Secure Health Monitoring of Soldiers with Tracking System using IoT: A Survey

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ABSTRACT

The paper reports an Internet of Thing (IOT) based health monitoring and tracking system for soldiers. The proposed system can be mounted on the soldier's body to track their health status and current location using GPS. These information will be transmitted to the control room through IOT. The proposed system comprise of tiny wearable physiological equipment's, sensors, transmission modules. Hence, with the use of the proposed equipment, it is possible to implement a low cost mechanism to protect the valuable human life on the battlefield. It also includes about securing of data of soldiers in the cloud using cryptographic algorithms.

Keywords: Child Labour , POVERTY, SOCEITY

I. INTRODUCTION

Indian armed forces are the third largest standing army in the world with 1,200,255 active troops and 990,960 reserve troops. The army suffers a lot due to the unavailability of information of injuries to its personnel which may increase the death/permanent disability toll. It is observed that the causalities are caused due to injuries rather than the direct assaults in the battlefield. The Military Balance 2014 contains region-by region analysis of the major military and economic developments affecting defence and security policies and the trade in weapons and other military equipment. Detailed entries describe the military capabilities of 171 countries, displaying key equipment inventories and defence economics.

Comprehensive tables detail major training activities, UN and non-UN deployments and international comparisons of defence expenditure and military personnel. By These number can be minimized if the real-time information is available at the control room about the health and location of the soldier. There are many issues regarding the safety of soldiers. Knowledge of current location of soldiers, inability of continuous communication with the control room during the operations, lack of immediate medical attention and operations under different geographical conditions are the few prominent safety issues. Enhancing safety and security of the country, providing humanitarian assistance and disaster relief during natural and man-made disasters, modern is a tionof the Armed Forces and supporting indigenisation and manufacturing of defence equipment through the 'Make-in-India' initiative have been the main features of the Ministry of Defence during 2017. Prime Minister Shri Narendra Modi dedicated the naval submarine INS Kalvari to the nation in December describing it as a prime example of 'Make-in-India'.

II. LITERATURE SURVEY:
1. Real Time Health Monitoring System Of Remote Paitent Using ARM7:
Many efforts were reported by different academicians and researchers to track the location of the soldiers' along with their health condition on the battlefield.

Pavan Kumar *et .a ,* reported a GPS based technology to monitor the soldier health parameters and location tracking using GPS. AT89C51 microcontroller was used to collect health parameters and then these parameters are transferred through GSM to the base unit [3]. A ZigBee based approach movements and heartbeat of the patient. The collected information were then added to the cloud-based websites with the help of IOT. A real-time, ARM processor based approach for the monitoring and collection of temperature, heartbeat, ECG parameters of patients by R. Shaikh *et. al.* [6]. ZigBee and GSM wireless technology were used to send current updates of patients to the doctor and then doctors can take immediate action against that patient. A wireless body area sensor networks (WBASNs) technology using ZigBee was reported in [7] to continuously monitor the human health and its location. RF based module to gather the live information of soldiers on the battlefield was proposed by G. Raj *et. al.* in [8]. Further, a one-time password (OTP) based system was proposed in [9] to secure and rauthenticate the data processing. Jassa*et. al.*proposed an idea of integration of wireless sensor network and cloud computing for the information processing in real-time and speedy manner [10]. A google map based approach was proposed in [11] to track the location of the soldiers.

However, all these systems are stuck-up by one or more reasons like costly implementation, delay in response and bulky nature. Hence, a portable wireless real-time system

based on IOT concept is developed and proposed in this paper which will be an effective alternative to the existing technologies in the area of soldiers' health and location tracking on the battlefields. Table 1 provides the state-of-the-art soldiers health and location monitoring system of the GPS to guide the soldier in correct direction. The base station can access the current status of the soldier using IOT as the different tracking parameters of the soldier get transmitted via Wi-Fi module. These information will be stored on the Cloud and can be extracted on the PC of control room, as and when extracted. Based on these information, the authorities can initiate immediate action by deploying a medical, rescue team or any backup force for their help. Using various biomedical sensors, health parameters of a soldier is observed along with its surrounding environment condition observed. The proposed system is divided into two unit i.e. Soldier and control room units.LM35 temperature sensor, Pulse Rate sensor and oxygen level detector sensor for continuously monitoring health status of soldier. GPS is used to determine real time position and orientation. Data originating from sensors and GPS receiver is processed and collected using ARM processor.

2. Health Monitoring and Tracking of Soldiers using GPS:

Communicating with the base (control room) station become the fundamental challenges in military operations. Also the proper navigation between soldiers' organizations plays important role for careful planning and co-ordination. So this paper focus on tracking the location of soldier from GPS, which is useful for control room station to know the exact location of soldier and accordingly they will guide them. Also High-speed, short-range, soldier-tosoldier wireless communications to relay information on situational awareness, such as Bio-medical sensors, GPS navigation, Wireless communication.

