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A Smart Asset Tracking System with IoT for Women and Child Safety Applications

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***Abstract*— Today, the most well-known location tracking devices are GPS systems. Well these systems are not capable of identifying exact locations or places within a building or on a specific floor or space of an individual. This paper proposes a smart asset monitoring system that enables items, goods, staff inside a building or any facility to be monitored. In order to accomplish this system, our system will make use of RF communication along with IoT. The program has the ability to classify the position of any object in the exact space in which it is actually stationed. To use as monitoring equipment, the system uses small RF circuits. To monitor these RF circuits, system made use of monitoring micro controller components. The tracker circuits are circuit battery - powered that can only be installed on objects/entities. The prototype is implemented and verified by placing the tracking circuits in individual rooms. The tracker circuits are placed within 2-3 meters of the range as any tracking object enters any room.**

I. INTRODUCTION

For the last 2 decades, wireless technology has become an important characteristic for commercial products and a common research subject. There are now more connections for smart phones than cabled subscribers. Lately, low-cost low-power, and short-distance wireless technology use it for 'private wireless connections' has been one area of commercial interest. Advancements in technology have smaller and much more cost-effective devices for the integration of data processing analysis , wireless communication, and a host of other activities. These integrated communication devices will be incorporated into various applications ranging from security in the native land to monitoring and tracking in the industry. They will also allow specialized planned route to be configured, providing a new way to spread and process information. Rather than being a general-purpose system with multiple tasks, electronic components are equipped to perform some specific job. For reasons such as usability and security, some have real-time performance limitations that must be met; some may have small or no performance requirements, encouraging the system hardware to have streamlined to reduce costs. New business activities and the need for employees in these technological areas come with new technologies and devices [1-8]. In high demand would have been engineers who have knowledge of embedded technology and wireless telecommunications. Unfortunately, for production and classroom use, there are few adorable environments available, but during hands-on lab activities, students will often not hear about all these technology. Twisted pairs, fiber optic, ultraviolet, and usually wireless broadcasting are now the communication media.

Child Safety and Tracking Management System. The Child Safety Application was proposed by Aditi Gupta, Vibhor Harit to ensure maximum security and live tracking for kids because parents' worries are genuine [9]. This application proposed a model for child safety through smart phones that provides the option to track the location of the children and the child can send SMS in case of emergency through GPS technology. It was developed by Fatin Balkis Binti Alzahri, Maziani Sabudin will give information of location coordinate to mobile phone whenever there is a request for it through the SMS [10]. Vehicle Tracking Device is an integration of hardware and software. Human tracking in certain indoor and outdoor area by combining the use of RFID and GPS by Daniel Patricko, Hendry Hendry, Jonathan Adiel Pranoto, Adi kurniawan [11].

This application to track the human position for both indoor and outdoor using RFID tag and GPS. An RFID tag was carried by a user and continuously read whenever he/she accesses a room while GPS was used mainly when the user was staying outdoors.. GPS will be activated automatically whenever the user leaves the room 3 meters away. RFID for personal asset tracking Steven Chan, Adam Connell, Eribel Madrid, Dongkuk Park, Ridha Kamoua used Radio Frequency Identification (RFID) that keeps track of registered objects that are within range of the user. The goal is to provide a new security for keeping belongings that are carried around like keys, wallets, passports, jewelry, watches, glasses, medicine, cell phone, laptops, etc,. If the object was lost and not stolen, RFID reader and GPS receiver gives the user information on where the object was last detected [12].

Achieving a high degree of reliability in output without adversely impacting the device's battery life. Considering the broad range of tracking applications and their criteria, the use of IoT devices for asset tracking is selected as the use case [13]. To achieve a cost-effective asset management solution, a Bluetooth location-based indoor positioning system is suggested for warehouse asset monitoring purposes [14]. The system's ability to incorporate various Sub-GHz technologies into the same programme, along with its ability to retrieve any kind of calculated data from sealed containers or analogous metallic properties [15].

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Today, the most well-known location GPS trackers are Navigation systems. Well these devices are not capable of defining precise locations or positions within a building or on a single floor or space of an individual. We are therefore proposing a smart asset monitoring system here that enables items, goods, workers inside a building or any facility to be monitored. In order to accomplish this system, our proposed system makes use of RF technologies along with IOT [16-19].

Technological development is exponential and offers all the solutions required and efficient for the specifications [20-25]. Data protection is among the most critical fields of interest. In this situation, by Electromagnetic Radiation technologies together with IOT, the IOT Asset monitoring system is aimed at improving the safety of women, children, people with mental disabilities as well as any valuable objects. The transmitter and receiver are part of the Radio Frequency module. The transmitter is aligned with the object to be monitored, which wants to send the receiver radio signals. If the object being monitored moves outside the range of frequencies, an alert signal and call would be sent via the Mobile Communications to specified guardians.

