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The Effect of Internet of Things (Iot) On Online Bpm Monitor

Alausa Dele W.S., ALASHIRI OLAITAN .A
Department of Computer Engineering, The Federal Polytechnic, Ilaro, Nigeria..
Department of Electrical and Electronic Engineering, Covenant University, Ota, Nigeria.
Corresponding Auther: Alausa Dele W.S.,

Abstract:*In a smart environment, one of the primary tasks is the assignment of data from the heterogeneous sources and making use of it to generate intelligence but getting this data have sometimes require numerous task. The first step towards mutual knowledge sharing is the virtual storage of the patient data thereby making it accessible ubiquitously to health personnel that are concerned. Also during the treatment phase, the doctors would be assisted by an intelligent clinical decision support system design connected data. Thus, a proposed model is put in place with an all inclusive approach of Internet of Things in e-Health providing ubiquitous services at its best and for an environment that is medically smart. Nonetheless, the Internet of Things for efficient and intelligent healthcare services is spreading enormously and quite inevitable. Therefore, ubiquitous services are made available to everyone and anywhere. At remote scenarios, end-to-end monitoring systems is expected to be enabled by the new age eHealth facilities, helping the unreached to get medical facilities.*
Keywords: *Heterogeneous Sources, Patient data, Internet of Things, eHealth, Smart medical environment*

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I. Introduction

Heart beat rate (HBR) is the cardiac cycle per minute or beats per minute (bpm). Due to age, Heart diseases occurs and the HBR disease is abnormal when it is lower than 60 bpm which is called Bradycardia and when it is above 100 bpm, it is called Tachycardia and increases blood sugar level, family history, lack of physical activity, social change, drug addiction etc. a lot of handheld, portable devices are available in market using which we can easily obtain and check the HBR regularly by ourselves. Some smartphones also can measure the HBR using the inbuilt camera and flash light through dedicated application. Mainly there are two techniques to obtain the HBR namely,

(a) Electrocardiography (ECG), and
(b) Photoplethysomography (PPG).

ECG uses two or more electrodes for measuring the HBR from the electrical changes occurs in our body. It is used for medical purpose. PPG uses optical techniques for obtaining the HBR. The PPG signal can be obtained from our fingertip, earlobe etc. and using a data acquisition system we can process, calculate and display the HBR value (Kishor Kumar Das et al 2016).

Today the diseases are increasing including Heart attack risks. The proposed system uses sensors that allow for detection of heart rate of a person that uses heart beat sensor even when at home. An interface to a microcontroller by the sensor allows for checking heart rate readings which is transmitted over the internet. The high and low levels of the heart beat limit is set by the user and the system starts monitoring. Immediately the patient heart beat is above a certain limit, an alert is sent to the controller which does the transmission over the internet, the doctor and the concerned users are then alerted. Alerts is also done for lower heart beats and the system also display the patient's live heart rate whenever the Doctor logs on for monitoring. Therefore, the patient's heart rate as well as heart attack alert can be monitored from anywhere and the patient can be saved on time. This innovation is a breakthrough in internet of things. Since the internet is on the verge of expansion, lots of new technologies are emerging as web identity is being assumed for large and small objects to get connected (Sristava, Lara 2015).

The next phase of development is the internet of things, when we connect servers and personal computers globally to the network, thus anything can be connected and managed virtually (Perera, C, 2014).

Hence, it is the largest Net's ever enlarged revolution and will give a drastic effect on daily lives and industry.

.The interconnected objects network has harvested from the environment (sensing) information due to the current Internet radical revolution, has also interacted with the world physically (actuation/command control), thereby using internet standards in providing services for transferring, analytics, applications and communications information. Bluetooth, radiofrequency identification (RFID), WI-FI and telephone data services for telephone including embedded sensor.The Internet revolution gave birth to interconnection amongst

people at an unprecedented rate and pace.The interconnected devices number is estimated to be 9billion, by 2020, the expectation is 24billion. The generated Revenue for mobile network operators amount to $1.3 trillion going through automotive, consumer electronics,health, and utilities according to GSMA (S. Dubner et al 2016).

