International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 6, Issue 12, December 2017 ISSN 2319 - 4847

Applicability of RFID Object Identification System as Cyber Physical System for Disaster Management

Jasbir Kaur[1], Seema Purohit[2]

[1]Phd Student at UDCS, Mumbai University, Assistant Professor, H.O.D- Information Technology, G.N.Khalsa College, Mumbai, India

[2]Associate Professor, Department of Mathematics, Kirti College, Dadar (east), Mumbai, India

ABSTRACT

Radio Frequency Identification (RFID) is a wireless contactless technology which can be used to track objects, animals and human beings in real time. Cyber Physical System (CPS) enables technological advances in different domains such as emergency management, transportation networks, smart manufacturing, health care..etc., Focus of this paper is to develop a Cyber Physical System for emergency response during disaster using RFID technology. This technology can be used to track and trace victims in a disaster situation and helps in quick decision making. In this research an attempt has been to develop an intelligent cyber physical system to track the exhibit carrying the tag and fetch and display detailed information about the exhibit from the database in real time during disaster. A middleware (software application) in .net C# has also been developed using a short range RFID System to implement the idea.

Keywords: RFID, CPS, Handheld RFID Reader, RFID Tags

1. INTRODUCTION

1.1 Role of Cyber Physical System (CPS)

Cyber Physical Systems are Systems of Systems [23], [24]. The term CPS was used in 2006 at National Science Foundation by Helen Gill in U.S [11]. The national Science Foundation (NFS) claims that CPS capabilities will far exceed the capabilities of embedded systems of today [22], [23]. CPS is a driving force to bring the cyber world closer to physical world and it requires exchange of critical information in timely and reliable manner [13]. Because of technological advancements in computing and manufacturing, sensing and network connectivity, Cyber Physical Systems (CPSs) have become more intelligent and they are shifting from programmed automation mode to autonomous mode of operations. CPSs are connected horizontally with each other which help them to collaborate directly. They are also connected vertically with the broader systems which bring the possibility of global view of vast network and optimization at global level. Computation, control and communication are main components of CPS [16]. As per [17], [18] and others, application areas of CPS are: Smart Manufacturing, Emergency Response, Air Transportation, Critical Infrastructure, Health Care and Medicine, Intelligent Transportation System (ITS), Robotics for service, Building Automation, Power Grids and City Infrastructure. **Researcher proposes to work in the domain of Emergency Response as a small contribution to the development of CPS.**

1.2 Disaster as an Emergency

Disaster can occur at any time. It can be natural disaster or because of human error and it may change our lives drastically. In such a situation, it is extremely important to be prepared to potential disasters and know how to act and behave in different situations. A clear plan of action is required. It is also important to clearly understand what natural disasters can really occur in a particular area. Whenever a disaster occurs it is an emergency situation and immediate help and rescue operations are required. Disaster response and recovery efforts require timely interaction and coordination of emergency services in order to save lives and property. **As a precautionary measure the most appropriate technology that can be used for pre – tagging the important documents, equipments, and people is RFID.**

1.3 Use of RFID during Disaster

Disaster or natural calamity can happen anywhere. Particularly, challenge is in knowing how many people are present in a damaged building or structure that needs to be evacuated. Decisions about the selection of new technologies such as RFID to track victims, equipment/assets and staff during the response to a disaster require significant investment

and can provide a real-time scalable decision support framework built on rapid information collection and accurate resource tracking functionalities [4]. RFID can be used to mitigate a wide array of logistical challenges such as monitoring evacuees and managing the flow of medical supplies in the immediate aftermath of major disasters, like an earthquake, to help save lives. Researchers found there is a 72 hour "golden" rescue period following an earthquake during which the efficiency of emergency response procedures are key to the rescue operation [8]. In these scenarios, RFID can be used to track people and provide real-time information that could be used to organize search and rescue missions.

A real-world example of the value that RFID can provide in emergency situations was realized immediately following the 7.0 earthquake that struck Port-au-Prince, Haiti on January 12th, 2010. As detailed in an RFID Journal report, the U.S. Department of Defense leveraged its In-Transit Visibility (ITV) network to track shipping containers as they moved to and from the island [8].

1.3.1 RFID Technology

Radio Frequency Identification (RFID) is an identification system that uses radio waves to retrieve data from a device called a tag or a transponder. It is a contactless technology used to identify tagged objects/devices/vehicles/exhibits at any time and any place without line of sight. This technology is currently being used extensively in many countries for industrial applications, animal tracking, supply chain management, hospitals to keep records of patient history, at airports to keep track of luggage/baggage, to collect toll at Toll Plazas, cashless bus passes, railway tickets, Passports, Currency Notes and at many other applications.

