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Implementing Internet of Things in Health Monitoring System for Comma Patients using IoT Authentication

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***Abstract*: The Internet of Things is an emerging topic of technical, social, and economic significance. IoT involves in various departments like Medical industries, Automobile industries, Manufacturing industries, and etc. Now a day's utility components everyday objects are being combined with Internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play. The term Internet of Things generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate exchange and consume data with minimal human intervention. In this project a for comma patient a Dynamic Service Non Dependency Verification has been implemented using IoT. The first process of this project initiate with hardware interface. The hardware has been designed using 8051 microprocessor. The microprocessor contains 40 pin. More interactions can be done using 8051 pin interaction. In added with various sensors can be connected through the controller board interface. The main objective of this project is to develop a web based application to communication with an internet server in a secured manner for comma patients. All the sensors will be wired over the body of the comma patients. The sensors value will be uploaded in a centralized cloud server. A threshold value will be assigned for each sensor. In case of any abnormal means, the warns immediately to the user interface end. Secure Service Virtualization in IoT by Dynamic Service Non Dependency Verification is ensured by the hardware phase initially. In this project, we propose a heterogeneous IOT scheme to secure communication between a sensor node and an Internet host. We prove that this scheme is indistinguishable against various conditions.**

***Keywords*: Internet of things, Network connectivity, Non Dependency, Web based, sensors, Microprocessor.**

1. Introduction

The Internet of Things (IoT) is an essential point in innovation industry, approach, and building circles and has progressed toward becoming feature news in both the claim to fame press and the well-known media. This innovation is encapsulated in a wide range of arranged items, frameworks, and sensors, which exploit progressions in processing power, gadgets scaling down, and organize interconnections to offer new capacities not beforehand conceivable. A bounty of gatherings, reports, and news articles examine and banter the forthcoming effect of the "IoT upheaval"— from new market openings and plans of action to worries about security, protection, and specialized interoperability. The huge scale usage of IoT gadgets guarantees to change numerous parts of the manner in which we live. For customers, new IoT items like Internet-empowered machines, home mechanization parts, and vitality the executives gadgets are pushing us toward a dream of the "brilliant home", offering greater security and vitality effectiveness. Other individual IoT gadgets like wearable wellness and wellbeing checking gadgets and system empowered medicinal gadgets are changing the manner in which human services administrations are conveyed. This innovation guarantees to be gainful for individuals with incapacities and the old, empowering improved dimensions of autonomy and personal satisfaction at a sensible expense. IoT frameworks like arranged vehicles, insightful traffic frameworks, and sensors inserted in streets and extensions draw us nearer to "shrewd urban communities", which help limit blockage and vitality utilization. IoT innovation offers the likelihood to change farming, industry, and vitality generation and dissemination by expanding the accessibility of data along the esteem chain of creation utilizing organized sensors. Be that as it may, IoT raises numerous issues and difficulties that should be considered and tended to all together for potential advantages to be figured it out.

A. Related works

In this paper, we describe the key technologies involved in the implementation of Internet of Things and the major application domain where the Internet of Things will play a vital role [1]. This system uses Web service interfaces to support standard Electronic Health Records for patient record interoperability. Customers can view and update their personal medical information via the web site, which seamlessly sync with one another. Because the system is built on Web services, it is easy to update, adapt and grow [2]. The purpose of this study is to help initiate and direct such empirical research by

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both conducting a review of the extant literature and using the findings to provide a discussion of current trends and future directions in this domain [3]. In spite of the recent beginning of the mass deployment of RFID systems their penetration is nowadays mainly limited by privacy concerns: products labelled with tags reveal sensitive information when queried by readers, and they do it indiscriminately [5]. At this price range, providing strong cryptographic primitives is currently not a realistic option. Any viable tag and reader designs must take into account security and privacy risks, while not exceeding this low-cost range [6]. To realize the full potential of the Internet of Things (IoT), IoT architectures are moving towards open and dynamic interoperability, as opposed to closed application silos [7]. A generalized context for data aggregation is established to effectively exploit spatial and worldly characteristics of the data, both in the sensing habitat and associated transform domains. The word has to be brought together and used intelligently and energy- efficiently. For capable city applications, visualization is consistent for data representation in user-understandable constitute, allowing definition by the users [8]. A privacy homomorphism is said to be secure against a known clear text attack if, for any fixed number n of known clear text-cipher text pairs, the probability of successful decryption of a cipher text for which the clear text is unknown can be made arbitrarily small by properly choosing the security parameters of the homomorphism. We will show in this section that the PH whose encryption function is given by Expression is secure. First, it will be shown that, for a fixed number n of known clear text-cipher text pairs, the probability of randomly guessing the right key can be made arbitrarily small [9]. Advanced sensing and computational capabilities data is united and evaluated in real time to recognize the information, which eventually converted into knowledge. It will recover the decision making of administration and citizens to turn city treatments. Here we are using environmental monitoring application where temperature mapping is taken as example to measure its merits [10]. To support IoT, flow policy operates across the range of 'things'. By protecting information flows wherever they occur, IFC embodies the nature of IoT interactions, addressing the flow-based security concerns. In this paper we present initial steps in using IFC to protect IoT information flows.