Since the early 1800s visions of machines have been communication with one another and have being providing

direct communications since the development of telegraph (the first landline) in 1830s and 1840s. the first radio

voice transmission established on June 30, 1900 was described as "wireless telegraph" and the necessary

components for Internet of things development. Computer developments begins in 1950s while the internet of things wasn't named officially until 1999. And endless support of opportunities to interconnect devices and equipment is provided by IOT. With aninfinite number of ways to interconnect devices, the field is wide open in terms of creativity. Thus, bothopportunities and security problems are offered by IOT. With an open mind, the IOT is best viewed for creativity,security and a defensive posture for privacy. One of the yardsticks to measuring IOT is getting fully conceptualized in Nigeria and to know how far broadband penetration has gone. It's pretty impressive to note that the Presidency under the watch of ex-president Goodluck Jonathan launched the National Broadband Plan, this pinpoints the importance the government has attributed to technology. Although, the progress to achieve this plan is snowballed as a result of several factors. Nigeria has only a few months to make the National Broadband Plan a reality, and with the current state of the economy, I doubt if that will happen. Connectivity is an enabler of IoT, and that is yet to be adequately addressed. Meanwhile, discussing issues like power seem not to make sense anymore. Building cloud solutions, designs and critical infrastructure will require power and Nigeria for over five decades is yet to find a solution to her energy problems.

II. Related Works

Q. George, (2003)in his work, proposed a HBR monitoring system using signal processing and Artificial Neural Network (ANN) techniques to detect and classify five cardiac conditions; Heused real time processing, intelligence, cost effectiveness and efficient use of the ECG diagnostic system. The use of the diagnostic medical system remotely was suggested for home diagnosis.

While Cheng et al (2008) described an on-linear input–output relationship between the treadmill speed and the HBR. A controller was employed to help regulate the input signal well-defined in relation to the predefined HBR value. But Antonio Cuesta-Vargas et al (2009) studied the resting and maximum HBR in treadmill and deep-water running for male volleyball players. Dorgan and kadri, (2010) in their work described the design of a simple, low-cost HBR measuring device using PIC16F84 microcontroller. Whereas, M. Hashem et al (2010) had presented the design and development using integrated microcontroller for obtaining the HBR from fingertip.

F. Sharief et al, (2011) proposed a microcontroller based HBR monitor using fingertip sensors. The microcontroller acquires the signal and removes the zero-crossing problems of the digital signal which is obtained by Fourier transformation. He also employed one audible alarm to indicate the HBR status. While C. R. Greeshma, N. P Ananthamoorthy (2015) proposed a system to control the speed of treadmill automatically with respect to a person's HBR. This system is very helpful for the person who is suffering from heart disease. D. Ghose et al (2016) designed a treadmill exercise system which can control the speed of the treadmill comparing with the predefined HBR of a person. M. M. Asheghan et al (2016) studied the Stability and control of the HBR during treadmill exercise and L. C. Keat et al (2016) proposed a HBR measuring device using Nios II Soft-core Processor. The microprocessor signal flow is observed and analyzed using Signal Tap II software from Quartos.

Moreover scalability of the device address of the present network must be sustainable. The performance of the network, the incoming of the devices must not be hampered by the addition of networks and devices, also data reliability over the network or the devices effective use from user interface. The Uniform Resource Name (URN) system is considered fundamental to IOT development and as used to address this issues. The replicas of the resources is created by URN and can be accessed through the URL. With the gathering of large amount of spatial data, the advantage of the benefits of metadata is important for transferring from the database the information over the internet to the user. A good option is given by IPv6 to uniquely access the resources remotely. Enabling the addressing home appliances uniquely is development of a lightweight IPv6 which is another critical development in addressing. A layer is needed for addressing sensor devices by the relevant gateway, since a subnet with a gateway having a VRN will be required when wireless sensor networks that runs on a different stack compared to internet cannot possess IPv6 stack to address individually. The URN for the sensor devices may be the unique IDs at the subnet level rather than the human-friendly names in www and a gateway lookup table to address this device. Each sensor at the node level has a

URN (as number) for those sensors to be addressed by the gateway. A web of connectivity is formed from the users (high level) to sensor (low level) addressable (URN) accessible (URL) and controllable (URC).

III. Methodology

Several complementary technical developments made the Internet of Things and not a single novel technology result. The gap between the virtual and physical world is been bridged by the capabilities of being taken together.

These include:

Communication and cooperation Localization
User interfaces Addressability Identification Sensing
Actuation Embedded information processing
User interfaces

A system based on the PPG light reflection technique for measuring the HBR using an Arduino micro controller, pulse sensor, lcd and Wi-Fi module (ESP 8366) which serves as an interface between the microcontroller and the web is proposed. The pulse sensor is used as the interface between the patient and the controller, the liquid crystal display (lcd), the HBR in absence of internet. In this method changes of light intensity is measured which is detected by the IR detector. As we place our finger over the sensor the pulse emits light. Light can passes through the fingertip and some fraction of light reflects back which varies with the heartbeat. The reflected signal intensity varies person to person which results the HBR.