1.3.2 Components of RFID

Components of RFID consist of RFID Tag, Reader (RF Antenna & RFID Reader), Workstation (Processor or PLC).

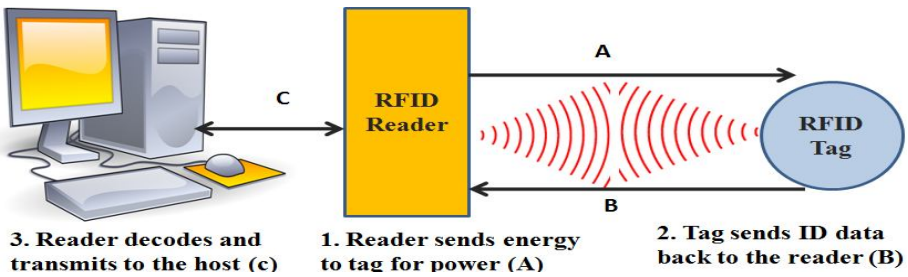

Figure 1

1.3.3 RFID Tag

A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified.

- RFID tags can be "***Passive***", or "***Active***". An active tag has an on-board battery and periodically transmits its ID signal. The passive tags don't contain any internal power source. The passive tags are activated when in the presence of an RFID reader.
- Tags may be Read only or Read/write.
- Tags can be classified as Generation-1 and Generation-2. They can also be classified as Class0 through class5 depending upon their functionality [19].
- Tags can also be classified based on frequency range as Low (30 to 300 KHz), High (3-30 MHz) and Ultra High (300-3Ghz) frequency.

1.3.4 Reader (RF Antenna & RFID Reader)

RFID Readers and Reader Antennas work together to read tags. Reader antennas convert electrical current into electromagnetic waves that are then radiated into space where they can be received by a tag antenna and converted back to electrical current. Just like tag antennas, there is a large variety of reader antennas and optimal antenna selection varies according to the solution's specific application and environment.

The two most common antenna types are linear- and circular-polarized antennas. Antennas that radiate linear electric fields have long ranges, and high levels of power that enables their signals to penetrate through different materials to read tags. Linear antennas are sensitive to tag orientation; depending on the tag angle or placement, linear antennas can have a difficult time reading tags [20]. Conversely, antennas that radiate circular fields are less sensitive to orientation, but are not able to deliver as much power as linear antennas. Choice of antenna is also determined by the

distance between the RFID reader and the tags that it needs to read. This distance is called read range. Reader antennas operate in either a "near-field" (short range) or "far-field" (long range). In near-field applications, the read range is less than 30 cm and the antenna uses magnetic coupling so the reader and tag can transfer power. In near-field systems, the readability of the tags is not affected by the presence of dielectrics such as water and metal in the field [20]. In far-field applications, the range between the tag and reader is greater than 30 cm and can be up to several tens of meters. Far-field antennas utilize electromagnetic coupling and dielectrics can weaken communication between the reader and tags.

1.3.5 WORKSTATION

The RFID Reader has to be initialized and programmed with the application software which is known as the middleware. The main use of this middleware is to connect the RFID readers with the application they support. The middleware sends control commands to the reader and receives tag data from the reader. This process is carried out by the workstation. Depending on the application the workstation can be PC (Personal Computer), a PLC (Programmable Logic Controller) or a Processor

1.4 RFID system as CPS

A Radio Frequency System is a typical Cyber Physical System because of its physical and functional components [16], [21]. Cyber Physical Systems have Computational element, Control element and communication element as their components. Whole RFID also have computing and data processing function, it is under control of inner micro control unit(MCU) and information is exchanged via radio frequency waves[16].

1.5 Research Objective

Researcher wants to develop a Cyber Physical System which can help to locate and identify people in disastrous situations like earthquake, flood, fire, stampede or any other natural calamity using RFID technology. This system will help the rescue team to search the victims, and deployment of rescue resources at correct location.

