A Proposed Model for Monitoring Students Health based on Internet of Things

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ABSTRACT
Among the wide and impressive range of applications enabled by Internet technology, IOT remains smart and interactive health care systems that are especially important for gathering rich information about our mental and physical health. The sensors in IOT are used either on the body or in the surrounding environment, by integrating mobile technology into IOT-based health care systems; the interactive care system can be transformed into a preventive and effective health system. In this context, the IOT-based health care system calculates the severity of the student's illness by predicting the potential disease by extracting and deriving health measurements collected from medical devices and other IOT devices. In order to effectively analyze student health care data, a smart health care system was designed for students. In our case study, a set of data and characteristics for each case of disease were included. This data is further analyzed to verify the image of the model, using different classification algorithms and then calculating the results based on accuracy, sensitivity, privacy and response time. Moreover, the proposed methodology effective in decision-making by providing sensitive information to the time-based care or specialist doctor on time. Finally, the system presents the results of the diagnosis to the list of data again to make a centralized feedback and an update and use later.

General Terms
(IOT) Internet of things; Health care

Keywords
(IOT) Internet of things; Health care; Cloud computing.

1. INTRODUCTION
IOT is a new direction for next-generation technology that can be described as the interconnection of surrounding elements and unique smart devices [1]. The IOT is surrounded by many of the things we see every day in our surrounding environment. Furthermore, IOT provides the desired solutions for huge areas such as congestion Traffic, industry management, emergency service and health care, to monitor patient health remotely effectively [2].

Acquires existing health care applications on the IOT motivation day after day, with the continuous development of information and communication technology provides medical sensors solution for many medical applications such as patient monitoring activity and remote diagnosis of chronic diseases and provide health care for the elderly[3].

In addition, the availability of IOT devices leads to a better way to diagnose diseases [4]. The use of medical devices, sensors and diagnostic devices as smart devices can also be considered as the operating environment of the IOT system as a whole [5].

With the use of cloud computing, IOT has become a powerful platform for remote disease monitoring, providing ongoing health information for Doctors and careers [6]. Cloud storage provides a great deal of storage and processing capabilities that can be updated and developed. These developments can handle the sharing of resources, data and processing in more than one place and the ability to store data with scalability and solve security problems easily, and in our case here we will use this technology to develop the application and use it in our environment [7].

In the current presentation, the smart healthcare system for students has been developed through various diagnostic plans using the IOT medical system. A series of measurements are used to detect additional information such as frequent change in health value over time or a bad event over a specified period of time [8].

1.1 IOT technologies have three health benefits
First: Continuous monitoring helps to detect early and persistent diseases without visiting clinics continuously [9]. Second, the repeated health measurements give the caregiver or doctor a sense that precautions can be taken in the initial stage. In addition, using the Android application, it is easy to recover and deal with student health data without difficulty [10].

The third and most effective benefit is to generate a series of measurements and data using IOT over a specified period of time [11]. Therefore, the Cloud Computing system provides an effective, less-effective user care environment and provides a continuous health status for healthcare providers and physicians while caring for patients [12].

1.2 IOT methodologies in health:
Since the development of mobile technology and information and communications technology, many developments have taken place in the healthcare sector, and the remote patient monitoring process has been effectively achieved using Wireless Sensing Technology [13].

Here, we offer you a smart healthcare system. This proposed system has great potential for analyzing health care data for students to avoid dangerous health conditions. This framework combines the student's health data using various modern devices and sensors, as well as a specific security mechanism to send health care data to cloud servers that are accessible by health care professionals in accordance with their respective privileges.

In addition, to avoid identity theft or medical errors by health workers, procedures such as signal enhancement and watermark were included in the system. In this network, the patient can be monitored using a small range of lightweight sensor networks and to maintain the student's privacy, taking into account the scientific basics such as cost, accuracy and data security, and then visualize the system to provide an easy interface between the doctor And the student to communicate with them, and to increase the utility of the system are sending messages warning under critical circumstances to people close to the patient using Nfc / Wlan technology.

