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IOT Based ECG Monitoring For Smart Healthcare

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ABSTRACT: Many researches are done for monitoring ECG for Health dieses analysis. Proposed system is design to monitor Health using TEMPERTURE SENSOR, mixed-signal ECG System-on-Chip (SoC) with low-power consumption for portable ECG monitoring applications using verilog module and IOT.It is used to evaluate the quality of the ECG measurement and to filter motion artifacts**.**

KEYWORDS: Bio potential recording, ECG, tempreture sensor, motion artifact reduction, System-on-Chip

I.INTRODUCTION

ECG also referred to as EKG, is the abbreviation of the word electrocardiogram is a heart test that tracks the electrical activity of your heart and records it on a moving paper or shows it as a moving line on a screen. An ECG scan is used to analyze the heart's rhythm and detect irregularities and other cardiac issues that might lead to serious health problems such as a stroke or heart attack.ECG data is interpreted to get the heart rate from the electrical signal. Electrocardiography (ECG/EKG) is a medical diagnostic test that captures the heart's electrical workings helping in understanding the rhythm of the heart and any irregularities associated with it. The result of the test is called an "Electrocardiogram". The heart muscles contract due to electrical signals received from the sinoartrial node. These electrical impulses are detected by an ECG. It is non-evasive and one of the most common procedures a person undergoes when having any trouble with breathing, chest pain, etc.

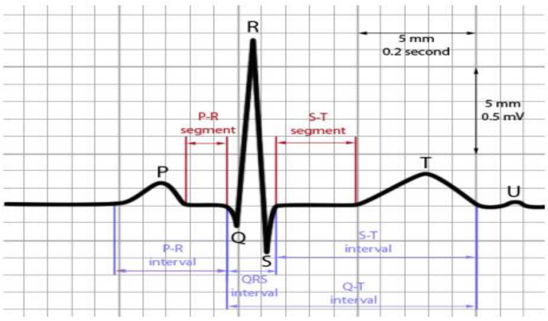

Figure 1. Typical ECG signal

- The P wave represents the atrial contractions.
- QRS complex represents the ventricular contractions. The R peak indicates a heartbeat.
- The T wave is the last common wave in an ECG. This electrical signal is produced when the ventricles are repolarizing.
- The letters used in the ECG signal description do not have abbreviations in medical terminology

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II. RELATED WORK

Hyejung Kim[1],In this Collection of data with low power consumption on soc for health monitoring and remoal of artefact with ETI.ECG work generally by detecting and amplifying the modest potential changes on the hand that are caused when the electrical signal in the heart muscle is charged and spread during eacg heartbeat.
Y. H. Hu et al.,[2],In that have investigated potential applications of artificial neural networks for electrocardiographic QRS detection and beat classification. For the task of QRS detection, the authors used an adaptive multilayer perceptron structure to model the nonlinear background noise so as to enhance the QRS complex. This provided more reliable detection of QRS complexes even in a noisy environment.
R. F. Yaziciogluet al[3] Ambulatory monitoring of ECG signals can be compromised by motion artifacts. Change of electrode-tissue impedance may be used to monitor the presence of such motion artifacts. However, challenge arises from the requirement of measuring the impedance without disturbing the ECG signal in a low-power manner.The electrode-tissue interface is stimulated with two AC currents at frequency, f(0°), being equal to 1kHz. Any DC component of this stimulation current aggravates the motion artifact signal. Hence, the AC current sources use chopper-stabilization at twice the frequency of the AC currents to set the mean value of the stimulation current to zero.
P. de Chazalet al., [4]It consists of three stages: a preprocessing stage, a processing stage, and a classification stage. The digitized ECG is applied at the input to the preprocessing stage. The preprocessing stage utilizes a filtering unit to remove artifact signals from the ECG signal. These signals include baseline wander, power line interference, and high-frequency noise. The processing stage consists of heartbeat detection and feature extraction modules. The heartbeat detection module attempts to locate all heartbeats. The feature extraction modules are required because, although it is possible for the classification stage to process the ECG samples directly, greater classification performance is often achieved if a smaller number of discriminating features(than the number of ECG samples) are first extracted from the ECG. The classification stage contains one or more classifier units which select one of the required classes in response to the input feature vector. The classifier units normally contain parameters which are set during the system development to optimize the classification performance. A combiner then unites the decisions of the classifier units to form the final decision of the system.
Y. H. Hu et al., [5]A patient-adaptable ECG beat classifier using a mixture of experts approach, This proposed approach is based on three popular artificial neural network (ANN)-related algorithms, namely, the self-organizing maps (SOM), learning vector quantization (LVQ) algorithms, along with the mixture-of-experts (MOE) method. SOM and LVQ together are used to train the patient-specific classifier, and MOE is a paradigm which facilitates the combination of the two classifiers (original and patient-specific) to realize patient-adaptation. In MOE, the two classifiers are modeled as two experts on ECG beat classification.
T. Torfset al.,[6] The ECG preprocessing module is the core component of the wireless ECG monitoring system. Its functionality allows the total system power consumption to be significantly reduced compared to conventional ECG acquisition systems. The analog ECG preprocessing ASIC simultaneously amplifies the ECG signal, extracts the power components of the signal within the frequency band of interest for detection of the QRS complex, and also provides a continuous measurement of the electrode-skin impedance. The built-in analog-to-digital converter (ADC) performs adaptive sampling on the ECG signal, whereby the regions with rapidly changing signal (e.g. the QRS complex) are sampled at 1024Hz to allow optimal time resolution for the R peak search, while the slow parts of the signal are sampled at 64Hz.