2. Sensors working model

A. PIC Microcontroller

PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability. There is no distinction between memory space and register space because the RAM serves the job of both memory and registers, and the RAM is usually just referred to as the register file or simply as the registers.

The PIC instruction set is suited to implementation of fast lookup tables in the program space. Such lookups take one instruction and two instruction cycles. Many functions can be modelled in this way. Optimization is facilitated by the relatively large program space of the PIC. These devices feature a 14-bit wide code memory, and an improved 8 level deep call stack. The instruction set differs very little from the baseline devices, but the increased opcode width allows 128 registers and 2048 words of code to be directly addressed. The mid-range core is available in the majority of devices labeled PIC12 and PIC16.

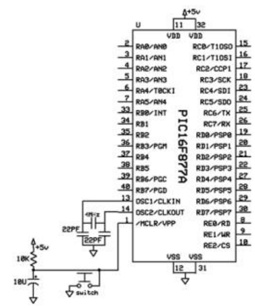

Fig. 1. PIC Microcontroller

B. Heartbeat sensor

Here we are using modified IR sensor with HEARTBEAT SENSOR for detecting the HEART BEAT in accurate. IR with HEARTBEAT sensor has less noise and ambient light than at normal optical wavelengths. The light is produced only when current passes through in the forward direction and block current in the reverse direction. Plethysmograph is an infrared photoelectric sensor used to record changes in pulsatile blood flow from the finger. The Plethysmograph operates by recording changes in blood volume as the arterial pulse expands and contracts the microvasculature. This sensor is integrated with the microcontroller.

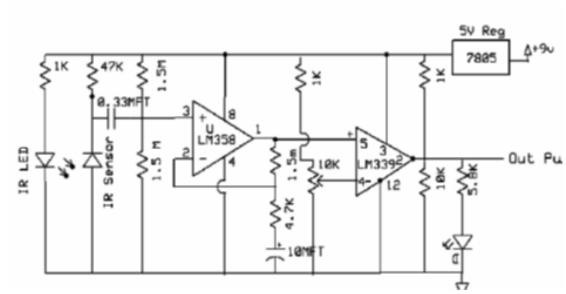

Fig. 2. Heartbeat sensor circuit diagram

This is a non-invasive measurement for changes in finger blood flow during wakefulness and sleep. Pulse wave amplitude (PWA) is the most frequently used parameter obtained by finger plethysmography. PWA is directly and positively correlated to finger blood flow. The hypothesis of this study was that finger plethysmography detects pharmacologically induced changes in finger blood flow, in particular changes induced by stimulation and blockade of vascular a-receptors. Due to the anatomic structure of the finger we expected that alterations of vascular tone following sympathetic activation or inhibition might be reflected by changes of PWA. A change in finger blood flow, reflected by PWA is derived from the finger plethysmography.

C. Accelerometer

The accelerometer is a low power, low profile capacitive micro machined Accelerometer featuring signal conditioning, a 1-pole low pass filter, temperature Compensation, self-test, 0g-Detect which detects linear freefall, and g-Select which Allows for the selection between 2 sensitivities Zero-g offset and sensitivity is Factory set and requires no external devices. This includes a Sleep Mode that makes it ideal for handheld battery powered electronics. Acceleration is a measure of how quickly speed changes. Just as a speedometer is a meter that measures speed, an accelerometer is a meter that measures acceleration. Accelerometers are useful for sensing vibrations in systems or for orientation applications. Accelerometers can measure acceleration on one, two, or three axis. 3-axis units are becoming more common as the cost of development for them decreases. You can use an accelerometer's ability to sense acceleration to measure a variety of things that are very useful to electronic and robotic projects.