2. RELATED WORKS:

This study is based on the following studies and techniques: Study aims to design Patient monitoring system. Using the tracking method, sensors inside the hospital, room temperature control and hand sanitizers[14].Another study is to ensure that biomedical devices are ready to be used when patients are badly needed by fixing potential problems before they occur using predictive maintenance based on Internet of things and cloud computing[15]. Study provides a proposed model for a system for the care of patients outside hospitals in their country. Through wearable sensors that help doctors monitor the patient's health status [16]. Study describes the system of protecting patients' medical information based on Internet of things. Helping employees spend less time searching for and managing patient data and medication [17].It provides a smart system that converts protocol, discovery and intelligent caching; it depends on a set of portals and internet of things [18].present Swiss Gate system which aims to operate the sensor network. And control heating and ventilation through specific parameters [19].

3. PROPOSED MODEL

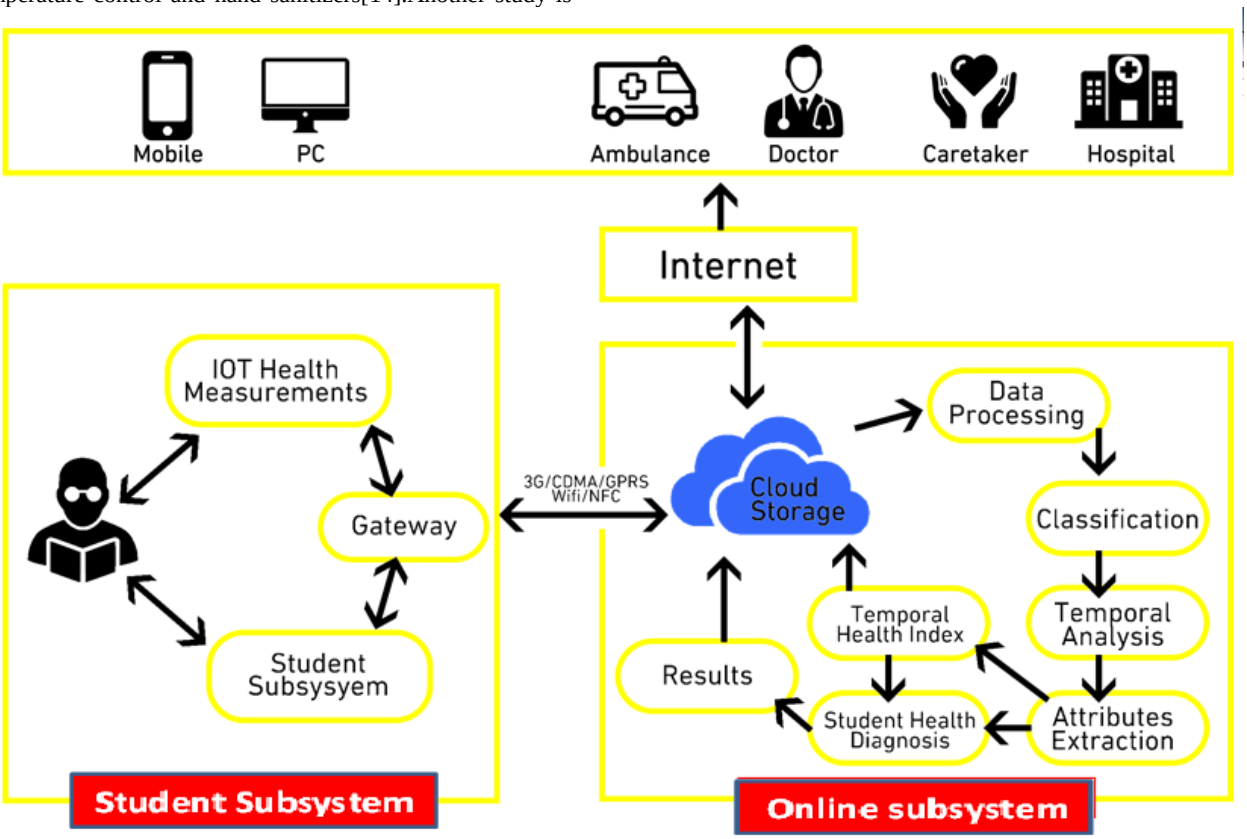

Fig.1 Show the proposed Model structure

The previous figure shows the proposed methodology. The IOT-based Intelligent Health Care System consists of three phases. Phase 1: Student health data is obtained from the surrounding environment and sensors. This data is sent to the subsystem via the Gateway or local processing unit and in the second stage: medical measurements are used by a medical diagnosis system to make decisions about the health of the student and in the third stage: alerts are provided to the officials or their health care providers. In addition, if the emergency situation worsens, also issued an alert to the nearby hospital to deal with a medical emergency.

3.1 Student Subsystem:

In this section, each student is initially enrolled in the system for the first time by entering the details of his health in the site uploaded and hosted on the Cloud Storage server. Each registered student is provided with a unique registration number of a type automatically created by the system.

In addition to the historical data, the student's health data is currently obtained through a data acquisition system that allows for seamless integration with intelligent sensors and other medical devices. These sensors are worn to monitor body functions. In our case, the sensor network consists of sensors Worn or placed in the environment surrounding the student allows the application installed on them to sense vital functions such as heartbeat and blood pressure and the rate of calories and others.

