

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

IOT Application for Fault Diagnosis and Prediction in Elevators

Omid SALIM¹, Erhan AKIN²

P.G. Student, Department of Computer Engineering, Engineering College, Elazig, Turkey¹

Professor, Department of Computer Engineering, Engineering College, Elazig, Turkey²

ABSTRACT: This paper's an elevator monitoring system of rules based on installed system and IOT. Through multi-sensor data obtaining, much data can be gotten to, for example, running noise, vibration, direction, quickening, speed, warmth of the traction machine, floor stopping place, entryway turn of the lift car and power supply voltage, now, in the meantime the noise and the temperature of the PC stay with the data if there is anybody in the lift, etc. A wide area network association between the elevator parameter observing stations and the remote control focus is set up to understand the center on checking and automatic remote disappointment caution for the lift operation. This framework gives artistic backing to elevator safeness orientation and the practical running outcomes is acceptable. The goal was a find error and detection. The aim is to create a programming capable of conduct these challenges and to examine the advantages and finding fault in elevator. A smart discovery system of machine room less lift is designed in this thesis in addition the diagrams of system's network design. The framework select innovation for system information gathering and transmission node, plans the circle schematic for the elevator sensor nodes and portal nodes and the monitoring center to acknowledge real-time showcase of the lift running state. The design mentality and the structure of the system are detailed in the paper. The design provides a solution for reforming elevators by IOT. With the application of more advanced sensors, the real time running status of elevator can be sensed more detailed and comprehensively. The elevator monitoring alarm system that made full use of advanced sensing technology and combined with modern communication technology can transfer the information from many elevators in a certain area to the monitor computer.

KEYWORDS: Elevator, IOT, Web application, real-time communication, control system.

I. INTRODUCTION

The Internet of thing (IOT) begins with your things – the things that matter most to your business. IOT is about making your information meet up in new ways. Take of information with IOT dashboards. Reveal actionable realization. And modernize how you work together. IOT is an idea and a worldview that look prevalent attendance in the environment of a variety of things/matters that from wireless and cable associations and one of a kind addressing schemes are capable to react with one another and coordinate with different things/items to make new usage /administrations and achieve shared target. In this setting the research and expansion challenges to make an intelligent world are large [1]. A world where the true, digital and the practical are converging to make clever environments that make transport, power, town and many else regions very smart. Internet of Things with goal is to can things to be linked, anywhere, anytime, with anything and anybody in a perfect use any path/organize and any management. With the progressive progression of World's urbanization, the quantity of building keeps on developing. The elevator is playing a basic transport in city vertical movement system. It is evaluated that the elevator establishments have surpassed high number in the industrial countries and in the whole world. At the same time, mishap in elevator happened oftentimes, which is bringing about more extensive worry as of late. Alongside the quick improvement of Internet of Things and the country's strong support, innovations for IOT are connected to different fields increasingly broadly [2]. As a typical application of IOT, elevator monitoring system can provide a more efficient management model. By using the elevator monitoring system with IOT, the elevator accidents could be predicted successfully and elevator disappointments could be repaired viably in request to warranty the safety of lifts and diminish the mishap recurrence rate and misfortunes [3,4,5].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

II. RELATED WORK

1- They offer fast access inside buildings, particularly to the tall building one. Elevator systems are run of the traditional carriage material in modern city. for all that, long-time use of the system builds error event likelihood. This is a critical issue when an error on the system happens, it reasons problems likewise to people living in the building particularly to oldest and to operators. Therefore, for these cause, partners providing composition and conservation consider true checking and error detection most critical query, in request to return the elevator system quickly and protect their work. According to literature survey [6,7], errors in induction engines utilized as pull machine for the elevator systems are the most critical wrong status. Keeping in order to guarantee safe action, in good time maintenance and defending saving, on-line error discovery on elevator pull machines is a critical duty. Is a useful means that providing many facilities for managing our daily works and tasks, such as all systems the elevator system also facing many problems and damage in its system [8]. For this purpose, in my project we will find out the problems that we faced in elevators system the specifying the best solution for them Figure 1.

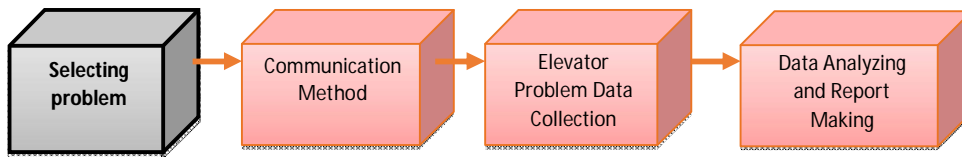


Figure 1. Selecting Problem.

2- As we mentioned in the previous step after finding and determining the errors and problems, in this step we specify the type of the connection between the elevator and the control system [9], for this purpose we use the IOT that is used for transferring the data and information from the users to control system through the internet Figure 2.