The most significance in this is implementation of M-Health. Implementation of this system improves the security of our country and also help to improve the safety of the soldier. This system also helps to provide real time video information. The casualties of war are reduced with the help of this system. It also helps to giving critical information and warning to the soldiers and can apply more of them to the current weak locations. This strengthens the defence system.

3. A Real Time Autonomous Soldier Health Monitoring:

Wireless Sensor Networks are the collection of a large number of low-cost, low-power, multifunctional sensor nodes that are small in size and communicate untethered in short distances. They can be an integral part of military C4ISRT systems. This paper suggests a method to ensure the safety and dignity of each and every army personnel of the armed forces of the world by providing them with a device that constantly monitors the value of the pulse rate of the wearer, and along with the aid of the GPS module present along with the transmitter setup present at the source, helps in keeping a tab on the immediate location details (latitude and longitude) of the wearer in those adverse situations where the pulse rate (or heart rate) falls below the clinically accepted value of 60 beats per minute. Thus it helps to track, observe and keep in mind the whereabouts of every soldier.

The paper also proposes further integration with existing equipment in use. Effective interfacing has been achieved and results suggest proper intimation of pulse rate and location as soon as pulse values drop below pre-decided threshold or on receiver demand.

4. An IOT Based Patient Monitoring System:

One of the key learning platforms for IoT is the Raspberry Pi. The Raspberry Pi is a popular platform because it offers a complete Linux server in a tiny platform for a very low cost. The Raspberry Pi also allows interfacing services and actuators through the general purpose I/O pins. In this paper specialized sensor is used to monitor patient's heart rate, body temperature, body movement and breathing rate. The combination of Raspberry Pi and IoT becomes a new innovation technology in healthcare system. Raspberry Pi acts as a small clinic after connecting these (Temperature, Respiration, Accelerometer, Heartbeat) sensors. Raspberry Pi works as small clinic in many places. Raspberry Pi collects data from sensors and then it transfer wirelessly to IoT website. Raspberry Pi board is connected to the internet, that board MAC address is registered to the internet. After that in IoT website, add MAC address of this board. Then the sensors output is connected to the IoT website.

One is directly connected to the monitor, keyboard, and mouse to the Raspberry Pi board and got output in monitor screen. Another method is Raspberry Pi board is connected to a laptop (or) computer using data cable. After that install putty software to the respective system. Change IP address, Subnet mask, gateway to that system. Then open that putty software, output will display in that screen.

5. A Smart System Connecting e-Health Sensors and the Cloud:

Cloud Computing is a general expression for any technological services provide through the Internet. Cloud computing provides compatible and on-demand network access for numerous computing resources such as networks, systems, applications, and services. Moreover, cloud computing are using modern and flexible methods to provide, manage, and pay for information technology services with minimal management effort and cost. Cloud computing technology has several advantages such as flexibility, highly auto-mated, low cost, fast services providing and a huge storage capacity.

The wireless health sensors are connected to a Raspberry Pi. This Raspberry Pi is responsible for collecting data from sensors and transmittingthis data through wireless communication channels to platform services hosted on the cloud.

The integration between wireless sensor networks and cloud computing will create a new generation of technology in many aspects such as patient monitoring with minimal cost, reducing the number of occupied beds in hospitals, and improving medical staff performance. In addition, applying various data mining techniques help to extract and analyse patients' data. The system introduced in this paper provides decisions based on patients' historical data, real-time data gathering, and thus eliminating manual data collection.

6. Providing Confidentiality and Integrity on Data Stored in Cloud Storage by Hash and Meta-data Approach:

Security is the protection of information assets through the use of technology, processes, and training . Cloud storage is a service that includes inherent vulnerabilities, but these have

never dissuaded users from taking advantage of its economies and flexibilities.

With adoption of a cloud model, users lose control over physical security. Users raised concerns whether their data are accessed by unauthorized person since there are many user sharing the resources over the cloud.

Sharing the cloud with other users possesses risks and concerns over security. Security overall covers mainly three aspects: Confidentiality, Integrity and Availability (CIA). These aspects are the topmost considerations in designing a security measure to ensure maximum protection.

Confidentiality: Protecting data and information from disclosure to unauthorized person.

Integrity: Protecting data and information from being modified by unauthorized person.

Availability: Authorized people are able to access and use data and information whenever require.

