# Low-Power Wearable ECG Monitoring System for Multiple-Patient Remote Monitoring

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## Introduction

The patient monitoring systems is one of the major improvements in the hospitality because of its advanced technology. This project is designed for convenience of patient using embedded technology. In this project simultaneously monitor the patient's condition. It is operated and available at an affordable cost.
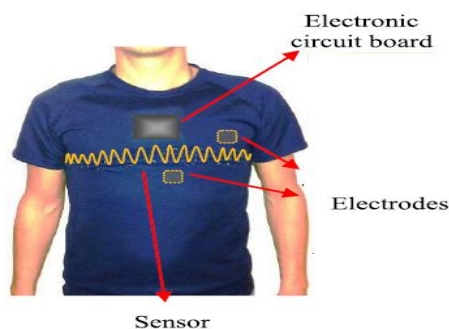


## Existing method

Heart beat monitoring of a patient is being done here. As the controller is directly connected to the controller. The details are visible on the PC.
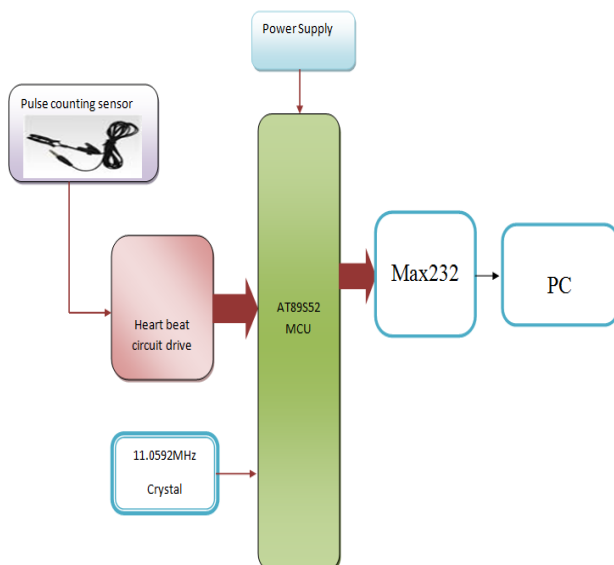


## Draw backs
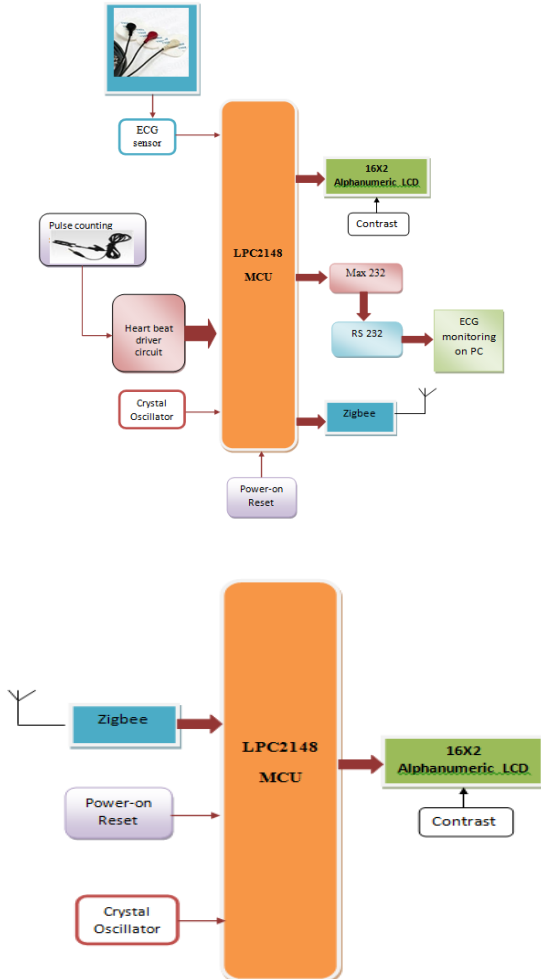
- No remote monitoring is possible

## Proposed method:

Many devices and solutions for remote ECG monitoring have been proposed in the literature. These solutions typically have a large marginal cost per added sensor and are not seamlessly integrated with other smart home solutions. Here we propose an ECG remote monitoring system that is dedicated to non-technical users in need of long-term health monitoring in residential environment.

The growing demand for wearable devices is imposed by the ability to monitor in real-time critical situations in the different areas of daily life. In many cases, power is the limiting factor for such devices. One aspect is the power supply with batteries that introduces issues due to the weight, the overall dimensions, and the disposal of the batteries. Low power sensor node design has become an important research topic since the measurement of physical quantities became very attractive to the industry, especially for medical applications that implement the concept of Wireless Body Area Networks (WBAN).

**Electrocardiography** (**ECG** or **EKG***) is the process of recording the electrical activity of the heart over a period of time using electrodes placed on the skin. These electrodes detect the tiny electrical changes on the skin that arise from the heart muscle's electrophysiologic pattern of depolarizing during each heartbeat. It is a very commonly performed cardiology test.