2. LITERATURE REVIEW

2.1 Earlier Works

Table 1.1

2.1.1 Use of RFID in disaster Management

1. "**Potential of RFID in Emergency Management:Task-Technology Fit Perspective" [1]**
   Ashir Ahmed in 2012 explores the potential of adopting RFID in emergency situations. A theoretical framework is proposed and case study method has been employed to validate the proposed framework. The findings of this paper will help emergency management organizations to better plan the use and adoption of RFID for emergency operations.
2. **"Role OF GIS, RFID and Handheld Computers in Emergency Management: An Exploratory Case Study Analysis " [2]**
   Ashir Ahmed in 2015 identifies task characteristics of emergency management and technology characteristics of RFID, handheld computers and GIS. This study reveals importance of various Emergency Management tasks and helps in adoption of any of the three technologies in emergency management.
3. **"E-Government Challenge in Disaster Evacuation Response: The Role of RFID Technology in Building Safe and Secure Local Communities"**, [3]
   This paper defines the e-government research priorities required to build regional disaster preparedness, as an integral part of e-government development policy and importance of RFID wireless network technology in emergency/disaster management. It concludes that there is lack of research awareness and studies in the government literature regarding the role of RFID technology in improving disaster preparedness and establishing safe and secure local communities for people. The RFID system should be integrated with e-government service.
4. **"Disaster Management: A Case Study of Uttarakhand"** ***Dr. Bindi Varghese* & Neha Itty Jose Paul** 2013[4]***
   The paper discusses the disaster which happened in Uttarakhand in 2013 because of a cloud brust and caused massive destruction. This study recommends several steps to be taken for disaster management, and touches upon how to restore a destination back to normalcy, how to tackle marketing for a destination in the midst of a crisis as well as the importance of destination management through the implementation of Destination Management Organizations (DMOs).
5. "**Contributing Factors In adoption of RFID In Emergency Management– A Multiple Case Study" [5]**
   Ashir Ahmed in 2009 uses TTF Model (Task Technology Fit model) to explore contributing factors of RFID

adoption in emergency management. It is expected that findings of this paper will not only enhance research in technology adoption but also help emergency management organizations to plan the use of RFID technology for emergency operations. This paper concludes that the cost of a technology is an important factor in the adoption and successful use of technology but for emergency management, the associated benefits of the technology overcomes the dollar value of technology.

6. **"Effects of Knowledge Management System in Disaster Management through RFID Technology Realization"[6]**

Akbar Badpa in 2013, suggests RFID System along with Oracle as Data Base Management System with a dedicated network system. A Knowledge Management System model is also proposed to focus on knowledge, human and technology-related issues of Disaster Management headquarters center. This model is designed to address its relevant issues and challenges.

7. **"Integrating GIS, GPS and GSM Technologies for the Effective Management of Ambulances "** [7]

Derekenaris along with others in 2001 integrates GPS, GIS and GSM technologies to provide solution for Ambulance management and emergency incident handling in Greece. This system routes the ambulance to the patients and then to the nearest hospital so that life of patient can be saved in best possible time. The use of these technologies collectively enable the management of any vehicle like trucks, patrol cars and ambulance.

2.1.2 CPS

8 **Peter Marwedel, "Embedded System Design", *Springer*, 2nd Edition, 2010. Article (Link) [11CrossRef]**

This book explains Embedded Systems, their characteristics, applications, and hardware software co design in detail. It also discusses how embedded systems have become integral part of Cyber Physical Systems. This book was very informative to the researcher to understand various hardware components.

9 **"CYBER PHYSICAL SYSTEMS FOR INTELLIGENT DISASTER RESPONSE NETWORKS: CONCEPTUAL PROPOSAL AND FIELD EXPERIMENT" [12]**

Hiroki Nishiyama in 2017, proposes an ICT system with intelligence which can adapt to continuously changing conditions in disaster situations. There is demand for real time information after the disaster and this demand changes moment to moment. To achieve this Cyber Physical System was developed which provides ICT services in disaster situations. A CPS equipped network was constructed and a successful field experiment was conducted. An algorithm which is used as an intelligent factor to virtually switch GW-AP instead of physically switched. This paper explains how the CPS can optimize the ability of network without additional ICT resources.

10 **"Cyber Physical System Using Intelligent Wireless Sensor Actuator Networks for Disaster Recovery" [13**]

Ramasamy Mariappan along with others in 2016, has built a system which can alert when weather information matches with specified conditions. This research also uses intelligent sensor systems for prevention, preparation, response and discovery of disasters. A wireless sensor network is designed. This research proposes the new concept of automatic computing for intelligent wireless sensor network application during disaster recovery and management.

11 **"Future Research on Cyber-Physical Emergency Management Systems" [14]**

Erol Gelenbe and Fang-Jing in 2013 surveys research on sensor assisted evacuation and rescue system. It also discusses research issues related to communication protocols for sensor networks, integrated asynchronous control of large scale emergency response system, knowledge discovery for rescue and also discusses future research directions.

12 **"Cyber-Physical Systems Can Make Emergency Response Smart"[15]**

Justyna and Pieter in 2015, presents a prototype of CPS implementation of a Smart Emergency Response System (SERS). CPS s are built from and depend upon integration of computational algorithms and physical components. A prototype of a Smart Emergency Response System (SERS) was also built. This system illustrates how to arrange for an efficient and trackable disaster response.