After collecting this information by the data collector, the Local Processing Unit (LPU) is connected to the main server using a wireless communication such as NFC / Wifi / 3G. In addition, the transmission channel is secured by SSL encryption to provide security and protection, providing

security in cloud storage multiple security measures are considered:

- Third party Encryption

- User Authentication

- Credential Mapping

3.2 Online subsystem:

IOT data is stored for the student in the cloud server, a basic infrastructure service as an online service provider. Data is retrieved from anywhere and retrieved regularly at different time intervals for effective storage and decision-making. A repository is defined to store data received on the server, health- Where the student's health index is calculated and the diagnostic mechanism is applied to determine the severity of the disease. The method of diagnosis depends on pre-defined terms collected from medical books and other sources.

There are also two classes of users who are only allowed to access the data. The first category consists of a doctor or authorized medical care provider who has access to isolated and shared data and the second category consists of agencies or service providers and allows them to know common public data that may be useful for providing medical service, drugs or drugs.

3.2.1 Data processing:

This section receives two types of information: - sensory data personal dataAt the time of recording the decisions of the different events of the sensors must remove the data is important and retrieve lost data and analysis for better results and the importance of this part in reducing the dispersion of sensor receivers also can be used personal information of the student for more necessary actions The following figure shows the features that are placed in the Consider the personal information required for the student:

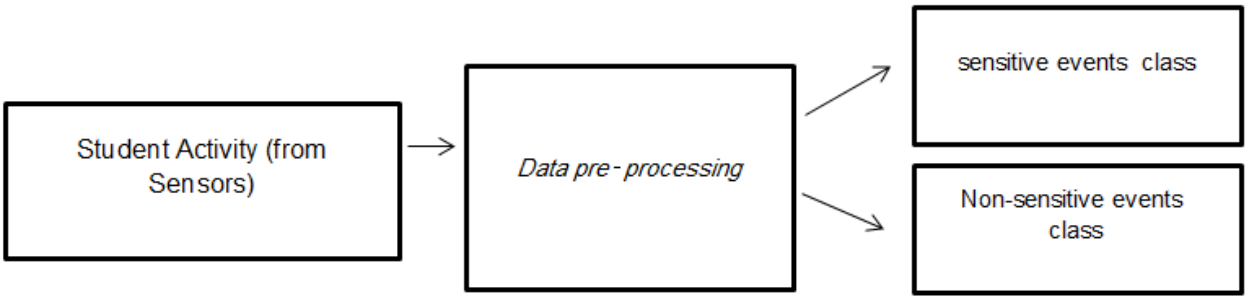

Fig.2 Show the Data processing steps

3.2.2 Event Classification:

Data sets consisting of different data are defined for different student health events and are classified into two different categories: the sensitive event category and the non-sensitive event. The category of sensitive events consists of those events that can lead to a severe health condition for the student such as: high temperature, glucose level, blood pressure, etc., while non-sensitive events are not affecting the health status of students based on this classification to previous experiences and predefined determinants as in the following figure:

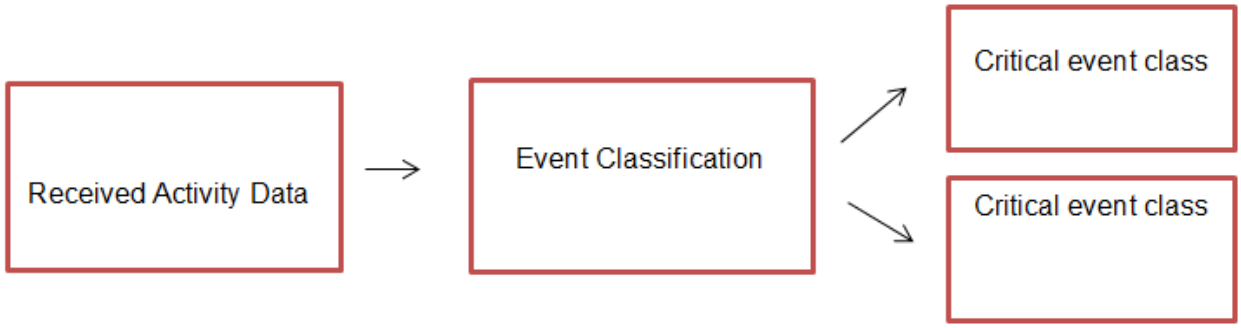

Fig.3 Show the Event Classification steps

3.2.3 Data extraction and analysis:

Cloud Storage provides a convenient platform for sensitive *data received from anywhere and all the time. The local* processing unit LPU transfers data to the cloud storage and is stored in an appropriate format to analyze thedisplay.These data are represented in chronological order and values of current events with previous events. This mechanism uses some definitions that can be considered:

Primary health indicator of the student.

Event data: - Data related to the student

-Environment-relateddata

Behavior-relateddata

Data on the health history of the student

3.2.4 Student Health Diagnosis:

The system performs a diagnosis based on the health information of students from IOT devices. The results of the students' diagnosis are created by measuring the current student's health status and comparing them with the previous values. After this, a general idea of the system is composed of a range of different diseases. System of different sensors In most cases the system has the ability to predict the disease of the student through two or three and in the rest of the cases are collected the rest of the data based on environmental indicators and behavioral student.

3.2.5 Make decision:

The decision-making process is performed using an algorithm to derive the final decision. The alerts are sent to health care providers or to the doctor based on future data. Based on the previous steps, the following figure illustrates how to make and decide on the following two algorithms:

Algorithm 1

- Student determination
- N = Number of Symptoms
- Determine current state (for I = 1 to N)
- If (Value (i) > Range value (i))
- Then state = unsafe
- Else state = safe
- Return state and exit
- Output Current State of StudentAlgorithm 2
- Student determination
- Input: A set of values (i.e., series of measurement for a context type) Event set Health + Behavior Environmental+ Historical dataset] Determine current state (for i = 1 to N)
- Output: Student diagnosis record (SDR) Disease type, Level, Expression for value, probability)
- Generate student health state using Algorithm

4. THE TESTING PROCESS:

The large-scale implementation of the Internet is expected to bring billions of additional devices connected to the Internet. The majority of these devices, such as wearable sensors, are not able to store the data they generate. Here is the approach of transferring this data to the cloud storage repository for processing. The following figure shows a detailed description of how the system components work, which includes the following main components:

Application of Android to receive and send data from sensors in the smart clock

The main server for the network of system and database access gates.

Backend system to control and read and send different data.