In addition, the location of the object can be tracked via the Global Positioning System whenever needed. In addition, sound and vibration sensors such as loud voice and human body movement are used to sense human behavior. Messages are sent to specified mobile numbers if the sensor reading reaches the threshold value.

II. Arduino Asset Tracking System

Health is one of the major problems nowadays as violence is growing rapidly all over the world [26-30]. The IoT Asset Tracking System focuses on the protection as well as protection of women, kids, psychologically disabled people and other such valuable things. This system will assist citizens to monitor and track the location of assets. The proposed system is depicted in fig 1.

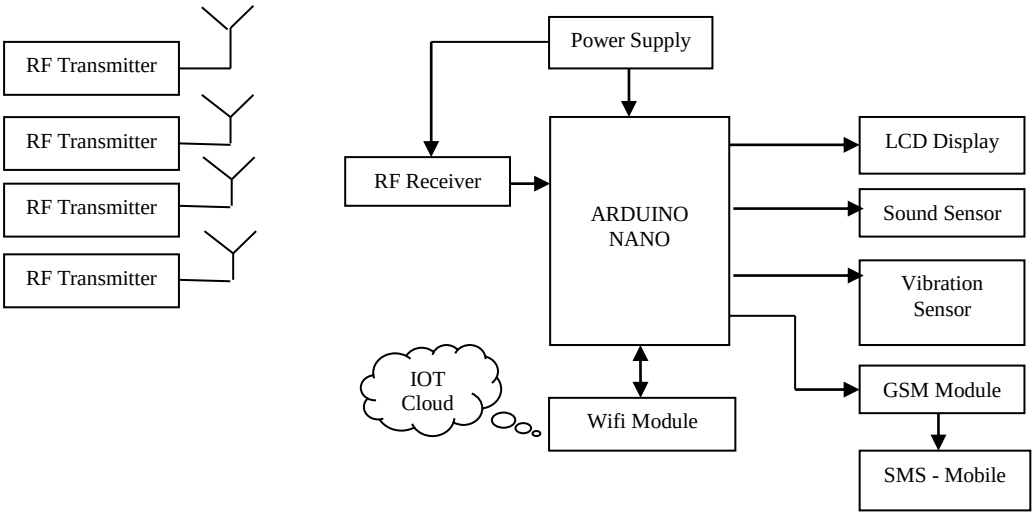

Fig. 1. Asset Tracking System

A. *Internet of Things (IoT)*

Internet of Things (IoT) is both an evolutionary and revolutionary paradigm which since its birth in the late 2008 has received considerable attention especially from researchers around the globe. It is Ashton who crafted the term “Internet of Things; though it had a meaning and used in a context different from what it is known today. The definition adopted in this paper is; “IoT is an interconnection of addressable things/objects using diverse technologies such as wireless network and internet”. This interconnection of ‘things’ is not limited to digital computing objects such as RFIDs, mobile phones, tablets and computers; but incorporates ‘things’ such as human beings, plants, domestic/wild animals, virtually ‘anything’. Applications built around IoT paradigm are propelled by three components which expedite pervasive computing: Hardware such as wireless sensors, actuators, cell phones and Radio Frequency Identifiers (RFIDs) Middleware to aid with mediation and data analysis. Applications in form of prototypes. The success of IoT is driven by interconnection of myriad devices that have on-board sensing, communication and processing capabilities. Radio Frequency Identifications (RFIDs) RFID is a contactless smart technology used to distantly retrieve data from or write (store) data to memory chip embedded within the integrated circuit of tags .

RFID is capable of remotely locating and identifying tagged objects spontaneously using radio waves. RFIDs are microelectronic devices that comprises of a microchip and an antenna;

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characteristically, the microchip has data carrying capacity of 2 kilobytes or less. IoT Gecko is a free IoT systems development platform for students, researchers and developers. Opening doors to physical devices controlled over the internet, IoT Gecko provides you the tools and support to design your IoT based systems with ease. Get sensor/device data and use it over the internet.

III. IMPLEMENTATAION AND RESULTS

For the asset to be tracked, the transmitter kit is positioned. The LCD monitor, sound sensor, vibration sensor, WIFI module, GSM module and RF transmitter are attached to the central nano microcontroller.