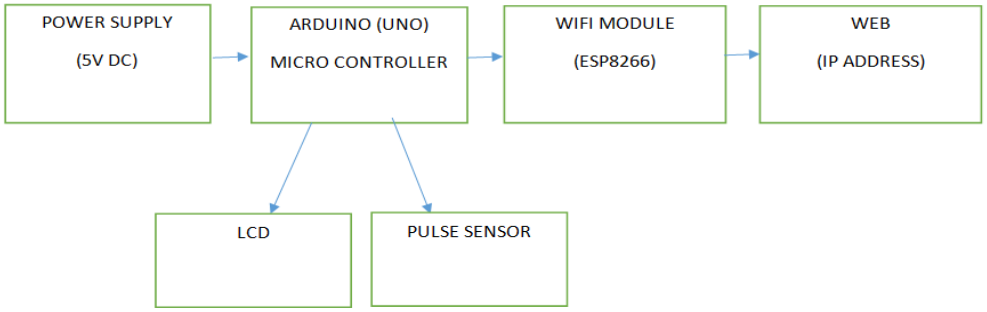

Fig 3.0 Block Diagram

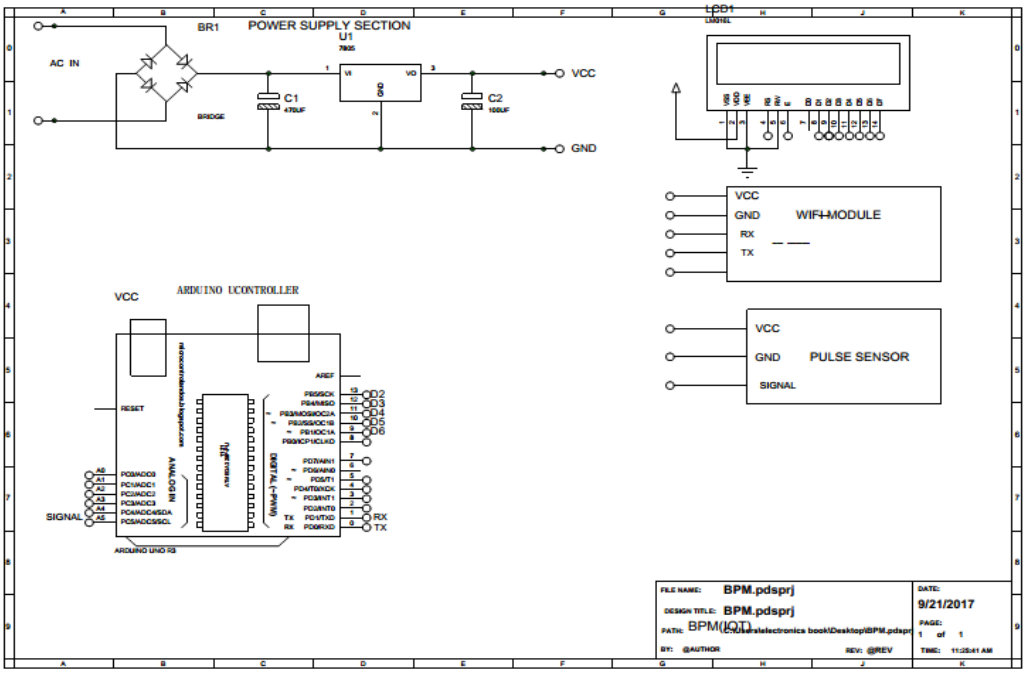

Fig 3.1: Circuit Diagram

3.1 APPLICATION

The emerging Internet of Things has impacted on lots of application domains. The applications can be divided based on coverage, network availability, scale, repeatability, heterogeneity, user involvement and impact. The applications can be categorized into four application domains:
(1) Personal and Home (2) Enterprise (3) Utilities
(4) Mobile.

