Proposal for TI India Analog Design Contest – 2011

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Title Of Project:

Health Log Manager

Health Log Manager

Introduction:

The number of diseases like diabetes ,blood pressure, obesity etc. are on a rise due to modern sedentary lifestyle .The primary aim of this project is to make people aware of the potential benefits of leading a healthy life by helping them easily analyse their day-to-day medical records over a continuous period of time. Smartphones today have become ubiquitous. With emergence of smart phones and cloud based applications in the market, data is being stored online for easy and stable access of information to users or group of users. The project is aimed at automating the system of storing the patient health record such as weight (BMI) and temperature, pulse rate as measured by digital devices directly on the cloud .The recorded data is transferred using Bluetooth from medical instrument to mobile which in turn sends data to the user medical profile on the server by accessing GPRS. The patient's medical records can be monitored by doctor regularly without the hassle for the user to update his account manually. The project can be extended to monitor other parameters like blood pressure and glucose levels.

Intention:

The purpose of project is as follows-

a) The readings from various medical instruments can be saved in SD card of mobile in the form of charts/graphs and a complete database of the User's medical record can be uploaded on server and hence shared with the Doctor or the Hospital.

b) A person following an exercise or a gym routine can keep track of his health status over a sustained period of time to find out the change. This uses the accelerometer of phone to count the number of steps taken and calories burnt.

c) Doctors and family members of the individual can be notified by an email/sms in case of an emergency i.e. when the reading of patient is dangerously high a certain set of people will be notified.

d) The collected medical record of a large no. of people over a certain period of time can be used for health related research and surveys.

e) The project can be extended to monitor other parameters like blood pressure and glucose levels.

Today there already exist many health care firms which offer services of remotely collected user related health data using devices which connect directly interact with the remote server of the hospital and accumulate data. Owing to the low cost custom-made

design of the project where existing components need to integrated with each other, the secondary aim of this project, when totally completed would be to compete with such services in terms of high device costs, sustained reliability and openness of accumulated data to organisations (keeping the privacy of the individual in mind).

Hardware Components required:

1) Devices used-

- Digital device for measuring various health parameters
  1) Balance - Weight
  2) Thermometer - Temperature
  3) Pulsimeter - Pulse rate

- Mobile phone having
  1) Android OS (Can be extended to Symbian and iOS).
  2) Bluetooth Connectivity
  3) Active Internet connection
  4) Accelerometer (to count distance travelled walking, amount of calories burnt)

2) TI Components required -

- TI Processor
  1) Stellaris™ DKTLM3S1xx/3xx/8xx Family Development Kit with Stellaris™ LM3S818 Microcontroller.
- TI Analog Chip
  1) UA741 General-purpose operational amplifier
  2) TPS61070 DC/DC Converter (Integrated Switch) - Step-up Regulator.

3) Bluetooth Module

Arduino Bluetooth Shield

Innovation and working:

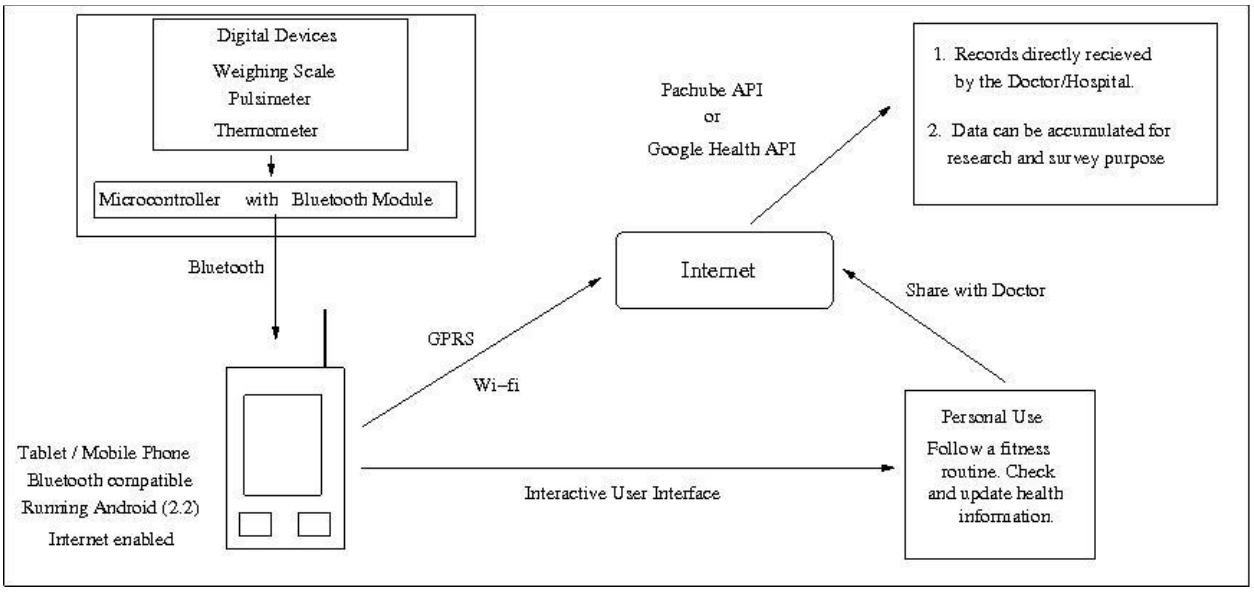

Figure 1: System Architecture

The various stages of the project as shown by Fig. 1 would be,

· 1. **Digital Device and Microcontroller interaction:**

The input to the microcontroller can be provided in two ways,

i) Use existing LCD output terminal points (going to the 7 segment displays) of the devices as input and program the microcontroller to use them appropriately.

ii) Tap the voltage amplified signal which is proportional to the measured quantity and represents it. Use this voltage as the input of the microcontroller.

