

# Heart Beat Monitoring And Wireless Data Logging Using Arm Cortex A8

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**Abstract**—Increasing importance in monitoring and logging the real time patient's related data has led to the development of a new wireless data acquisition system. The basic concept presented in this paper is that we have made one type of wireless data logger[1] system using arm platform which is logging the real time heartbeat[2] data in one text file it is give the heartbeat rate with respect to time. Here we use UDOO[8] development board, UDOO is a single-board computer development platform that merges a dual or quad core ARM Free scale Cortex-A9 i.MX.6 CPU and an Arduino[4] compatible board embedded with a dedicated ARM Atmel SAM3X8E CPU. Physical data is converted in to the electrical form using Arduino UNO R3 and after processing these data it will be transmitted by the RFM. Same way at receiver side one RFM device is required to receive the data which was transmitted by the transmitter. Once the data is received, these data will be given to UDOO board. In UDOO board the data is processed and the data will be monitored on LCD or DVI Monitor.

**Keywords**-Heart Beat,Pulse Sensor,UDOO Board,Arduino uno R3, ARM Cortex A8,ubuntu

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## I. INTRODUCTION

These wireless systems are very effective for temperature monitoring in refrigerators and freezers, cold storage areas. They also provide a very cost-effective solution for medical monitoring in hospital pharmacies, blood banks, and food storage areas, as well as houses, labs, and offices. In this wireless data logger system is design for the hospital and bio medical solution. Ease of Use

## II. HARDWARE DESIGN AND SYSTEM COMPONENTS

### A. Block Diagram of system

Hardware design is the most important part in the development of the data acquisition systems. The present wireless data logger system is design for the hospital and bio medical solution. This system is give the heartbeat data from the transmitter side through the processing this data on Arduino uno R3. Arduino is a powerful development board which design based on the ATmega382. The output of Arduino is given to the RF module which is based on 433MHz frequency. This RF module is come with the transmitter and receiver both pair. At the transmitter side it is transmit the data. This data is received by the receiver side by RF module of receiver and this data is directly given to the UDOO[8] board. The UDOO development board is very powerful device. It provides the quad core arm Freescale cortex A9 i.MX6 CPU. It also provides inbuilt Arduino compatible board embedded with a dedicated ARM Atmel SAM3X8E CPU. In UDOO board we port ubuntu[5][6] OS which is based on the linux. We are processing on this OS and we made GUI which is plotting the real time graph of human heartbeat data. And it is also provides a real time data measuring text file in backhand of the process. The real time GUI is displayed on monitor. Whole wireless data logger system is shown in below figure 1.

### B. Heartbeat Sensor:

The Heartbeat Sensor (KY-039) Amped is a plug-and-play heart-rate sensor for Arduino. 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. Simply clip the Pulse Sensor to your earlobe or finger tip and plug it into your 3 or 5 Volt Arduino and you're ready to read heart rate. The 24" cable on the Pulse Sensor is terminated with standard male headers so there's no soldering required. Pin function of sensor is shown in Table 1.1

Pin No.	Function
1	Data pin
2	VCC
3	GND

Table 1.1 Heartbeat pin function

### C. Arduino Uno R3

The Arduino[9] Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started.

The Arduino[9] integrated development environment (IDE) is a cross-platform application development tool which includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. A program or code written for Arduino is called a "sketch".