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III. PROPOSED SYSTEM

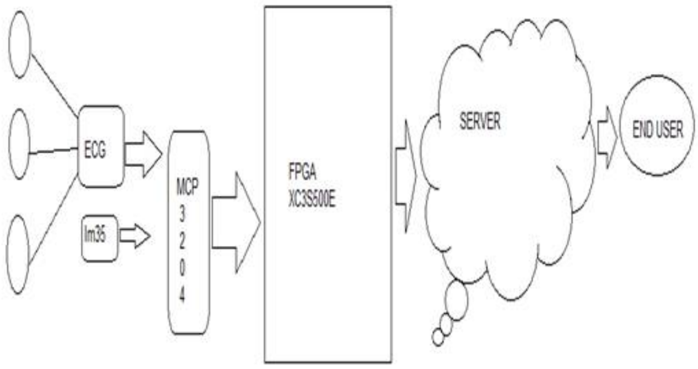

Fig: 2. System Architecture

A wireless ECG patch has been produced using the ECG SoC to perform streaming ECG monitoring with real-time motion artifact decrease and arrhythmia detection (Fig. 2). The system consists of ECG SoC, Also temperature sensor to know more result about patient. server for update new information also the storage of old records of patient. The ECG SoC monitors concurrent 3-channel ECG signal and performs the required application, such as motion artifacts reduction and the R peak detection algorithm. The information is processed and analyzed locally, and relevant events and information is wirelessly transmitted in real time and/or stored on a server. finally it displayed on the web page. Due to the fpga chip and server the system provides connection to PCs and mobile phones through a standard protocol, and maintains very low power consumption for long-term monitoring in home environment.

IV. RESULT

4.1ADC Timing Diagram-

The given system is implemented on FPGA using ISE 14.7 using verilog language. We had design SPI protocol for ADC interfacing by using and serial interfacing we send it to server. This project is implemented using Spartan 3. The MCP3204 is connecting to FPGA using by SPI connection i.e, CS, MISO, MOSI and SCLK.