13 **"RFID Applications in Cyber-Physical System", Published by INTECH 2011 [16]**

Nan Wu,Nanjing in 2011 in this paper defines Cyber Physical System, its components, comparison of CPS with embedded system. This paper explains RFID system as typical example of a Cyber Physical System. It discusses disadvantages of a CPS and how it should operate. This paper concludes that Active RFID has great potential of building a highly mixed system of information and physical devices

2.2 Researcher's view

Most of the papers mentioned above propose theoretical framework of use of RFID technology in emergency /disaster management [1]. Task Technology Fit (TTF) model is used by [1] and [5] to explore the contributing factors of RFID Technology in emergency/disaster management and suggest that RFID technology is best fit to be used for tracking assets and human beings. [2] Suggests that GIS, handheld computers and RFID technology can be used for emergency /disaster management. [3] Concludes that there is lack of research about the importance and use of RFID provide solution for Ambulance management and emergency incident handling in Greece. This system routes the ambulance to the patients and then to the nearest hospital so that life of patient can be saved in best possible time.

None of the studies have actually implemented the use of RFID and other technologies in emergency/disaster management except [7]. Since researcher proposes to develop a cyber physical system for emergency response using RFID technology, various studies in this regard were explored. Researcher could understand from [11] how embedded systems have become integral part of CPS. As per [16] RFID is typical example of CPS and has great potential for is development.

In this paper researcher has made an attempt to use RFID technology to track people and objects in disaster situations. A middleware has been developed in visual studio C# to read and write on the tag and to identify the victims during disaster situation and gives his detailed information to rescue management team. . Database is also maintained about detailed information of objects and human being with context to RFID tag UID issued to them.

3. WORKING OF PROJECT

Our system works on following assumptions

- All the exhibits are having RFID tag with unique identification number.
- We propose to use adhar card number as UID in case of human being.
- Detailed information about all the exhibits is saved in the database along with the photograph.

Following figure shows how the RFID Software modules connect RFID devices:

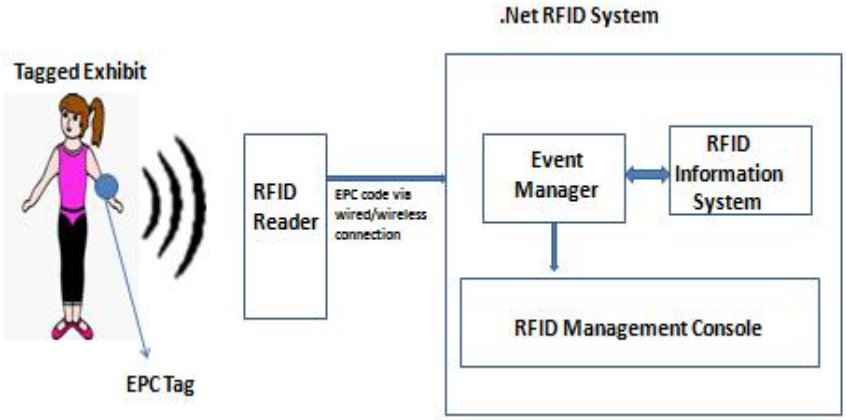

Figure 2

The RFID Software consists of RFID Event Manager, The RFID Management Console and RFID Information Server Modules. The RFID Event manager gathers information from RFID Reader filters the information and provides the processed information to the RFID Information Server Module. RFID Server Module based on received information (information about UID number on Tag) sends detailed information to Event manager which displays the information on RFID management Console.

3.1 EXPERIMENTAL SETUP

An industrial RFID system of Balluf was available to the researcher, for experimentation. The arrangement of the system with this industrial setup is complete in all respect as far as the fulfillment of the idea is concerned, except the RFID Reader (which is a short range industrial RFID reader/writer) used in prototype needs to be changed with long range handheld RFID reader. The following industrial setup consists of all the components mentioned above.