2. **Microcontroller and Mobile/Tablet device (using bluetooth)**

For this we would be using a Bluetooth module (Arduino bluetooth shield). Both the phone (Java Language) and the microcontroller (C Language) will need to be programmed appropriately. We will be using Amarino Library (http://www.amarino-toolkit.net/) to connect the microcontroller to the phone via Bluetooth and exchange data.

·3. **Mobile/Tablet device and the use**

The data can be accumulated and stored and presented in form of charts/graphs to the user using a friendly UI on the mobile/tablet device. This data will be uploaded on the server:

1. **Google account of User :**
   The Google health API (http://code.google.com/apis/health/ , http://code.google.com/apis/health/) serves the purpose of keeping track of an individual's health record containing BP, weight(BMI), glucose level ,medication, allergies, immunisation etc. It includes features of making charts, graphs and tables to make information presentable and easy to read. It can also be used to notify family members and doctors in case of any emergency (Google Voice can also be used) .

2. **Pachube:**
   The Pachube API (http://api.pachube.com/, http://code.google.com/p/pachubelibrary/) serves as a more generalised tool to present data in a easy to understand form. It stores the Real-time data (Continuous series of readings) from the device on to the server .Thus this can be used to extend the concept of project to medical devices like ECG. This data can then be made public or kept private depending on the user's preference.

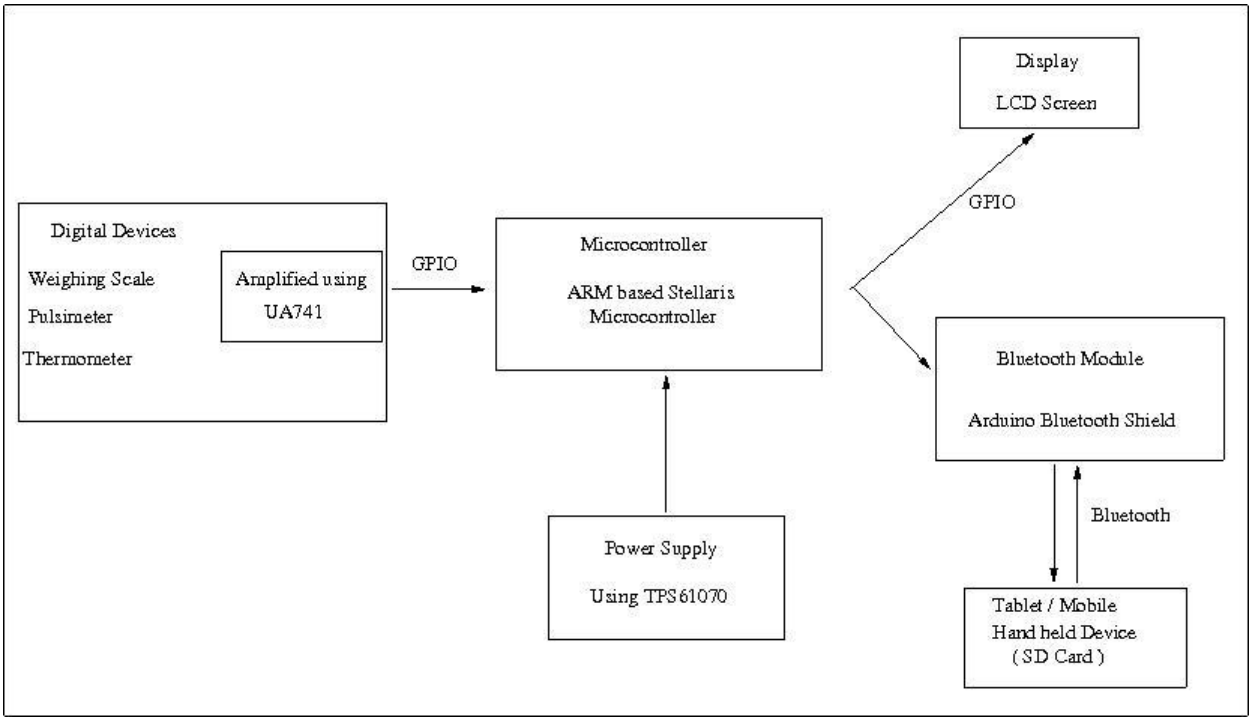

Figure 2: Analog Implementation