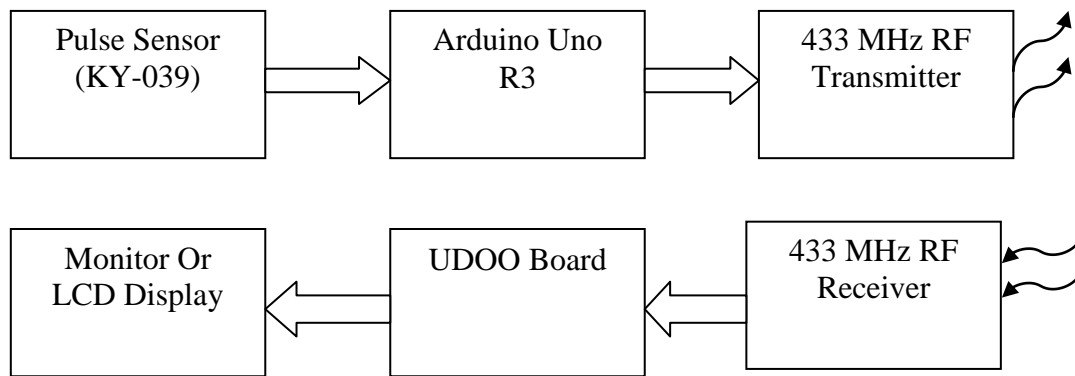


Figure. 1 System Block Diagram

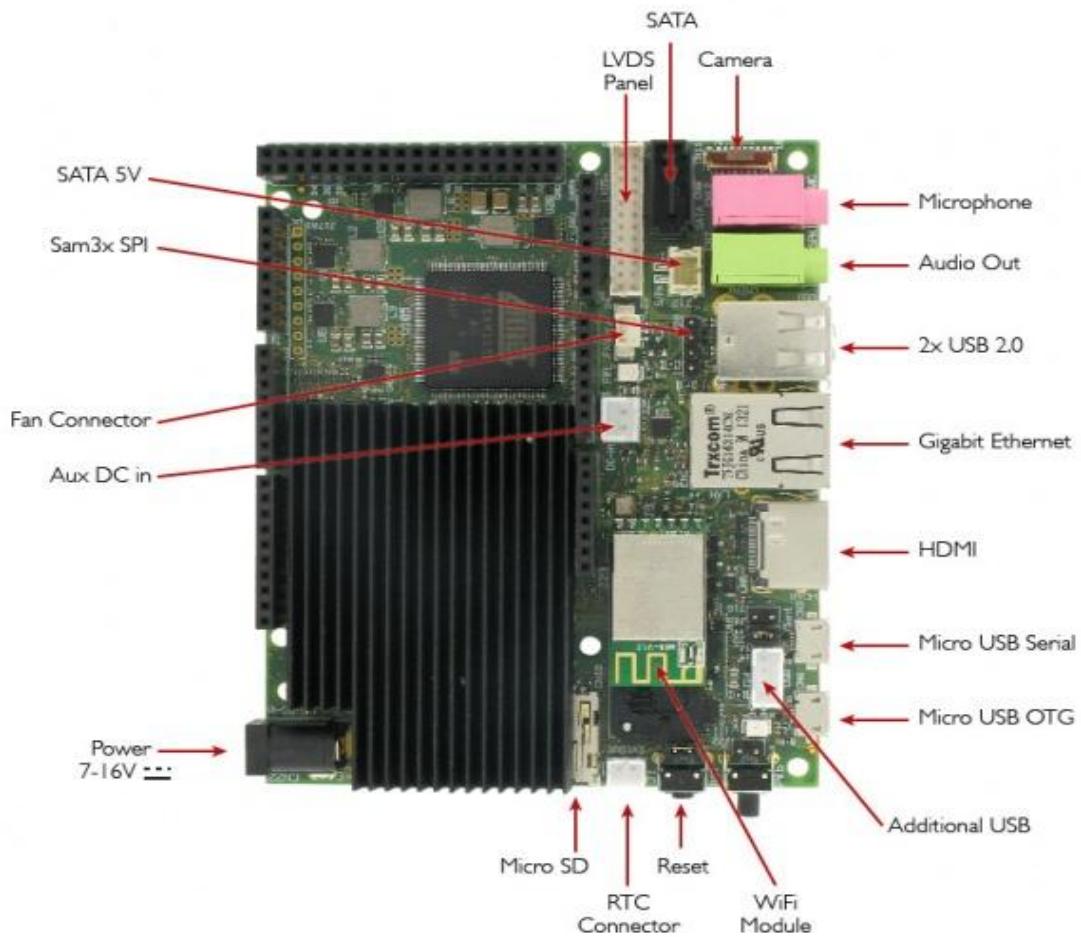


Figure. 2 UDOO Board.[8]

D. RF module

These RF[3] Transmitter Modules are very small in dimension and have a wide operating voltage range (3V-12V). The low cost RF Transmitter used to transmit signal up to 100 meters (the antenna design, working environment and supply voltage will seriously impact the effective distance). It is good for short distance, battery power device development. transmitter and receiver modules are shown in figure 3.



Figure. 3 433 MHz Tx-Rx RF Pair:

E. UDOO Board:

UDOO is a single board computer, as shown in figure 2. That can be used both with Android and Linux, paired with an Arduino-compatible processor. It is an open hardware, low-cost, small sized computer that merges in one single board an ARM cortex-A9 iMX.6 CPU and an Arduino Due compatible board embedded with a dedicated ARM SAM3X8E CPU.

III. WORKING

A. Transmitter section

As shown in figure 4 the Heartbeat sensor Data pin is connected to Arduino pin A0 and rest both pin is connected to VCC and Ground of Arduino. The analog heartbeat converted into digital form which is available on Arduino pin.3. That pin directly connected to data pin of RF 433Mhz transmitter pin 1 and rest both pin is connected to VCC and Ground of Arduino. We add the Virtual Wire library which uses to support RF module on both side of Arduino to give the wireless connection between Arduino and UDOO development board.

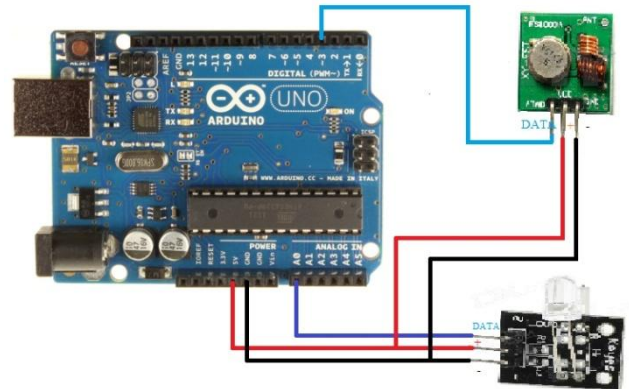


Figure. 4 KY-039 Heart Sensor, Arduino UNO R3 and RF transmitter Connection

B. Creating a bootable Micro SD Card[8]

Creation of a bootable micro SD card for UDOO board, First SD Card size is more important. The micro SD card size must be at least 8GB, higher capacity SD card may be used but only 8GB will be available at the end of procedure. Without the OS, It is possible only to use UDOO like a normal Arduino.