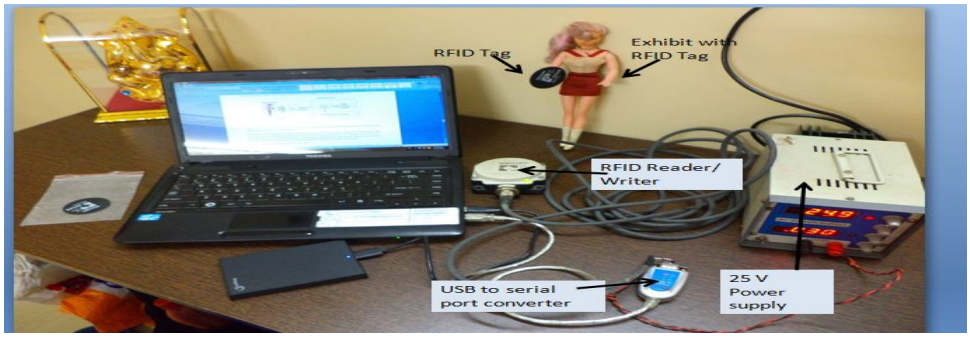

Figure 3

3.2 Flowchart of Working of .NET Application

Figure 4

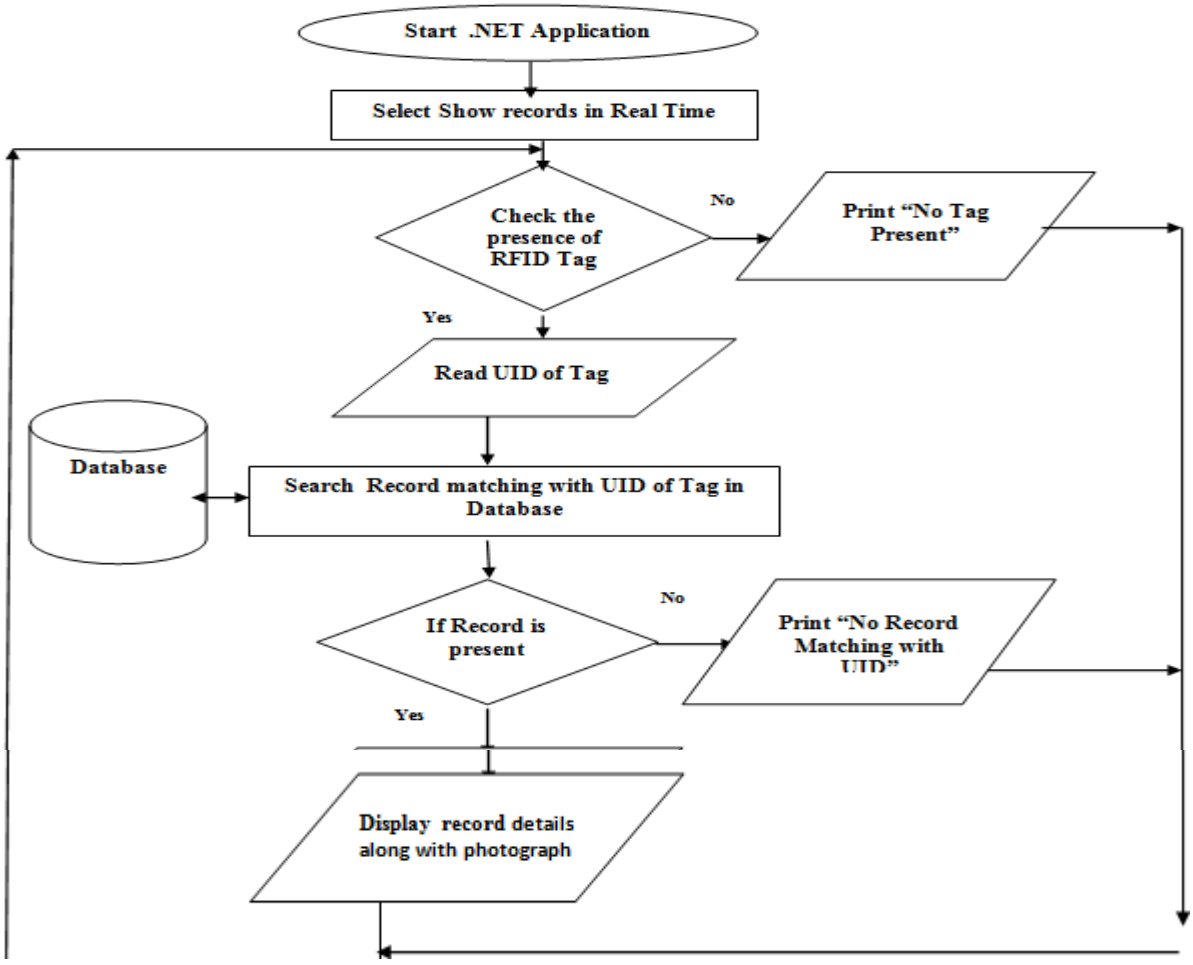

Figure 5

3.3 Screen Shots

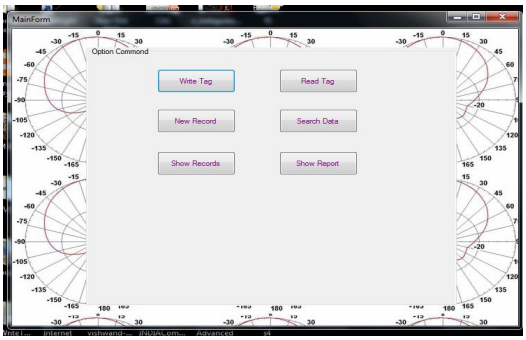

Figure 6 (Main Form)