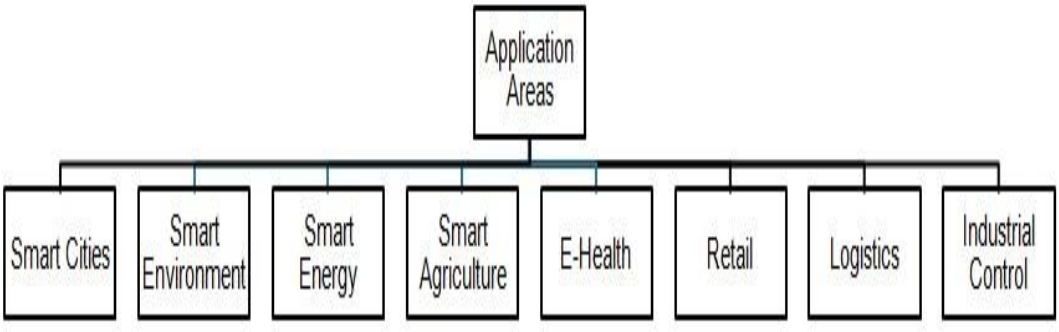

Fig 3.2: Application Domain

3.2 **IOT E-HEALTH**

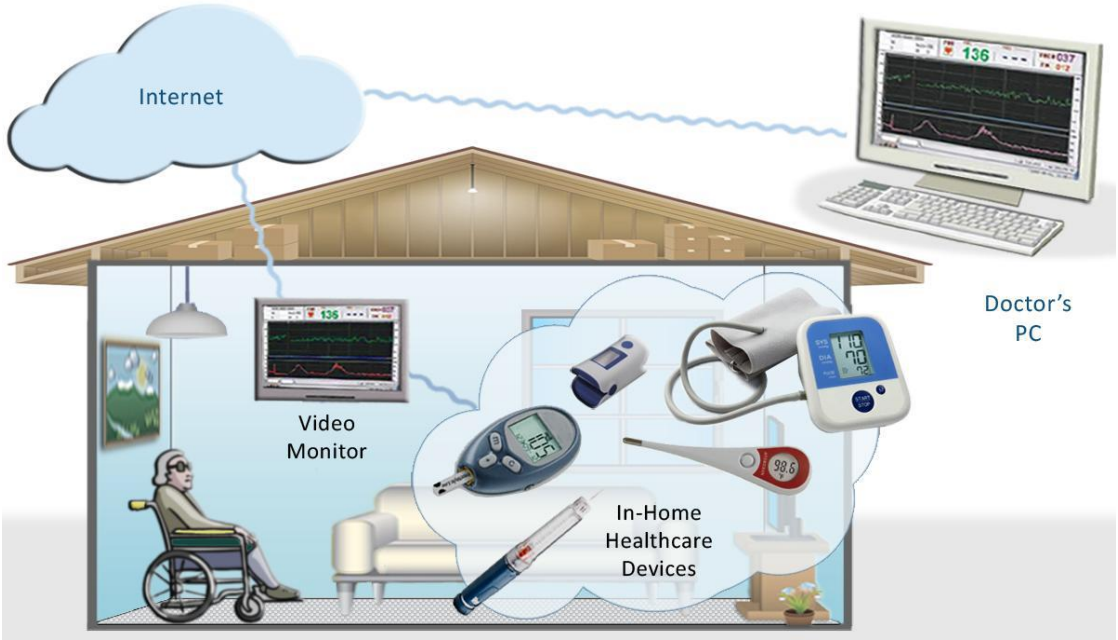

Fig 3.3: Internet of Things e-Health

A recent term for healthcare practice supported by electronic processes and communication dated back to 1999 is known as E-Health (also called e-health). According to a study in 2005, there are 51 unique definitions. Some argument says it is interchangeable with health informatics and a definition broadly covering electronic/digital processes in health while some uses it in the narrower sense of healthcare practice using Internet. Health applications are included with links on mobile phones known as mHealth. The need for better cyber-security increases since 2011 and the need for specialized resources to develop eHealth safer solutions that will withstand the growing threats as a result of the regulations also increases.

3.3 ONLINE BEAT PER MINUTE MONITOR

AccordingtoMcGrawHilldictionaryBPMcanbedefineasthe unit of measure for the frequency of heart de polarization's or contractions each minute–or pulse rate. It is the number of times a person's heart beats per minute. An individual normal heart rate depends on the body size, age, whether the person is sitting or moving, heart conditions, air temperature and medication use. Also, heart rate can be impacted by emotions. For example, getting scared or excited can cause increase in heart rate. Heart rate is also lowered by getting fitter,

thus making heart muscles work more efficiently. One can monitor his fitness level by ones knowledge of the heart rate and this can help spot developing health problems by experiencing other symptoms. Knowing your heart rate is important if you are having symptoms such as dizziness as an athlete. As a general rule, it is not important to always know your heart rate except you are having problem.

3.4 PULSE CHECKING

Whenever you want to check your pulse, either:

- Take a count for one minute the number of beats felt.
- Take a count for 30 seconds and multiply it by two.
- Whatever you get is the times per minute your heart beats. This is called your heart resting rate, once you've been resting for a minimum of five minutes before taking your pulse.

By feeling your pulse rhythm for about 20—30 seconds, you can check if your pulse is regular or irregular. Very common are occasional irregular heartbeats such as missed beats. But if you have irregular pulse for continued length of time, which can be a sign of atrial fibrillation (a heart condition that causes an irregular and often abnormally fast heart rate). This becomes more prominent as you grow older and it affects 10% of people over 75years.