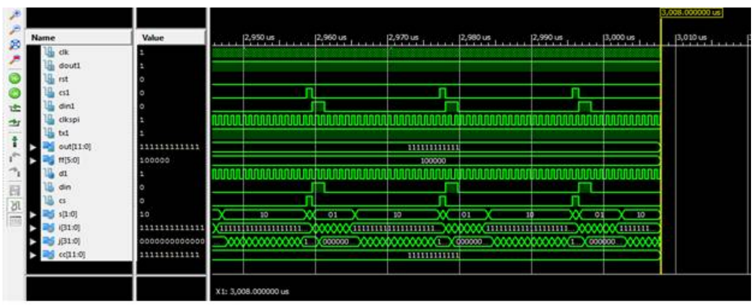

Fig.3- SPI protocol simulation on xillinx 14.7

4.2 Final Database output-

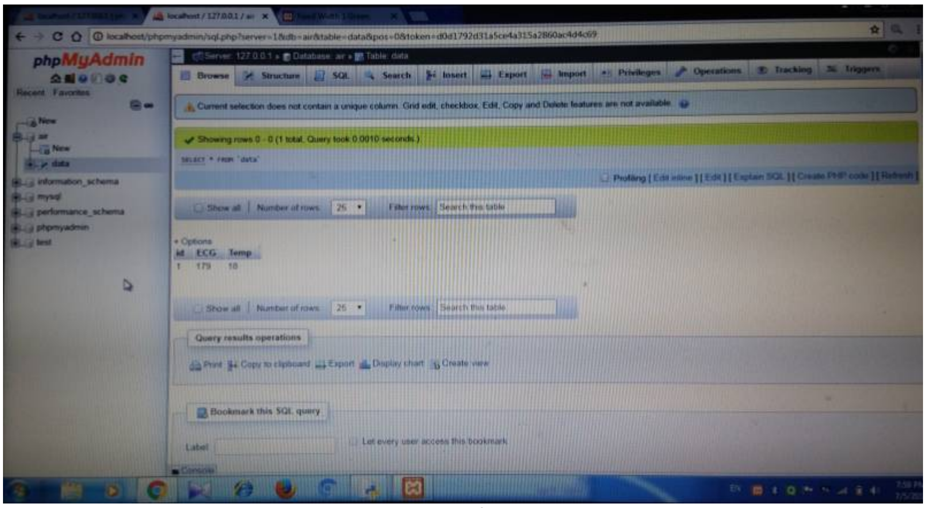

Fig.4-Snapshot of DATABASE

4.3 HARDWARE OUTPUT ON WEB PAGE IMAGE: -

The web page is designed by using php ,MySql & python language, which displays real time behavior. Hardware is connected to main server PC and through Wi-Fi collected data is send to DATABASE.

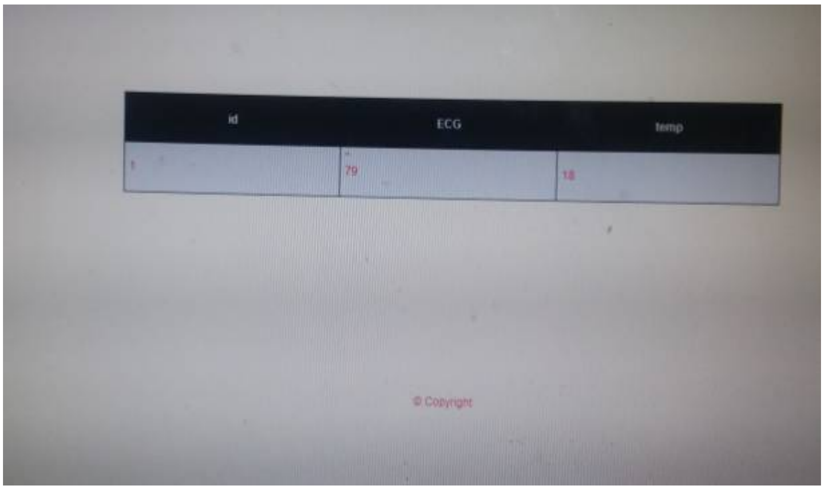

Fig 5-Output On Web Page

V .CONCLUSION

This paper present parallel processing IC that make fast solution for health monitoring. This health parameter is updated on internet server using web based concept. This is data is also process to detect critical condition related to health.The use of FPGA makes it low power and fast solution as compare to other. We had used 2MHz speed ADC which extract a data and send it FPGA. This system can detect, measure, and analyse various biomedical parameter like ECG and temperature. Using this system, health care professionals can detect, monitor and prescribe the patients with

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treatment in real time manner from remote location. The system is simple, power efficient, user friendly and bridges gap between doctor and patients. The patient history, treatment given and other related records are permanently stored on the server for future references. Therefore, the proposed system decreases intervention time and medical emergencies for patient and also multiple patients can be monitored simultaneously by the doctor. Practical application of the system is superfine in rural areas as there would be no need for the patients to get their continuous follow-ups.

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