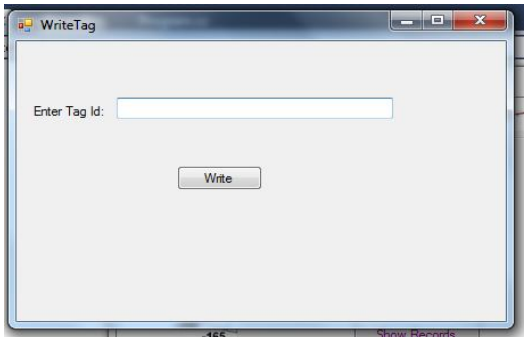

Figure 7(Write Tag ID on Tag)

Figure 8

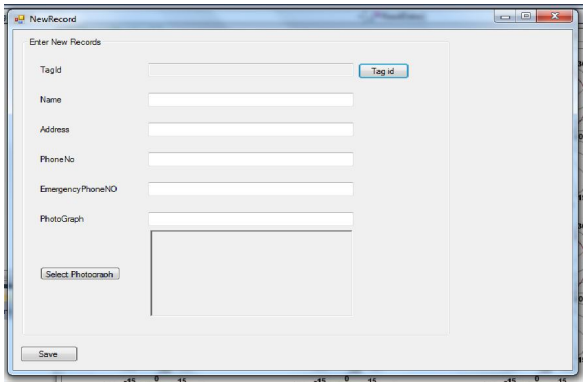

Figure 9 (Add new records in Database)

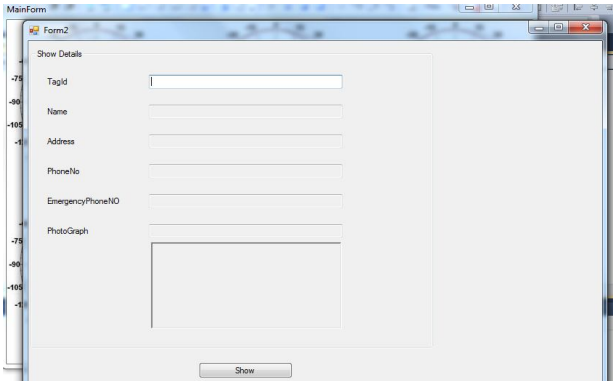

Figure 10 (Show details of particular)

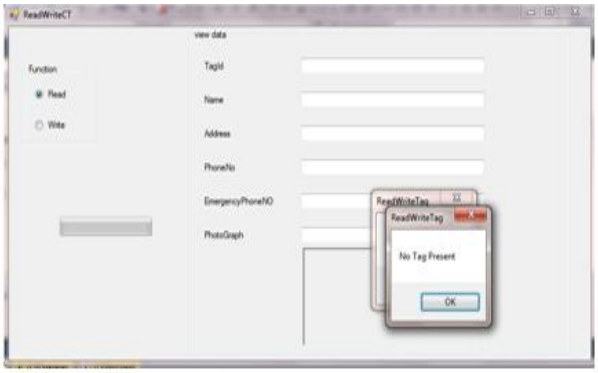

Figure 11 (Tag ID from database)

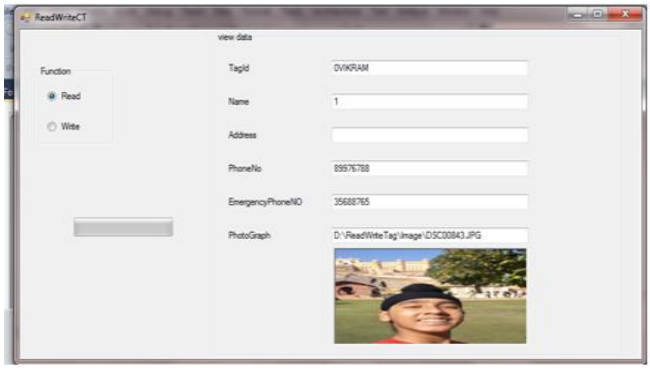

Figure 12

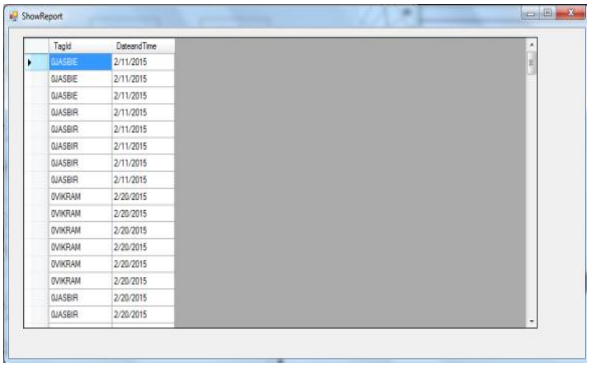

Figure 13

4. RESULTS

This above project was tested with various obstructions between tag and the reader and results were as given below:

SrNo.	Object name	Result of read operation
1.	Cement Brick	Yes
2.	Wooden Plank	Yes
3.	Steel plate and other metals	No
4.	Book	Yes
5.	Plastic sheet and other plastic material	Yes
6.	Glass Material	Yes
7.	Granite	Yes
8.	Water	Yes
9.	Wood+Granite+water	Yes
10.	Wood+Plastic+Water	Yes
11.	Combination of all the objects except metal	Yes
12.	Oil	Yes

The results were quite encouraging. RFID reader could read tag data when it was buried under various types of materials. It could not read only in case of metals. When the tag is completely covered by metal, it could not read tag information. If it is partially covered by metal it may read the data.

5 CONCLUSION AND FUTURE WORK

An attempt has been made to develop a Cyber Physical System which can help to locate and identify people in disastrous situations like earthquake, flood, fire, stampede or any other natural calamity using RFID system which is a contactless technology. A system needs to be developed to issue RFID tags to people who are going for a pilgrimage or to some places which are prone to earthquake or any other natural calamity and database needs to be maintained. There can be privacy issues. Every one may not like to be tracked. The choice can be left with individuals.
This system can be integrated with Intelligent Transportation Systems (ITS), Health care and Medicine which are other domains of CPS. Researcher plans to integrate this system with ITS to help the victims to reach hospital in best possible time as future work.

References

[1] "Potential of RFID in Emergency Management:Task-Technology Fit Perspective", Ashir Ahmed, Swinburne University, Australia, azahmed@swin.edu.au, Lyfie Sugianto Monash University, Australia lyfie.sugianto@monash.edu
2012, 45th Hawaii International Conference on System Sciences

[2] Ashir Ahmed, Swinburne University of Technology, Australia, "Role OF GIS, RFID and Handheld Computers in Emergency Management: An Expolatory Case Study Analysis " , JISTEM - Journal of Information Systems and Technology Management Revista de Gestão da Tecnologia e Sistemas de Informação Vol. 12, No. 1, Jan/Apr., 2015 pp. 03-28 ISSN online: 1807-1775 DOI: 10.4301/S1807-17752015000100001

[3] "E-Government Challenge in Disaster EvacuationResponse: The Role of RFID Technology inBuilding Safe and Secure Local Communities", A. Chatfield, University of Wollongong, akemi@uow.edu.au, S. F. WambaUniversity of Wollongong, samuel.fosso.wamba@neoma-bs.fr, T. HirokazuKyoto University, tatano@imdr.dpri.kyoto-u.ac.jp

[4] "Disaster Management: A Case Study of Uttarakhand" Dr. Bindi Varghese* & Neha Itty Jose Paul** 2013

[5] "Contributing Factors In adoption of RFID In Emergency Management– A Multiple Case Study", Ashir Ahmed, Lyfie Sugianto Faculty of Business and Economics, Monash University, Australia
Proceedings of Second Annual SIG GlobDev Workshop, Phoenix, USA December 14, 2009

[6] The 4th International Conference on Electrical Engineering and Informatics (ICEEI 2013)-" Effects of Knowledge Management System in Disaster Management through RFID Technology Realization", Akbar Badpa - Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Bijan Yavarb-GraduateSchool of Business, Universiti Kebangsaan Malaysia, Masoud Shakiba- Disaster Management

Institute of Southern Africa, 7130, Cape Town, South Africa, Mandeep Jit Singh- Department of Electrical Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia
Procedia Technology 11 (2013) 785 – 793

[7] Derekenaris, G., Garofalakis, J., Makris, C., Prentzas, J., Sioutas, S., and Tsakalidis, A. "Integrating GIS, GPS and GSM Technologies for the Effective Management of Ambulances " Computers, Environment and Urban Systems (25:3), May 1, 2001 2001, pp 267-278.

[8] Shibayama, A. and Hisada, Y., "An Efficient System For Acquiring Earthquake Damage Information In Damaged Area", The 13th World Conference on Earthquake Engineering, No.1121, Vancouver, Canada, August 2004.

[9] "Disaster Preparedness: Concepts, Guidance, and Research" Jeannette Sutton and Kathleen Tierney, Natural Hazards Center, Institute of Behavioral Science, University of Colorado, Boulder, Report prepared for the Fritz Institute Assessing Disaster Preparedness Conference Sebastopol, California, November 3 and 4, 2006.

[10] Mohammad Yamin Faculty of Information Sciences and Engineering, University of Canberra ACT 2601 Australia, "A FRAMEWORK FOR IMPROVED HAJJ MANAGEMENT AND RESEARCH"

[11] Peter Marwedel, "Embedded System Design", Springer, 2nd Edition, 2010.