**Block diagram:**





## Modules used in this project

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical

systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.
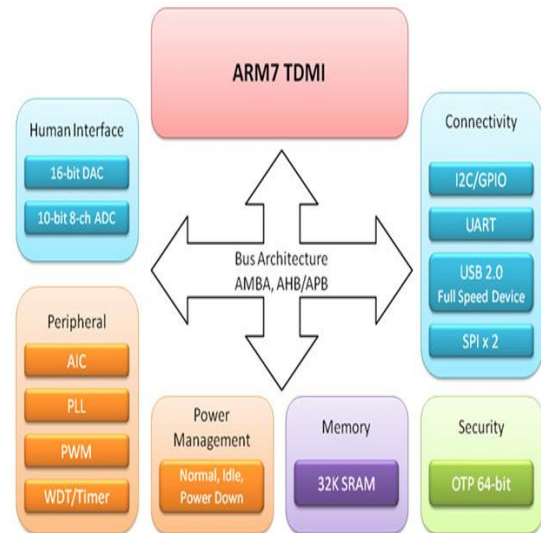


This project uses regulated 3.3V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

## ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
  - T: Thumb, 16-bit compressed instruction set
  - D: on-chip Debug support, enabling the processor to halt in response to a debug request
  - M: enhanced Multiplier, yield a full 64-bit result, high performance
  - I: Embedded ICE hardware
- Von Neumann architecture

## Pulse counting sensor

Heart rate is the speed of people's emotional state, exercise intensity and objective indicator of cardiac

function. But most people are very difficult to accurately measure the time and his heart rate values. If the heart rate monitor with me, heart ECG electrodes will be detected by monitoring the signal processing device, the user can at any time that your heart rate changes, changes in heart rate, self-monitoring status.

Heart rate monitor for heart rate range (60 ~ 160) / min. Circuit by adjusting the relevant components, in the (60 ~ 160) / min within the audible alarm can change the heart rate range. This heart rate range the width of the design center values ± 20% range. If central values such as emphasis on the 100 / exceptionally, the heart rate signal range (80 ~ 120) / min, if the heart rate exceeds this range, the lower limit, the instrument does not sound, if the heart rate in the range of the instrument ECG is the sound issue.
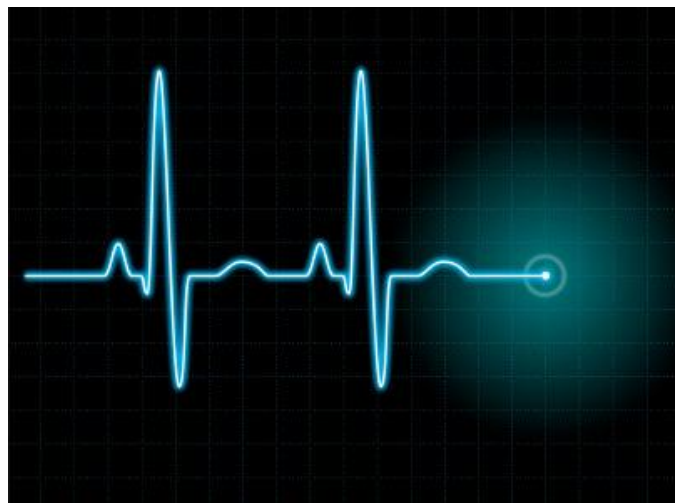
## Software tools

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.
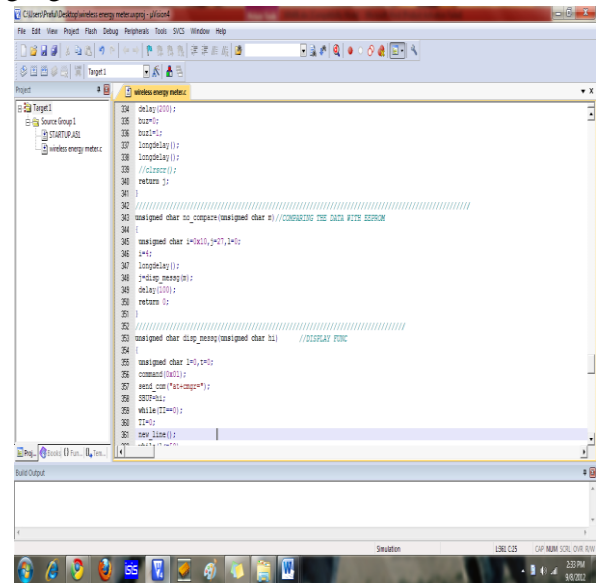
## Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051.**

**Advantages:**

- Ease of operation
- Low maintenance cost
- Fit and forget system
- No wastage of time
- Durability
- Accuracy

**Applications:**

- Hospitals
- Remote heart rate monitoring applications
- Body temperature Monitoring
- Local monitoring applications
- Designed for Home and Clinical *Applications*

**Future scope**

Video monitoring could be used for monitoring patients

**CONCLUSION**

Here we have designed a simple, low-cost controller based wireless A wireless electrocardiogram detection (heart beat) for personal health monitoring

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