1. Download any SD card image (Ubuntu) from the image section on the website <http://www.UDOO.org/downloads/>.
2. Extract OS image file using 7Zip.
3. Select Specified drive for SD card and press write to start copy image into SD card using Win32 Disk Imager as show in figure 5.
4. After completion take out memory card.
5. Put SD card in UDOO board to port an OS.

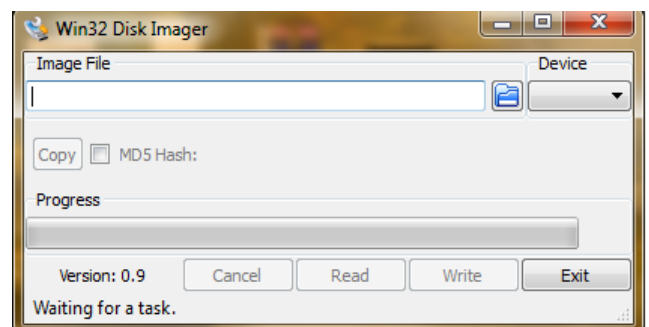


Figure. 5 Win32DiskManager

C. Receiver Section

RF module will Received data available on receiver side. Data is carry to the UDOO board by connecting Data pin of RF module is connects with pin no. 6 of UDOO board.

Here we are using python[7] for the plotting a graph of real time data which is graphically display the heart beat data. After establish the connection for system in both receiver and transmitter side. First of all run the python script which is made in the Ubuntu OS on terminal. Terminal window of Ubuntu shows the data getting from the transmitter side. Digital heartbeat data is display on terminal window as shown in figure 6.

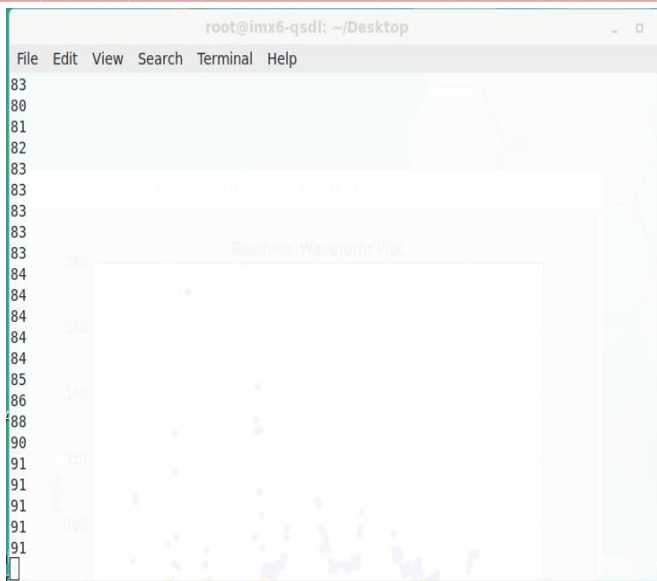


Figure. 6 Terminal window

We are also logging the real time heartbeat data via generating a text file behind the procedure as shown in figure. This text file shows the every data of heart rate with respect to time and it also updating time by time. We are also made GUI to realize the heartbeat via plotting real time graph as shown in figure 7.

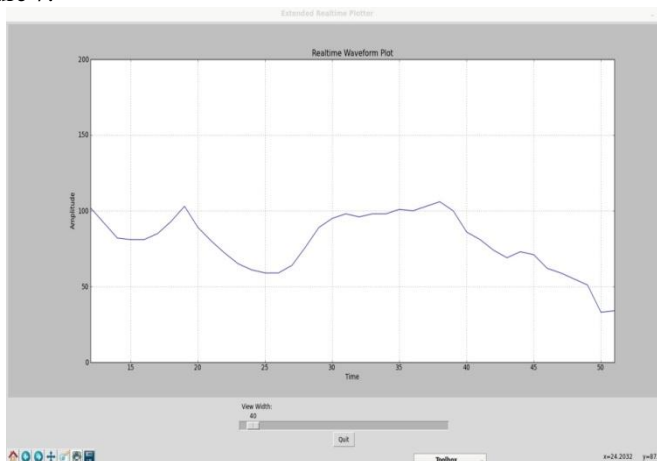


Figure. 7 Heartbeat Plotting Window

#### IV. CONCLUSION

The application presented here allow user not to use the whole software and can execute the system by just installing the small set up. GUI based software also provides easy and flexible access to user The low cost Python based design as well as UDOO Board makes system affordable to the medical field. And also plotting graph Ubuntu OS which makes user use this system portably like tablet to see real time heartbeat data of patient. And by generating data of real time in text file which will use in future for any patient related query.

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