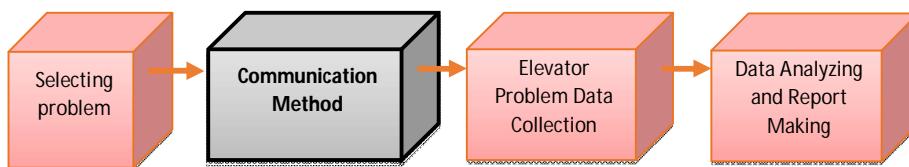


Figure 2. Communication Method.

3- In this step we collect all data that had been sending from the elevator to our control system such as fire, door cannot open be closed, door cannot be opened [10], power off and rope Figure 3.

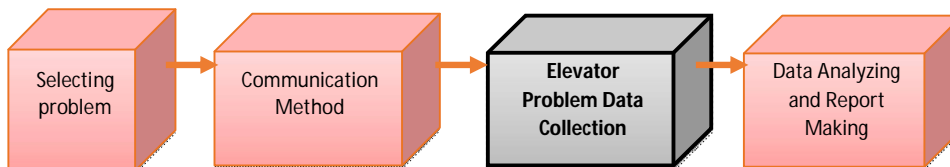


Figure 3. Elevator Problem Data Collection.

4- After collection all data that had gotten by the last previous steps, in this step we analysis all of them, then setting each data with the problem that belong it [11]. Finally, we make reports about the details of our collection [12], then sending then to the experts to solve and fix up the problems Figure 4.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

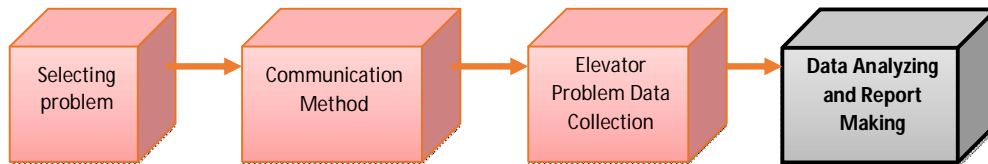
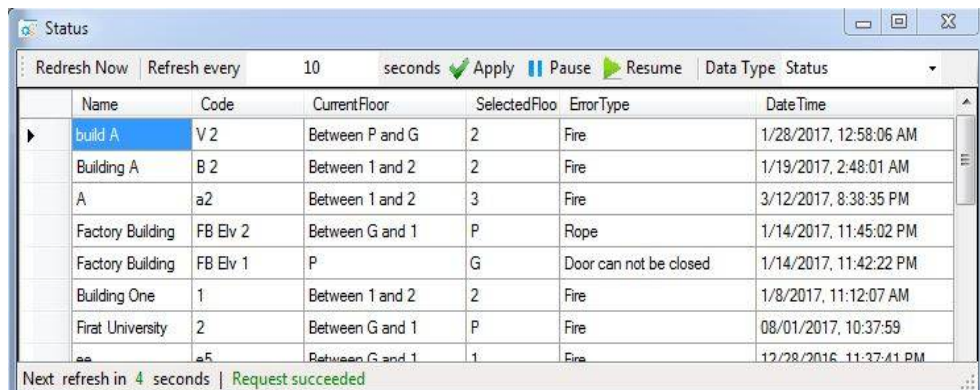


Figure 4. Data Analyzing and Report Making.

III. MATERIAL AND METHOD

The software is developed with C# programming and it is able to read and show us the data from the web application and save them in the server when is connected by IOT. After that the software will determine and show us the kind of fault, select which floor, name of building, and give us the date of fault in elevator, and in every 10 second the software is refreshed. Software is created by C# programming and takes in several coding for action Figure 5.



Name	Code	CurrentFloor	SelectedFloor	ErrorType	Date Time
build A	V 2	Between P and G	2	Fire	1/28/2017, 12:58:06 AM
Building A	B 2	Between 1 and 2	2	Fire	1/19/2017, 2:48:01 AM
A	a2	Between 1 and 2	3	Fire	3/12/2017, 8:38:35 PM
Factory Building	FB Elv 2	Between G and 1	P	Rope	1/14/2017, 11:45:02 PM
Factory Building	FB Elv 1	P	G	Door can not be closed	1/14/2017, 11:42:22 PM
Building One	1	Between 1 and 2	2	Fire	1/8/2017, 11:12:07 AM
Firat University	2	Between G and 1	P	Fire	08/01/2017, 10:37:59
ee	a5	Between G and 1	1	Fire	12/28/2016, 11:37:41 PM

Figure 5. Software of Interface Design.

IV. EXPERIMENTAL RESULTS

The testing of the system's performance is performed by the web application. Write the name of client site or web application in the web browser (umed.smartinium.com) in Figure 6. The web application can show a motion elevator and can see the problem or fault through this program and connected to the internet, after fault happens is automatically sending for server show on another application.