[12] Hiroki Nishiyama, Tohoku Univ., Sendai, Japan, **"Cyber Physical Systems for Intelligent Disaster Response Networks: Conceptual Proposal and Field Experiment", Published in: IEEE Network (Volume: 31, Issue: 4, July-August 2017)**

[13] Ramasamy Mariappan, P.V.Narayana Reddy, Chang Wu Yu Chang ," Cyber Physical System Using Intelligent Wireless Sensor Actuator Networks for Disaster Recovery", Published in: Computational Intelligence and Communication Networks (CICN), 2015 International Conference, Added to IEEE Xplore: 18 August 2016

[14] Erol Gelenbe, Fang-Jing Wu ,"Future Research on Cyber-Physical Emergency Management Systems", Future Internet 2013, 5, 336-354; doi:10.3390/fi5030336, Received: 15 April 2013 / Accepted: 17 June 2013 / Published: 27 June 2013

[15] Justyna Zandera, Pieter J.Mostermanb , Taskin Padira , Yan Wanc , Shengli Fuc, "Cyber-Physical Systems Can Make Emergency Response Smart", Procedia Engineering 107 (2015) 312 – 318 1877-7058 © 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/). doi: 10.1016/j.proeng.2015.06.086 ScienceDirect Available online at www.sciencedirect.com Humanitarian Technology: Science, Systems and Global Impact 2015, HumTech2015

[16] Nan Wu,Nanjing University, china and Xiangdong Li,The City University of New York, US'2011, "RFID Applications in Cyber-Physical System", Published by INTECH 2011

[17] Volkan Gunes, Steffen Peter, Tony Givargis, and Frank Vahid
" A Survey on Concepts, Applications, and Challenges in Cyber-Physical Systems "
KSII TRANSACTIONS ON INTERNET AND INFORMATION SYSTEMS VOL. 8, NO. 12, Dec. 2014 4242 Copyright © 2014 KSII

[18] Bartłomiej Gładysz, "AN ASSESSMENT OF RFID APPLICATIONS IN MANUFACTURING COMPANIES" , Warsaw University of Technology, Institute of Production Systems Organization, Poland, Management and Production Engineering Review Volume 6 • Number 4 • December 2015 • pp. 33–42 DOI: 10.1515/mper-2015-0034

[19] M Ayoub Khan, Manoj Sharma, Brahmanandha Prabhu R,"A Survey of RFID Tags", Communications Research Centre, SoE Center for Development of Advanced Computing (CDAC) (Ministry of Communications and I.T., Govt. of India), Noida, India, International Journal of Recent Trends in Engineering, Vol 1, No. 4, May 2009

[20] Tanuja Dahariya, Ankit Naik, Menka Chandra,"Study on RFID, Architecture, Service and Privacy with Limitation", International Journal of Computer Science Trends and Technology (IJCST)- Volume 2 Issue 6,Nov-Dec 2014

[21] Bartłomiej Gładysz, "AN ASSESSMENT OF RFID APPLICATIONS IN MANUFACTURING COMPANIES" , Warsaw University of Technology, Institute of Production Systems Organization, Poland, Management and Production Engineering Review Volume 6 • Number 4 • December 2015 • pp. 33–42 DOI: 10.1515/mper-2015-0034

[22] Strategic Vision and Business Drivers for 21st Century Cyber-Physical Systems, Report from the Executive Roundtable on Cyber-
Physical Systems, January 2013.

[23] The NITRD CPS Senior Steering Group's 2014, CPS Vision Statement 2014, https://www.nitrd.gov/nitrdgroups/images/6/6a/Cyber_Physical_Systems_%28CPS%29_Vision_Statement.pdf

.

[24] Strategic Opportunities for 21st Century Cyber-Physical Systems, Foundations for Innovation in Cyber-Physical Systems workshop, Chicago, IL, March 13-14, 2012.

Abstract

Jasbir Kaur is MSc-Economics(Hons) From G.N.D.U(Guru Nanak Dev University, Punjab), PGDCA-Comp.Sc & Applications from G.N.D.U(Guru Nanak Dev University, Punjab), MS(System Softwares) from BITS(Birla Institute of Science & Technology, Rajasthan) with Distinction, M.Phil-IT from YCMOU with Distinction, Phd student at UDCS, Mumbai. She is Assistant Prof. & HOD-Information Technology, G.N.khalsa college, Mumbai, India

Seema Purohit is an Associate Professor and is a PG recognised teacher and Research Guide for University of Mumbai, and published her work in several peer reviewed journals for last 12 years. Her area of expertise includes computational mathematics & intelligence and soft computing. She has been actively engaged in training Computer Science, IT, Technology and Management students for more than twenty five years at the graduate and postgraduate level.