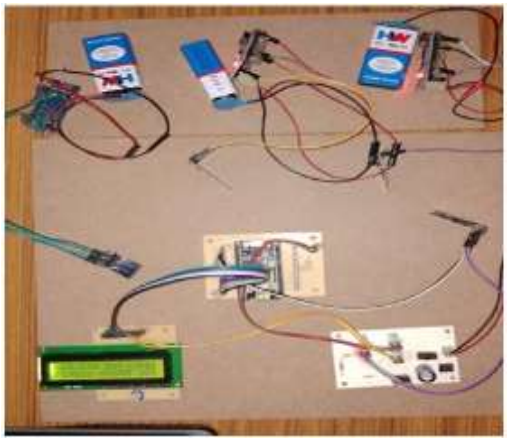

Fig. 2. Asset Tracking System

The proper operation of the unit while the machine is ON is seen on the LCD panel. In addition, it also shows asset status. The sensor data is constantly read by the sound sensor and the vibration sensor.

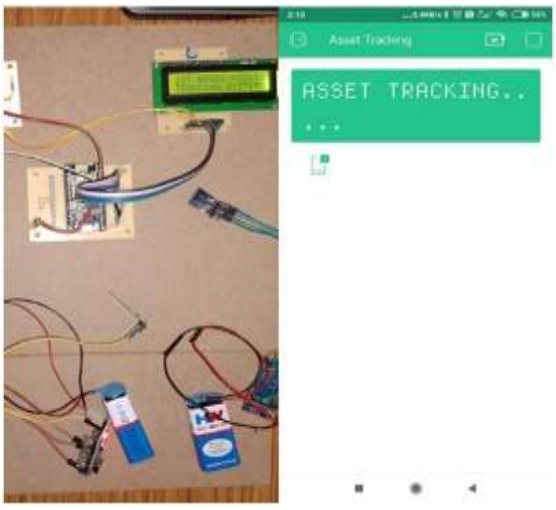

Fig. 3. Asset Tracking using Zigbee.

As the sensed value crosses the threshold value, call and warning messages are transmitted via GSM to the specified mobile numbers signaling that the asset is in danger.

The transmitter-phase RF transmitter modules communicate with the receiver-phase RF receiver module continuously via the propagation of radio signals. The frequency spectrum of the highest threshold is 433MHz.The signal strength between them decreases when the transmitter moves away from the receiver, and call and alert messages are sent to specified mobile numbers indicating that the asset is being lost. In addition, once the kit has been disconnected, alert messages will be sent.

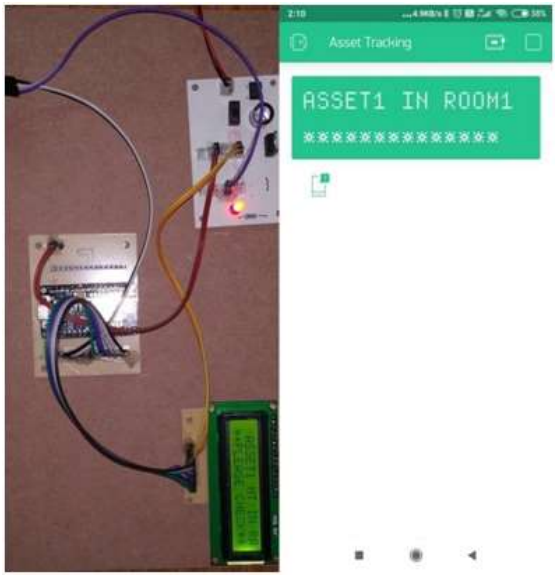

Fig. 4. Asset 1Tracking.

Fig. 5. Asset 2 Tracking

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Fig. 6. Asset 3 Tracking.

It is important to position the monitoring circuits in individual rooms. Now the tracker circuits arrive in the 2-3 meter range of the control circuit for that room as soon as any tracker items reach any room. The tracking system now transmits to the online system the location of the tracker circuit. To manage the IoT tracking component, IoT Gecko/Server Mobile App is used. IoT Gecko now shows the transmitted data to identify which room a certain object/entity is located in. The machine is able to pinpoint the location of any object to the precise space in which it is actually located. To be used as detection equipment, the device uses mini rf circuits. To map such RF circuits, tracking microcontroller based circuits are used. The tracker circuits are circuits powered by batteries that must be installed on objects/entities.

Fig. 7. Asset 3 – Not in Range(Cannot be tracked).

IV. Conclusion

A smart asset monitoring system that enables items, goods, staff inside a building or any facility to be monitored is implemented. With the use of RF communication along with IoT has the ability to classify the position of any object in the exact space in which it is actually stationed. The tracker circuits placed the tracking circuits in individual rooms. The tracker circuits are now within 2-3 meters of the range as fast as any tracking object enters any room. The proposed IoT Asset Tracking System focuses on the protection of women, kids, psychologically disabled people and other such valuable things. This system will assist citizens to monitor and track the location of assets.

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