MEDBOX: A RELIABLE e-CAREGIVER SMART SYSTEM USING IoT

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Abstract:

Advances in technologies of information and communication have led to the emergence of Internet of Things (IoT). In the modern health care environment, the IoT technology is used to bring the convenience of physicians and patients, since they are applied to various medical areas such as real time monitoring, health care management and patient information management. Medbox is one of the healthcare system in IoT technology, where the patient is monitored continuously using a collection of lightweight wireless sensors and to provide personalized medication. However the development of this IoT technology over health care systems affects the patient privacy.

In this paper, we highlight the major security requirements and avoidance of false alarms. Our aim is to obtain a device in order to achieve high quality, cost effective and secure patient-centric monitoring along with some potential solutions.

Keywords*: *Applications, smart city, ehealthcare, IIoT.

I. Introduction:

Internet of things (IoT) is actually a cyber-physical systems or a network of networks. It is envisioned with huge number of things/objects and sensors/actuators connected to the internet. Via heterogeneous access network technologies such as radio frequency identification (RFID), wireless sensor networks and semantic web services, etc. The automatic real-time data flow is produced by connecting things with the sensors.

The main purpose of using internet of things in medical application is due to two key aspects, 1. To obtain real-time monitoring over patients, and 2. To check whether the patient is following the instructions or not. IoT makes possible to monitor in real time, run remote diagnostics, provide virtual hands – on support, automate replenishment and analyse utilization.

In healthcare system, IoT involves many kinds of sensors (wearable, implanted, and environment) that enables the people to enjoy modern medical healthcare services anywhere and anytime. Meanwhile, it also greatly improves the quality of life for all kinds of people predominantly aged people.

In this paper, we propose a secure IoT based health care system using Med box, which can guarantee to efficiently accomplish the requirements. The remaining portion of the paper is organized as follows. In section II, we present a list of existing systems which describe some of the related work in health care. In section III, we present the architecture of Med box and the details of the components used in this article. In

section IV, finally the conclusion is discussed.

II. Existing systems:

Boyi Xu and Li Da Xu [8] proposed a system to access big data in heterogenous format. Phillip [12] provided the importance of IoT in healthcare applications. Prasanta Gope and Tzonelih Hwang [4] developed an IoT-based modern health care system using Body Sensor Network. The paper [3] provided a detailed study on types of sensors. The author [6] provided the definition and various features of RFID technology. The author [12] provided a way to improve the quality of health monitoring system.

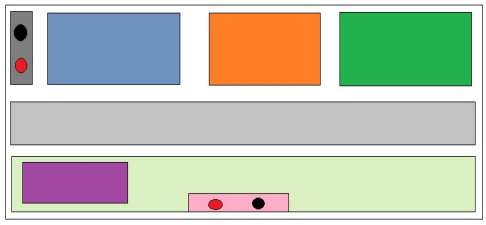
An IoT based smart system [5] is implemented to measure the heartbeat of the cardiac patient. The paper [13] proposed an M-Health system for diabetic patient. Geng Yang, Li Xie, Matti Mantysalo and Xiaolin Zhou [9] provided a health monitoring system, especially for an elderly people suffering from chronic disease. The author [16] implemented an event-based techniques to monitor the patient's health. V.Manju and Abeera V.P [14] delivered a secure health IoT using Med box and Zigbee protocol. P.Raga Lavima and Mr.G.Subhramanya Sarma [18] used a bio-medical sensor to measure the bio-signals and Wi-Fi is used to transmit the signal to the receiver. The paper [15] uses Med box and sends an SMS alert when the signal is abnormal.

III. Proposed System:

Our proposed med box is based on users whoever will have taken drugs or medicine on regular basis. This med box specify the pill quantity and count for each day. This notifies the users when the pill had to be taken. Our smart med box is designed for different age groups of people. The objective of the proposed architecture is to provide the user proper healthcare using IoT and various supporting technologies like body sensor network, WSN.

The Architecture design is given in Fig 1.

Fig 1:Medbox Top View



It consists of the following parts:

ARDUINO Board: It consists of microcontroller (ATmega) that can be programmed to perform a specific task.

BATTERY: It is used to provide supply voltage (9v) to Arduino board

TIMER: It is used to display the time, change the time settings, etc.

LOAD CELL: It is used to measure the weight of an object placed on it. The provided load cell can measure up to 1kg.

A/D CONVERTER: It is used to amplify and digitize the output from load cell and provide it to Arduino board.

IR SENSOR: It is used as a sensing element. Whenever an object is detected, the LED connected to the sensor will stop glowing denoting the interruption.

RF MODULE: It is used to transmit the digital data wirelessly to another Arduino board or any other electronic devices.

BREADBOARD: It is used to connect various electronic components .For example, RF module can be connected to Arduino board using breadboard.It uses Arduino board which is give in fig 2.

Arduino is a license- free open source software that has both programmable microcontroller and software (IDE) tools. It can be easily

interact with buttons, LED, motor, speakers, GPS unit, etc.

Fig 2: Arduino Board

There are different types of Arduino namely Arduino Uno, Arduino Nano, etc. For our project, Arduino Uno is being used. The pin details is given below:

GND (3): It is used as a short for grounding purpose.

5V (4) & 3.3V (5): It is used for providing power supply. Arduino can accept either 5V or 3.3V supply depending on application.

ANALOG PINS (A0-A5): It can be used to provide analog signals as input.

DIGITAL PINS (0-13): It can be used to provide digital signals as input.

PWM (8): The pins labelled as ~ can also be used for PWM purpose.

AREF (9): It can be used whenever external power supply is required.

RESET button (10): It can be used to reset the microcontroller.

POWER LED INDICATOR (11): This LED can be used to test whether the board is in working condition or not. When the supply is provided, the Led must glow.

TX-RX LED & PIN (0-1): It is used to denote whether transmission or reception is taking place or not.

VOLTAGE REGULATOR: It converts the provided voltage to 9V (Arduino's supply voltage).In other words, it regulates the voltage.

The outcome of the reliable e-caregiver system is for notifying the user (through app) about his/her medications on time .

Monitoring the patient activity, whether the right medicine has been taken at the right time and in correct quantity. Notify the patient (through app) in case of running short of supplies before in hand , to avoid non availability of supplements.

Application of med box are –

An efficient and reliable caretaker for people who are to take medications on time.

Medbox can undoubtedly serve as an efficient system for monitoring the avert erratic situations and notify them before in hand.

To avoid skipping of regular medicine intake due to our busy schedule.

Applicable to all folks irrespective of age.

Conclusion:

Thus the system proposed will act as a efficient, reliable e-Caregiver integrating the advantages of IoT sensor inter networking, android app and unambiguously be a smart system for day to day application and a reliable usage.

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