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A Proposed System for Tracking Invaded from the Crisis Zone Using RFID and Sensors

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Abstract: *This study is to show how sensors can help rescuing affected people from the casualty area caused by natural or human caused disaster. Sensors that will use Radio Frequency Identification to transmit the data to the recipient to know the existence of the living creatures that are stuck in the casualty area. Here the sensors would use the temperature of the invaded to determine the existence of the Pulsation of life. The proposed technology could potentially save the life of the invaded as it will help finding them and rescuing them from the crisis zone by using Radio Frequency Identification for transmitting the signals to the recipient which will coming from the sensors.*

I. Introduction

A basic requirement in virtual environments is the tracking of objects, especially humans. REAL-TIME human tracking has many applications in such fields ranging from virtual reality to medicine. There are currently several fundamental tracking technologies, such as mechanical tracking, electromagnetic tracking, acoustic tracking, optical tracking, and inertial/magnetic tracking. These systems typically have fairly high latency, marginal accuracy, moderate noise levels, shadowing problems, and limited range.

Now a day's Earthquake, building collapse and human caused disaster is very common. From 1990 to present, the percentage of all deaths related to natural disasters were in developing countries Hurricanes, earthquakes, landslides etc. caused unnecessarily high death tolls and damage in low-income countries. In recent time we heard about the earthquake in Nepal, India, and Japan etc. And there are also

many cities in under danger. Here we give the largest list of earthquake by 2008-2014:

Year	Region
2014	NW of Iquique, Chile
2013	Sea of Okhotsk
2012	off the west coast of northern Sumatra
2011	Near the East Coast of Honshu, Japan
2010	Offshore Maule, Chile
2009	Samoa Islands region
2008	Eastern Sichuan, China

Fig: 1 (The largest earthquake list)

The April 2015 Nepal earthquake killed over 9,000 people and injured more than 23,000.If we look at the past years we will find there was thousands of people died. Some of them died at just the right time they could not be recovered. During Hazard we get a very short time to rescue a large number of people. Most of the time we fail to identify where is the affected people. May be there are faint that time. They failed to send any signal to rescue them. Sometimes we may unable to find them in right time, so we could not save them. Just for not identifying them properly we could not save thousands life. We get very little time to save lives. On this short time we have to save people from crisis zone. So here we propose a system using RFID and sensor to identifying the affected people. Sensor will use skin temperature of affected people. It will send a notification to the recipient about affected people. The notification will send through RFID. It will say in which place the person is.

If the savior will get the proper information about the affected person it will helpful for him to save the person in time. And the rescuing process will be very quick. After rescuing process the system will say if there any affected people leave or not. That time it will send a confirmation that there is no invaded.

1.1 Radio Frequency Identification:

Radio **F**requency **Id**entification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying object at a distance. It is a tiny computer chip smaller than a grain of sand. Each tiny chip is hooked up to an antenna that picks up electromagnetic energy beamed at it from a reader device. When it picks up the energy, the chip sends back its unique identification number to the reader device, allowing the item to be remotely identified. Spy chips can beam back information anywhere from a couple of inches to up to 20 or 30 feet away. The tiny chip typically is capable of carrying 2,000 bytes of data or less. RFID is also tracking tags attached to objects

The tags contain electronically stored information about the object. Mainly there are two types of RFID tags: passive and battery powered. A passive RFID tag will use the interrogator's radio wave energy to relay its stored information back to the interrogator and act as a passive transponder. A battery powered RFID tag is embedded with a small battery that powers the relay of information. Some types collect energy from the interrogating radio waves. It may operate at hundreds of meters from the reader. RFID is one method for Automatic Identification and Data Capture (AIDC). RFID tags are used in many industries. RFID can also be categorized by the size of its radio wave frequency. These systems throughout the world operate in low Frequency (LF)**,** high frequency (HZ) and ultra-high frequency (UHF) bands.