- If you're concerned about your pulse, see your DOCTOR.

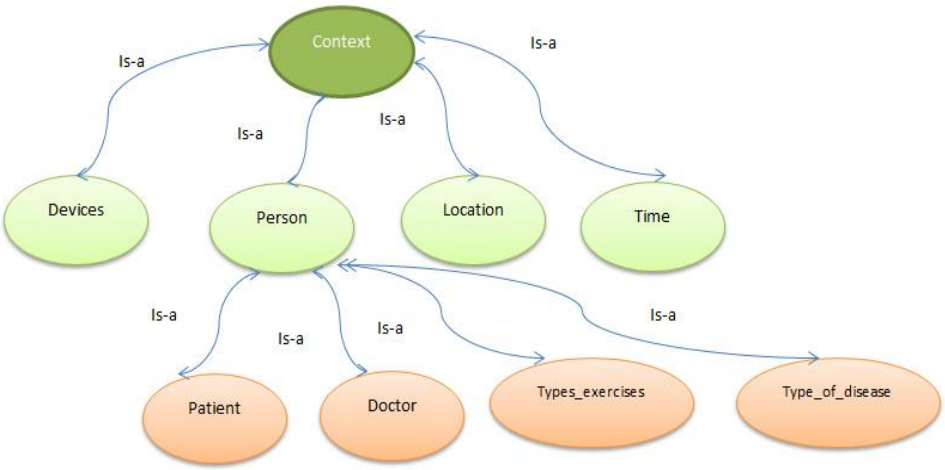

Fig 3.4: Sematic Network

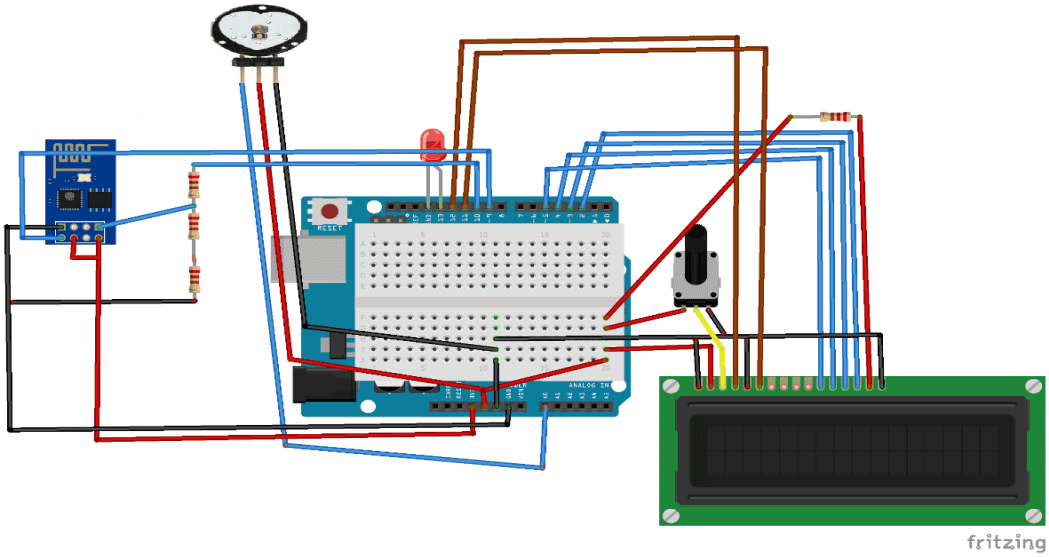

Fig 3.5: Circuit

IV. Result

The Pulse is first attached to any organ of body where pulse can be detected easily like your finger. The change in volume of blood is measured by the pulse sensor and it occurs every time the heart pumps blood in the body. A change in the light intensity is caused by the change in the volume of blood. The change is converted into the heart beat per minute (BPM) by the Arduino. The LED connected at pin 13 will also blink according the Heart Beat. The ESP8266 then communicates with the Arduino and the data is sent to Things speak. The network of the router you provided in the code connects with the ESP8266 and the sensor data is sent online. The Things speak data is shown in a Graph from which the readings can be accessed over the Internet from anywhere.

Fig 4.0: Thing Speak shown in graph form

V. Conclusion

The patient monitoring based on the Internet of things is another alternative used for patient with chronic diseases. Improving the quality of life of patients and not just monitoring is the aim of this work. Also it enables patients in improving their eating habits and work out itenary. The system model has been seen to be efficient at inference making with respect to the context. Thus, patients are implored to follow the recommendation measures through the sensors and work out routines tips in improving their eating habits.

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