



Accident Tracking and Visual Sharing Using RFID and SDN

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Abstract– In this era, many situations request tracking systems. GPS can be used for location tracking, but it has some limitations. By analyzing the problems of using GPS for location tracking, RFID technology integrated with SDN for vehicle tracking has put forward in this paper. In case of road accidents RFID can be used to track the vehicle thereby the authority get information about the vehicle and its owner. With the help of SDN visual sharing is also possible which is useful in case of getting accident claims. This system overcomes the limitations of vehicle tracking using GPS. The main goal of this paper is complete solution architecture for locating, tracking and informing the authority in the right time when accidents are detected.

Index Terms--IoT, RFID, SDN, Tracking, Visual Sharing.

I. INTRODUCTION

The digital world that we live in today is the result of many innovations and technology advances. We have now systems in our cars that can be installed so we won't get lost. Also, computer processed materials make it much faster to access data in a convenient form and within a short period of time. Thus things are become easier and faster to access.

Now a day's road accidents are increasing in a large scale. Most of the accidents are due to human error. In some cases we can save the lives of the injured people if they are brought to the hospitals in the right time. But people don't care about this in their busy life also they have to face so many issues regarding to it. In such cases we can use a new technology that will detect road accidents and provide details about the vehicle involved in the accident. The technology also provides visuals about the accident vehicle and people injured in the accident. This helps the authority to get a clear idea

about what has happened and how serious the situation is. This technology can also be used to identify whether the accident occurred is real or created in case of getting accident claims. This technology can be implemented using SDN and RFID with the help of networking.

Global Positioning System (GPS) is used to find the location or velocity of an object. It is used in many tracking situations. RFID stands for Radio Frequency Identification and is a term that describes a system of identification. RFID is based on storing and remotely retrieving information or data. SDN is an approach to computer networking that allows network administrators to manage network services through abstraction of lower-level functionality [5].

II. BACKGROUND

2.1 GPS Tracking

Tracking and localization system is wide spread

in different domains. GPS Tracking mainly focuses on tracking the position of a monitored object using Global Positioning System(GPS) technology. Tracking and localization system (TLS) is able to find the position of an object and to track its movements. Due to TLS characteristics this is helpful to locate position in case of accidents and can rescue persons involved in that accident[1].

TLS using GPS system is illustrated in figure 1. When an accident occurs, the witness who sees the accident runs the mobile application. Using that he can report the accident. The location is send to the server using GPS. It is passed to the server through PHP services. Database is an intermediary between the server and mobile application.

Server works on one or more rescue centers. Server will find a solution to the accident. Server finds the shortest route to the nearest hospital and sends it to the user. The server informs the nearest hospital and emergency service will starts. The medical team will reach the accident location and provides immediate service.

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Figure1:GPS tracking system

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But, GPS is not available in some locations. Also it takes more time by the mobile phone to find the GPS coordinates. So we can go for another trending technology, which is Radio Frequency Identification (RFID) technology.

2.2 RFID Technology

RFID is an identification tool or tracking tool which consists of RFID tag, RFID reader and backend Database. RFID technology depends on the communication between the RFID tags and RFID readers. The RFID reader generates magnetic fields that enable the RFID system to locate objects (via the tags) that are within its range. The high-frequency electromagnetic energy and query signal generated by the reader triggers the tags. As a result communication between the main components of the system i.e. tags and reader is established. So large quantity of data is generated. The reader can perform certain operations on the tags such as reading the tag's identifier number and writing data into a tag.

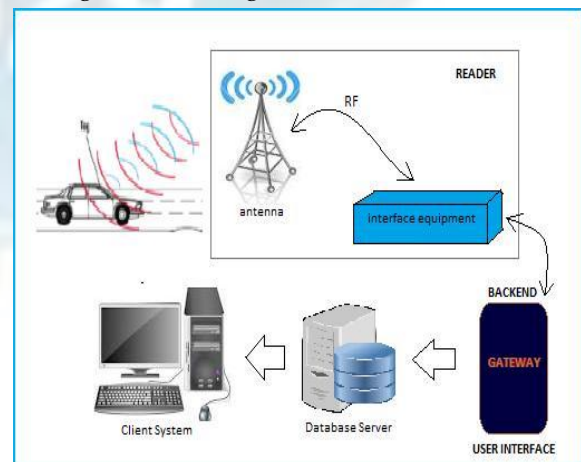


Figure 2: RFID system

2.2.1. Components of an RFID System

As shown in figure 2 ,the RFID system consists of following five components:

- Tag (attached with an object, unique identification).
- Antenna (tag detector, creates magnetic field).
- Reader (receiver of tag information, manipulator).
- Database server
- Gateway
- Communication infrastructure (enable reader/RFID to work through IT infrastructure).
- Application software (user Chipless RFID sensor needs significant investigation in suitable smart materials for sensing individual physical parameters and fabrication processes. The most useful characteristic of a smart material [14] is its carrier mobility μ , defined as the proportionality constant between the applied electric field, E and the corresponding average carrier drift velocity, v . usually, the carrier mobility of these materials is quite low, and they are not suitable for RF applications. They can be introduced as the sensing materials that change RF responses of microwave devices under the influence of changing physical parameters.

The identification of smart sensing materials is based on dielectric and conductive property analysis for mm and μm wave RF sensing. The classification of materials for temperature, humidity [13], PH, gas, strain sensing is based on physical parameter sensing. Moreover, these materials having multifunctional properties and having potential to sense more than one parameters.

2.2.2. RFID Applications

RFID, Radio Frequency Identification is a technology, which includes wireless data capture and transaction processing. Vicinity (long range) and Proximity (short range) are two major application areas[15] where RFID technology is used. Track and trace applications are long range or vicinity applications. Access control applications are Short range or proximity type of applications.

A. Manufacturing & Aerospace:

RFID technology provides an easy way to manage a huge and laborious manufacturing process. This type of process helps in better analysis, reduce and eliminate bottlenecks, reduced time in locating parts and products and production process based sensors can be installed to alert any anomalies. Aerospace industry and Department of Defense have a lot to gain from RFID integration into their production and process lines like to track the aircraft parts.

B. Asset Tracking:

Static or in-motion assets tracking or locating was not so easy task. User can instantly determine the general location of tagged assets anywhere within the facility with the help of active RFID technology.

C. People Tracking:

People tracking system are used just as asset tracking system. Hospitals and jails are most general tracking required places. Hospital uses RFID tags for tracking their special patients. In emergency patient and other essential equipment can easily track. It will be mainly very useful in mental care hospitals where doctors can track each and every activity of the patient.

The best use of the people tracking system will be in jails. It becomes an easy tracking system to track their inmates. Many jails of different US states like Michigan, California, and Arizona are already using RFID-tracking systems to keep a close eye on jail inmates.

D. Healthcare:

Patient safety is a big challenge of healthcare vertical. Reducing medication errors, meeting new standards, staff shortages, and reducing costs are the plus points of use of RFID solutions. RFID wristbands containing patient records and medication history address several of these concerns.

E. Government Library:

Many government libraries use barcode and electromagnetic strips to track various assets. RFID technology uses for reading these barcodes unlike the self-barcode reader RFID powered barcode reader can

read multiple items simultaneously. This reduces queues and increases the number of customers using self-check, which in turn will reduce the staff necessary at the circulation desks.

2.3 RFID Tracking

RFID system consists of tags and readers. Reader has two parts-a transceiver and an antenna. The transceiver generates radio signals and is necessary to activate the tag and is transmitted through the antenna [12]. The tag stores digital information about the vehicle and its owner. The tag is attached to the vehicle to be tracked. The working of RFID is shown in the figure 3.

When a vehicle in which RFID tag is attached passes within the vicinity of reader, the reader automatically collects the digital information stored in the tag and save it to a software system that controls the activity of vehicles. RFID technique deals with multi vehicles, multilane and multi road[3]. It provides an efficient time management with enough correctly data reporting.

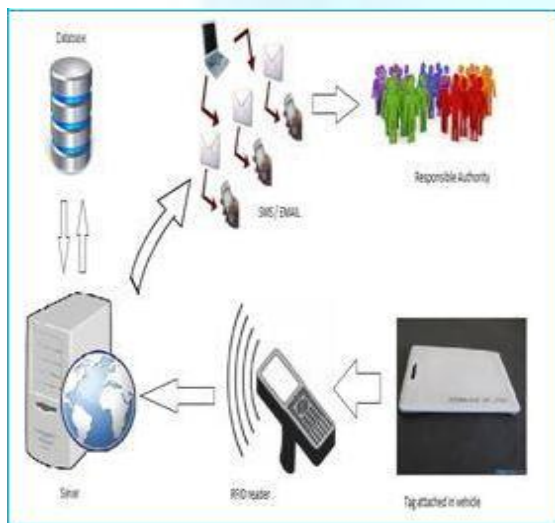


Figure 3: RFID tracking

The transponder [3] is a part of RFID tag that convert radio frequency into usable power, also sends and receives messages [11]. When the transponder is hit by the radio waves, the waves go up and down the length of the transceiver. The RFID has some power to work with, it wakes up the transponder. The

transponder immediately gets activated and collect all information stored in the tag. This information is passed to the server, which is connected to server. The server checks the validity of the information read by the reader. This information is then passed to the SMS gateway or email-server which will sends messages to the responsible people/authorities.