The LF band covers frequencies from 30 KHz to 300 KHz. This frequency band provides a short read range of 10 cm. The HZ band ranges from 3 to 30 MHz Most HZ RFID systems operate at 13.56 MHz with read ranges between 10 cm and 1 m. The UHF frequency band covers the range from 300 MHz to 3 GHz. The read range of passive UHF systems can be as long as 12 m, and UHF RFID has a faster data transfer rate than

HZ. So normally we use HZ or UF in RFID. Here we give a comparison table between HZ and UHF:

	HZ	UHF
Frequency	13.56 MHz	Between
		900 and 915
		MHz
Read range	10 – 20 cm	3 – 6 meters
Read Rate	50 tags / sec	400 tags/
		sec
Memory	64 – 256 bits	64–2048
Size	read/write	bits
		read/write
Power	Inductive /	Capacitive/
source	Magnetic FieldElectric	
		Field
Advantage	Low Cost	High Speed
	Standard	Longer read
	Frequency	range
Usage	Used	In The
	immobilizers,	technology
	ticketing,	For item
	payment	tagging

Fig: 2: (Comparison table between HZ and UHF)

1.2: Sensor:

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena. The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing. In the broadest definition, a sensor is an object whose purpose is to detect events or changes in its environment, and then provide a corresponding output. A sensor is a type of transducer; sensors may provide various types of output, but typically use electrical or optical signals. Sensors are used in everyday objects such as touch-sensitive

elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. With advances in micro machinery and

Easy-to-use micro controller platforms, the uses of sensors have expanded beyond the more traditional fields of temperature, pressure or flow measurement, for example into MARG sensors. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used. Applications include manufacturing and machinery, airplanes and aerospace, cars, medicine and robotics. It is also included in our day-to-day life. There are several types of sensors-

- Pressure sensor
- Temperature sensor
- Ultrasonic sensor
- Humidity Sensor
- Gas Sensor
- PIR Motion Sensor
- Acceleration sensor
- Displacement sensor And so on.

The most commonly used type of all the sensors are those which detect Temperature or heat. These types of temperature sensor vary from simple ON/OFF thermostatic devices which control a domestic hot water heating system to highly sensitive semiconductor types that can control complex process control furnace plants. There are many different types of Temperature Sensor available and all have different characteristics depending upon their actual application. A Temperature Sensor consists of two basic physical types:

- **ContactTemperatureSensor**

Types – These types of temperature sensor are required to be in physical contact with the object being sensed and use conduction to monitor changes in temperature. They can be used to detect solids, liquids or gases over a wide range of temperatures.

- **Non-contact Temperature Sensor**

Types – These types of temperature sensor use convection and radiation to monitor changes in temperature. They can be used to detect liquids and gases that emit radiant energy as heat rises and cold settles to the bottom in convection currents or detect the radiant energy being transmitted
from an object in the form of infra-red radiation (the sun).
As it is not possible for detecting the invaded in the crisis zone with the Contact Temperature Sensor Types , so our main focus is on Non-Contact Temperature Sensor Types.

II. Methodology

In the crisis zone there would be the invaded that might be under collapsed area. So it's not possible to get reach to them with the use of normal temperature sensors. Here we would need wireless temperature sensor. This sensor will find the heat from the body that match with the human body temperature and calculate to determine the actual ratio to find the invaded. All this process will be executed by using Radio Frequency Identification. Sensor will receive and transmit the data using Radio Frequency Identification.

Temperature	Effect
44°C	Almost death.
	Sometimes patient
	Known to survive at
	up to 46.5°C
43°C	Normally death/brain
	damage/cardio-
	Respiratory collapse
41-42°C	Fainting, confusion,
	very fast heart rate,
	convulsion, Low/high
	blood pressure
38-40°C	Severe sweating,
	dehydration,
	weakness, vomiting,
	headache, dizziness,
	fast heart rate, slightly

	hungry
37°C	Normal temperature
36°C	Mild or moderate
	shivering. May be
	normal temperature

34-35°C	Intensive shivering,
	Numbness and
	bluish/grayness of the
	skin. Heart irritability.
	Confusion and Loss
	Of movement of
	finger
29-33°C	Moderate to severe
	Confusion or
	complete, sleepiness,
	Progressive loss of
	Shivering or stop,
	Slow heart beat,
	Shallow breathing,
	Unresponsive to
	stimulus and
	hallucinations
24-28°C	Breathing may stop.
	But mostly death.
	Sometimes patient
	known to survive at
	14.2°C

Fig: 3: (This is the figure that shows how the temperature varies in human body in different situation.)