7. GPS Based Soldier Tracking And Health Indication System With Environmental Analysis:

This paper has an idea of tracking the soldier and navigation between soldier to soldier health status along with knowing their speed, distance, height as well as environmental situation of them during the war, which enables the army personnel to plan the strategies of war. The control room gets location of soldier from GPS. Even in case of losing the battlefield it is the responsibility of the GPS to guide the soldier on correct path if he is lost in the battlefield. The base station can access the current status of the soldier which is displayed on the PC. And hence can take immediate action by sending help for the soldier or sending backup for threat ahead. Using various biomedical sensor health parameters of soldier's are observed, as well as surrounding atmosphere pressure, oxygen levels are observed. The position and orientation of soldier is trapped using GPS.

### 8. A Survey Of Authentication Of RFID Devices Using Cryptography:

A secure ECC based RFID authentication protocol with ID verifier This paper[Liao's schema] proposes an ECC based mutual authentication algorithm that satsfies the essiential requirements in RFID system [2].

In this algorithm tag believes that the ID verifier Z_t is

securely transmitted to the server and vice versa. This algorithm provides Mutual authentication, confidentiality, forward security, scalability. This algorithm resisting replay attack, tag masquerade attack, server spoofing attack, location attack, cloning attack [2 To implement this schema successfully a powerful server device needed [2]. There are also some other schema [3-6] which are more efficient then this schema in tag computational time [2].

b) Cryptanalysis and improvement of an efficient mutual authentication RFID scheme based on elliptic curve cryptography This paper is improved version of Chou's protocol [7] based on ECC which is failed to provide mutual authentication and cloning attack. [8]

9. Secure File Storage On Cloud Using Cryptography:
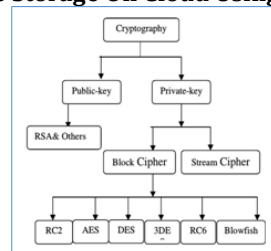
The main goal is to securely store and access data in cloud that is not controlled by the owner of the data. We exploit the technique of elliptic curve cryptography encryption to protect data files in the cloud. Two part of the cloud server improved the performance during storage and accessing of data. The ECC Encryption algorithm used for encryption is another advantage to improve the performance during encryption and decryption process. We assume that this way of storing and accessing data is much secure and have high performance. Our efforts are going on to solve the problem of group sharing of data in the shared data section as in this scheme only member of group can access the data stored over shared data section. One to many, many to one, many to many communication is not possible.

III. SYSTEM DESIGN:

System design is the process of defining the architecture, modules, interfaces and data for a system to satisfy specified requirements. Systems design could be seen asthe application of systems theory to product development .

COMPARISION OF DIFFERENT METHODOLOGIES

Authors	Year	Technologies and algorithms used	Merits	Demerits
R. Shaikh	2012	Zigbee,GPS, GSM	Location can be tracked easily and more accurate.	As we are using zigbee communication is done in minimum distances.
P.Kumar,G.Rasika, V.Patil, S.Bobade	2014	Wireless communication	Improves security and reduces complexity.	Problems due to network error.
S.Sharma, S. Kumar, A.Keshari,S.Ahmed, S. Gupta, A. Suri	2015	Biomedical sensors	Continuous monitoring of health	Adds more load to soldier.
R. Kumar and M. Rajasekaran	2016	Raspberry Pi	Low cost and low power consumption	Less processing speed.
M..Jassas,A.Abdullah, H. Mahmoud	2015	Cloud computing and Raspberry Pi	Flexibility, highly auto-mated, low cost, fast services providing and a huge storage capacity	Less processing speed.
Jeet Vyas, Prof : Prashant Modi	2017	Cloud computing and security approaches	Flexible and more secure	Vulnerability to attack
G. Raj and S. Banu	2013	GPS and Bio-medical sensors	Easily trackable and health monitoring	Heavy load and sensor failure

SutharMonali ,Prof.Alka J Patel	2018	ECC Algorithm	Provides Mutual authentication, confidentiality, forward security, scalability	Complicated and tricky
Joseph Selvanayagam, Akash Singh, Joans Michael, Jaya Jeswani	2018	Survey on different cryptographic algorithms	Knowledge of security approaches	Slow key generation and slow signing

IV. CONCLUSION:

This project reports an IoT based system for the health monitoring and tracking of the soldiers. Biomedical sensors provide heartbeat, body temperature, and environmental parameters of every soldier to control room. This technology can be helpful to provide the accurate location of missing soldier in critical condition and overcome the drawback of soldiers missing in action. The addressing system is also helpful to improve the communication between soldier to soldier in emergency situation and provide proper navigation to control room. Thus we can conclude that this system will act as a lifeguard to the army personnel of all over the globe.In future, a portable handheld sensor device with more sensing options may be developed to aid the soldiers. In addition to that, Grove gas sensors can be placed which measures oxygen concentration in environment, medical instruction can be given to the soldiers to overcome the situation, zigbee technology can be used for extending the range of network for communication.

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