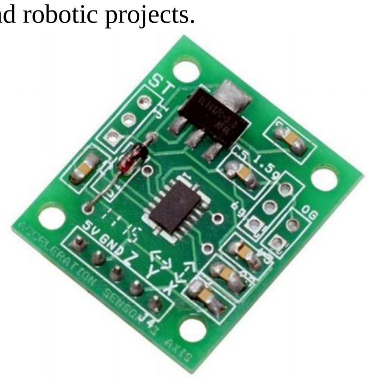

Fig. 3. Accelerometer

D. Temperature Sensor – LM35

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ºC). The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient.

E. Centigrade scaling.

The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

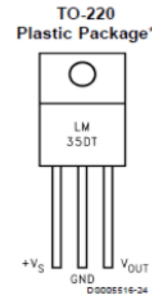

Fig. 4. LM 35

3. IoT Communication with cloud

A. Hardware abstraction

Hardware abstracts common computing resources such as memory and file I/O. The OS also provides very low-level support for the different hardware interfaces. Generally, these abstractions are not easy to use directly, and frequently the OS does not provide abstractions for the wide range of sensor and actuator modules you might encounter in building IoT solutions. we can take advantage of libraries that abstract hardware interfaces across platforms. These libraries enable you to work with a device, such as a motion detector, in a more straightforward way. Using a library lets you focus on collecting the information the module provides to your application instead of on the low-level details of working directly with hardware. Now the hardware is ready to communicate with the software.

B. Software abstraction

Data from the hardware will communicate with the software for cloud upload. The cloud computing environment platform executes the software. Based on the hardware constraints the capabilities of the processor will vary. Some computing environments consist of a full system on a chip (SOC), which can support over cloud system. Microcontroller-based devices might be more constrained, and your application code could run directly on the processor without the support cloud system. These computing environments are the bridge between the logic of your application code and the physical hardware of the platform. The software they run might be entirely loaded during boot up from read-only memory (ROM). Alternatively, the environment might result from a staged boot process. This makes effective communication between hardware and Software.

C. Communicate abstraction

After data is collected from a sensor, the device can provide data processing functionality before sending the data to the cloud. Multiple devices might handle the data before it gets to the cloud, and each might perform some amount of processing. The diagram is shown below.

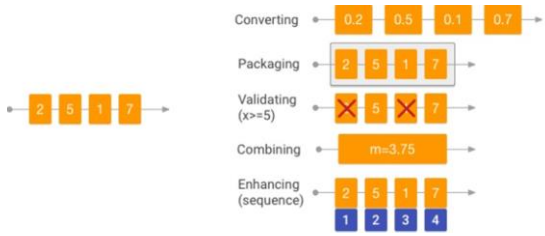

Fig. 5. Communicate abstraction

4. Result and discussion

The IoT is always connected, always on, and that "Perpetual Connectivity" to products and users affords three key benefits. These sensors work well and communicate effectively with the cloud server. The result and discussion shows the efficient communication between hardware, software and cloud architecture.

- *Monitor:* Continuous monitoring which provides ongoing and real-time knowledge of the condition and usage of a product or user in a market or industrial setting. This monitoring involves all the sensors enabled and gathering sensors values in the offline phase. The sensor data will be furnished in a LCD Display. And the data is ready to transfer from the sensor node to the next level.
- *Maintain:* This maintains data values and checks from threshold signature. Due to continual monitoring one can now push upgrades, fixes, patches, and management as needed. This result involves with the cloud functionalities and maintains the data logs. All the induction process will be done here for accessing the output.
- *Output:* Constant and ongoing connection to patient is the way to compel or motivate others to take corresponding actions. Here the can be view in both PC and Mobile. The users are provided with login for efficient data access.

5. Conclusion

IoT methodologies with Medical environment are undoubtedly the core technologies of future IoT. Many researchers have studied various research issues on integrating IOT health monitoring and sensor technologies. At present, efforts are being made to integrate these two technologies on the same IoT platform in different fields. Unlike conventional studies that provide IoT platforms at the architecture level only, this study proposed an implementation model of a sensor data repository on the SQL Server. Furthermore, based on logistic process simulation of automotive parts, the proposed sensor data repository was empirically validated in terms of even distribution of data and query speed. This phase is implemented up to IoT hardware unit, which works more perfect than expected.

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