Hub) portable remote monitoring applications, and normal PC based (we call this Home Hub) remote monitoring solutions

II. The Hardware System

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid

crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

III. Design of Proposed Hardware System

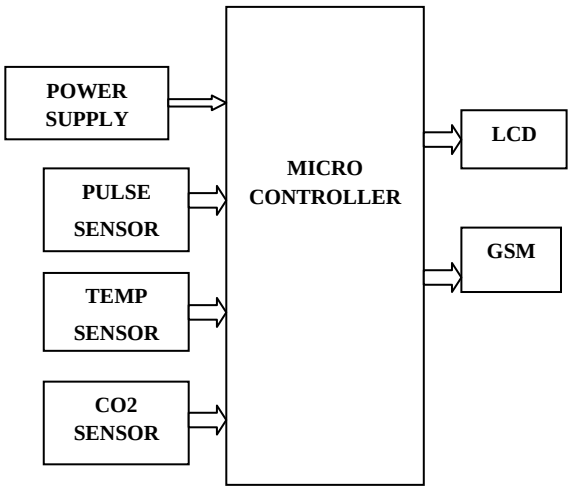

Fig.1.Block diagram

The process of working of this project is explained as follows. The total equipment of this project is placed inside a vehicle. Here we have GPS (Global Positioning System) module by which we can get the location of the vehicle, the location values are displayed on the LCD (Liquid Crystal Display). In this project we have two sensors which are interfaced to the micro controller. Those are temperature sensor and CO sensor through which we can measure the temperature and amount of CO released from the vehicle. These values are also displayed on LCD. Here ADC (Analog to Digital Converter) is used to convert the analog data from the sensors to digital form. Whenever these values exceed the threshold then intimation is given to the RTA including vehicle's exact position

Board Hardware Resources Features

THERMISTOR: Thermistors are a temperature sensing devise. It is used to sense the temperature. In this project by depends on the value of temperature the exhaust fan will run.

PULSE SENSOR:

Heart rate data can be really useful whether we are designing an exercise routine, studying our activity or anxiety levels or just want our shirt to blink with your heart beat. The problem is that heart rate can be difficult to measure. Luckily, the ***Pulse*** **Sensor** Amped can solve that problem!

The Pulse Sensor Amped is a plug-and-play heart-rate sensor. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. It essentially combines a simple optical heart rate sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings. Also, it sips power with just 4mA current draw at 5V so it's great for mobile applications.

***SMOKE SENSOR*:**

Smoke sensor is used to detect any leakage of smoke and any hazardous gases such that an alarm can be initiated to avoid any damages in the industries. These sensors are also used in many applications like corporate and in any office work areas these are linked to fire alarms .And buzzers through the micro-controller. There are two main types of smoke detectors: Ionization detectors and photoelectric detectors. A smoke alarm uses one or both methods, sometimes plus a heat detector, to warn of a fire. Ionization detectors have an ionization chamber and a source of ionizing radiation. The source of ionizing radiation is a minute quantity of americium-241 (perhaps 1/5000th of a gram), which is a source of alpha particles (helium nuclei). The ionization chamber consists of two plates separated by about a centimeter. The battery applies a voltage to the plates, charging one plate positive and the other plate negative. Alpha particles constantly released by the americium knock electrons off of the atoms in the air, ionizing the oxygen and nitrogen atoms in the chamber. The positively-charged oxygen and nitrogen atoms are attracted to the negative plate and the electrons are attracted to the positive plate, generating a small, continuous electric current. When smoke enters the ionization chamber, the smoke particles attach to the ions and neutralize them, so they do not reach the plate. The drop in current between the plates triggers the alarm. In one type of photoelectric device, smoke can block a light beam. In this case, the reduction in light reaching a photocell sets off the alarm. In the most common type of photoelectric unit, however, light is scattered by smoke particles onto a photocell, initiating an alarm. In this type of detector there is a T-shaped chamber with a light-emitting diode (LED) that shoots a beam of light across the horizontal bar of the T. A photocell, positioned at the bottom of the vertical base of the T, generates a current when it is

exposed to light. Under smoke-free conditions, the light beam crosses the top of the T in an uninterrupted straight line, not striking the photocell positioned at a right angle below the beam. When smoke is present, the light is scattered by smoke particles, and some of the light is directed down the vertical part of the T to strike the photocell. When sufficient light hits the cell, the current triggers the alarm.

WIRELESS CAMERA:

Wireless IP/Wi-Fi cameras work using the 802.11 protocol utilized by wireless network cards and routers, and these devices have been around about as long as Wi-Fi. Early wireless IP cameras that used 802.11b technology were not very reliable, though, and few companies produced them because of the relatively slow 5Mbps transfer speed cap with the protocol. When 802.11g became the standard for Wi-Fi in the mid-2000s, wireless transmission speeds increased ten-fold but were still too slow to stream live video reliably and still be affordable. It was not until 802.11n was released in 2009 that wireless data transfer became fast enough to make affordable wireless IP/Wi-Fi cameras a reality. With 802.11n transfer speeds exceeding standard Fast Ethernet wired connections, manufacturers began mass-producing wireless IP/Wi-Fi cameras for consumers. Connecting a wireless IP camera to a Wi-Fi router requires little more than turning it on and installing the viewing software on a computer connected to the same network. The camera can obtain an IP address dynamically from the router, or you can hard-code an address for the webcam using the monitoring software. Once configured, all computers on the network can access the webcam by entering its IP address in the monitoring application or a Web browser.

IV. CONCLUSION

During our almost 4 years long development period both the fixed and portable solutions have been rigorously tested in the Living Lab environment. Beside patient monitoring we had to monitor remotely not only the patient's status, but also some mobile hardware and software specific parameters (such as: battery level of sensors), and we had also to redesigned the whole user interface of the handheld device to support elderly persons with low IT skills. According to the received result both our PC and Android based DAQ solutions are capable to provide seamless remote monitoring of elderly persons not only at home, but with Mobile Hub also abroad. The developed solutions provide important feedbacks about health status to the patient and to the medical experts.

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