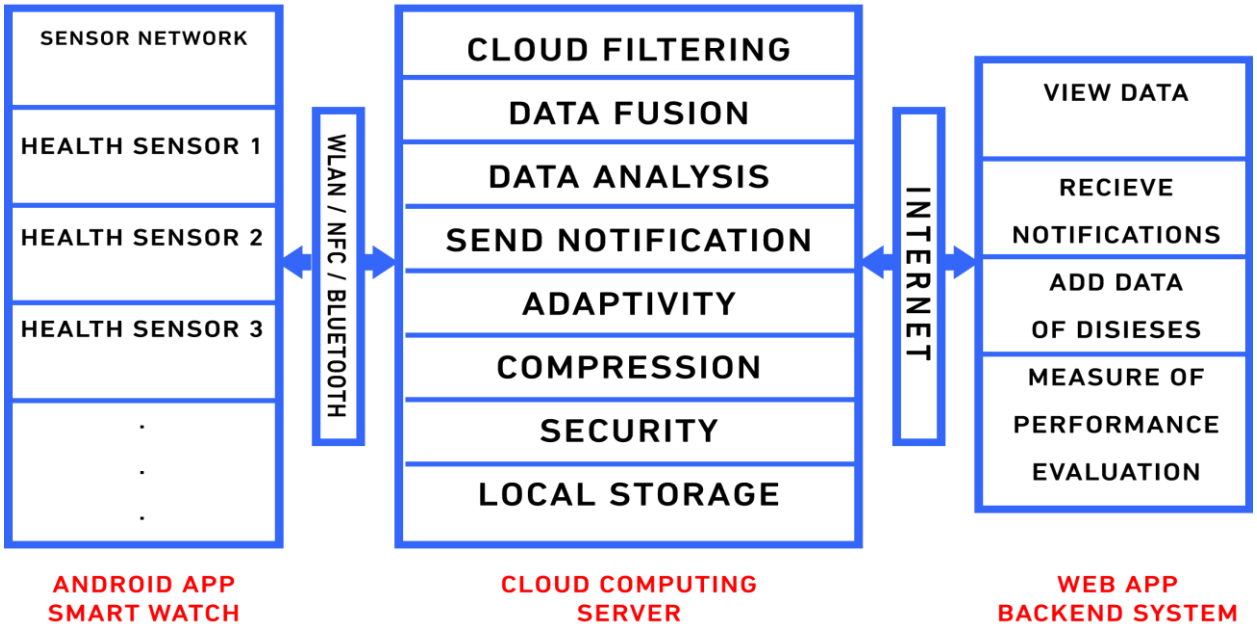

Fig.4 Show the testing process and implementation steps

5. CONCLUSION

With the ease and accessibility of medical devices in the Internet environment, IOT can make the diagnosis more effective and reliable. The main feature of this research is to describe the conceptual framework of the student health care systems based on the concept of chronological analysis.

Furthermore, this proposed methodology consists of key factors such as time periods of the event and the decision-making process based on the alert. More specifically, the proposed system describes two important concepts:

1) Data extraction based on current time information for different health conditions.

2) Making the decision based on an alert that provides information for various critical health conditions.

The health data recovery process is delivered to students for real-time health examples and information from the Cloud Storage repository, which is further processed to calculate the results of diagnosing the results of the student's health diagnosis. In addition, the development of the surveillance system gives information quickly to be the most important time factor for the health care provider or the doctor. This increases the usefulness of the proposed system. To increase the usefulness of the proposed system, different diseases are identified, placed in cloud storage and distributed with symptoms and characteristics of each disease. The algorithms are used to extract the data and the final output of the decision is made to calculate the efficiency of data extraction based on feedback from users and caregivers. The results show that the proposed methodology provides an effective scenario for the timely retrieval of time-sensitive information in an optimal manner.

The results of the survey of the arbitrators in the proposed model were supported by 95% approval and 5% opposition. The current study recommends the implementation and construction of the proposed system, its use in schools and universities and the design of similar systems in the educational process.

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