Visual sharing can also possible in the proposed system. Existing system still poses fragmentation challenges. Fragmentation hurdles can overcome by the device become configurable and programmable [4]. Software defined networking is outstanding way to solve fragmentation. The SDN movement as it currently exists is an evolution that started with a basic idea: How do we make the configuration and management of a network quicker and easier [7].

The fig.4 shows the layout of visual sharing scenario of vehicle tracking. Proposed system works on the basis of two technologies, RFID and SDN. Here RFID is used for tracking location and SDN for visual sharing without any delay. In the case of accidents visuals are helpful to detect how the accident is occurred, whether created or normal for insurance claim.

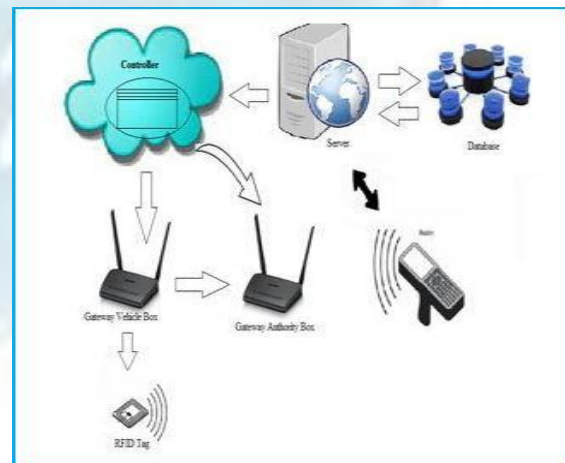


Figure 4: Layout of system

In the system, a controller is provided for controlling the gateway box. There are two gateway

boxes for visual sharing one is placed in the vehicle and another one is in the responsible authority. Gateway box is used for controlling the visual sharing privacy. Communication of controller and gateways are possible with the help of application description messaging (AD)[4]. Application description messaging is a messaging format for application based messaging. If accident is detected then the responsible authority first informs it to the nearest hospital and then to the responsible people. If in the case of police case and insurance claim, visuals of accident is helpful to prove the accident is created or real.

III.SYSTEM WORKFLOW

In our system, when the vehicle passes near to a RFID reader detect the tag, contains the details about the owner, vehicle details and hence we can identify the location of vehicle now.

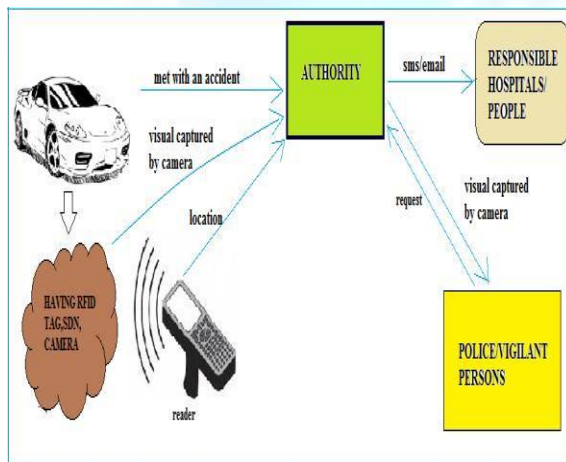


Figure 5: System workflow

When a vehicle met with accident, the SDN attached in the vehicle will send email/SMS to the authority, which is the server. It will inform the nearest hospital, responsible people. Also the camera fitted in the vehicle will record the accident visuals. It is helpful to many cases regarding the accident. The nearest hospital will start the emergency services.

IV.CONCLUSION

This paper presents a new type of tracking system with visual sharing especially in the case of

accident detection. Flexible networking coordination gives strength to RFID-SDN tracking system. It is a promising solution to locating, reporting, rescuing and solving the cases regarding the accident. The future goal of this paper is by using chip less RFID which promotes green technology by using c and pollution-free disposable sensor nodes for pervasive sensing.

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