A non-invasive (and non-trivial) method of measuring internal body temperatures is to use a microwave radiometer. In the low GHz range, the body has sufficient microwave attenuation to be a decent blackbody radiator. In this area of the spectrum, the Rayleigh-Jeans Approximation holds true and the RF power emission is proportional to absolute temperature. This method is complex and expensive; but-- depending on the frequency choice-- temperature measurement from virtually any tissue depth is possible.
RFID works through three parts. 1) RFID needs a scanning antenna: which can receive And send signals.
2) A Transceiver with a decoder to interpret the data.
3) A Transponder- RFID TAG that has been

Already programmed with information.The scanning antennas can be permanently affixed to a surface. There are also some hand handle antennas. It can take whatever shape we need. When an RFID tag passes through the field of the scanning antenna, it detects the activation signal from the antenna. That "wakes up" the RFID chip, and it transmits the information on its microchip to be picked up by the scanning antenna.A non-invasive method will measure the body temperature of invaded. Sensor can be indentifying the condition of invaded from the programmed already decoded in its chip. Sensor can also tell the recipient the where the invaded is. Then it will put a signal through scanning antenna. Transceiver will interpret the data. Then it will send the signal to transponder. Transponder will receive the signal and transmit it in a different signal. The signal will be shown in a monitor. From monitor Recipient will get to know about the invaded. Then it will be easy to locate them who need help in a crisis zone. Also they can measure the condition of an invaded. It will help them decided which invaded need helps first.

III. Related Work

There is already some paper about RFID and Sensor.

1) *RFID Tag Antenna Based Temperature Sensing in the Frequency Domain by R. Bhattacharyya, C. Floerkemeier and S. Sarma, D. Deavours:* In this paper, they investigate the design of a low-cost, single-use RFID based temperature threshold sensor that is capable of relating the violation of a temperature threshold to a shift in the optimal operating frequency at which the tag antenna is well matched to the tag IC. They use sensor for a read distance of over 3 m and in noisy environments.
2) *Applications of Inertial Sensors and Flux-Gate Magnetometer TO Real-Time human body motion capture by William Frey III:* In this paper they propose a new method of compensating for azimuth drift using a three-axis fluxgate magnetometer. The fluxgate magnetometer is capable of azimuth drift compensation since its sensitive axis is not Collinear with the local vertical.
3) *A Real-TimeArticulated Human Motion Tracking Using Tri-Axis Inertial/Magnetic Sensors Package by Rong Zhu and Zhaoying Zhou:* In this paper they mainly presented and evaluated A Real-Time Human Motion Tracking system. System sensors were built using tri-axis micro electro mechanical accelerometers, rate gyros and magnetometers.
4) *Accurate Temperature Measurements for Medical Research using Body Sensor Networks by Carlo Alberto Boano, Matteo Lasagni, Kay R¨ome, and Tanja Lange:* They design a body sensor network for unobtrusive and highly accurate profiling of body parameters over weeks in realistic environments.
5) *Orientation Tracking for Humans and Robots Using Inertial Sensors by E. R. Bachmann, I. Duman, U. Y. Usta, R. B. McGhee, X. P. Yun, M. J. Zyda:* This paper describes the design, implementation, and preliminary testing of an inertial tracking system using a "complementary" filter based upon quaternions. This filter is capable of tracking a rigid body through all orientations and is more efficient than those based on Euler angles.
6) *Towards Tag Antenna Based Sensing – An RFID Displacement Sensor by Rahul Bhattacharyya, Christian Floerkemeier and Sanjay Sarma:* In this paper, they examine a technique to utilize a UHF RFID tag antenna as a displacement sensor by mapping structural deformation to a change in RFID tag characteristics.
7) *Human Motion Tracking with Inertial and Magnetic Sensors by Estimation of Body Segment Orientations by Goran Šeketa:*

This work is about the result of a re-search on relevant literature and presents the main technologies and challenges in the field of inertial and magnetic tracking of human motion. From above papers about RFID and sensor based on system they discussed about different uses of sensor. We proposed a work where our system can tell the present condition of an invaded and also tell the place of invaded. This system mainly proposes for rescuing people in any critical situation.

IV. Conclusion

This paper presented a proposal to track the invaded in the crisis zone caused by natural or accidental disaster. Here we combine RFID and sensors to introduce a system that will detect the invaded in the crisis zone. The system will work on the basis of transmitting and receiving the data from sensors using RFID which help transmitting signals to the

Recipient. Sensor will detect the human body by detecting the temperature of the body and calculating the temperature for the current status of the invaded whether the invaded is dead, alive or senseless. The calculated result will go to the recipients using RFID. The sensor will also tell about the location of the invaded. Thus the system would be a unique system for track down the location and condition of the invaded and help rescuing the invaded.

Appendices

1. Automatic Identification and Data Capture (AIDC): AIDC is a broad set of technologies used to collect information from an object, image or sound without manual data entry.
2. Transceiver: A transceiver is a device comprising both a transmitter and a receiver which are combined and share common circuitry.
3. Transponder: a device for receiving a radio signal and automatically transmitting a different signal.

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