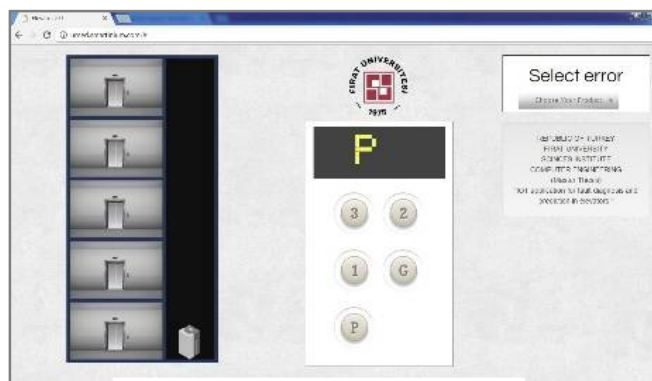


Figure 6. Interface Client Site.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

This projects as many project faces some problems and its problem has a solution, then the problems that we are talking about in my project each of them should connect with a sensor to detect which kind of problem completely will face, then showing it to the control room who has responsibility for solving problems. Elevator consists of some errors (power off, fire, a door cannot be closed, a door cannot be opened and rope) and it's consist of some button floors (floor 1, floor 2, floor 3, ground, and parking). Show in Figure7.



Figure 7. Web Application Consist of Errors and

As mentioned before the definition of the server it's components in detail, also how it connects all parts with each other and transferring data and information's with a high security. Behind this project also have a server that it very important for this project, because it has a role for saving, storing data and show in that application created which is connected with the server through the internet, sending the data and information to the technical room which has been connecting with a prepared application specially created for finding problems and solving properly. In the same time in technical room when happened Fault in elevator this application to diagnosis prediction in elevator give the kind of fault, give the name of elevator building and which floor happen showing on application it is created by C#, Show in Figure 8.

Name	Code	CurrentFloor	SelectedFloor	ErrorType	DateTime
a2	a2	Between P and P	2	Rope	1/16/2017, 8:58:23 PM
Factory Building	FB Ely 2	Between G and 1	P	Rope	1/14/2017, 11:45:02 PM
Factory Building	FB Ely 1	P	G	Door can not be closed	1/14/2017, 11:42:22 PM
Building One	1	Between 1 and 2	2	Fire	1/8/2017, 11:12:07 AM
Firat University	2	Between G and 1	P	Fire	08/01/2017, 10:37:59
ee	e5	Between G and 1	1	Fire	12/28/2016, 11:37:41 PM
BB	H7	2	3	Door can not be closed	12/28/2016, 11:32:01 PM
Building A	A4	Between G and 1	3	Power off	12/28/2016, 11:30:34 PM
z	z1	Between 2 and 3	1	Power off	12/28/2016, 10:55:09 PM
Building D	D2	1	2	Door can not be closed	12/24/2016, 8:37:01 PM

Figure 8. Application for Fault Diagnosis and Prediction in Elevator.

The modality of sending and receiving data is depend on type of program that use for showing the information, depends on times, places and the type of the problems will have showing in different way in the program, after receiving the information through the server that has sent by the user this program demonstrate a classify the information in a special way depending on times and the place of the problem that occurred to which be a responsible of finding the solution and fixing it up, this program has created by C# language that mentioned the details about it codes, commands and their function with example figures, this program had designed to make connection with the server easily through internet with facility for transfer data quickly and receiving data in 10 second or less depending on user desire, on the other

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

hand the user can set and fix the required time for sending and receiving data. Showing one fault in one elevator, on client site first must be getting in a building and write a name of elevator, show in Figure 9.



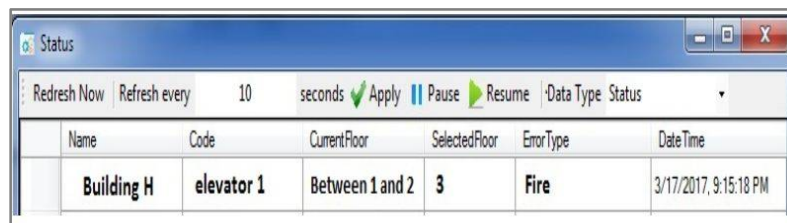
Figure 9. Name Building of Elevator.

When elevator worked and going to floor 1 after press button 3 in the same time happened Fault (fire), show in Figure 10.



Figure 10. Fire Alarm on Web

After happen fault in elevator the same time data go to server also in technical room on the application show the result (fault or fire), get all information about it happened in building H, fault is fire, current floor between 1 and 2, and time is 9:15 pm, show in Figure 11.



Name	Code	CurrentFloor	SelectedFloor	ErrorType	Date Time
Building H	elevator 1	Between 1 and 2	3	Fire	3/17/2017, 9:15:18 PM

Figure 11. Technical Room

V. CONCLUSION

This paper’s agent-based system for an IOT application for fault diagnosis and prediction in elevators framework will be developed. Through the thesis to be always literature review and investigation system would work for implementing the proposed way will be done. For my project create a web application, it’s can show us a motion elevator and can see the problem or fault through this program and connected by internet, after fault happen is automatically sending for server with real time and name program is Front end or Client site or web application.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

REFERENCES

- [1] Zhang, J. Wang, G.C. Urban Research, "The elevator is playing a basic transport in city vertical movement system", IEEE elevator system movement, vol.9, pp. 51-53, 2008.
- [2] Peng, Y. C.S. Zhou, "Machinery Design & Manufacture", IEEE innovations for IOT are connected to different fields, vol.4, pp. 14-16, 2011.
- [3] Huang, Q.L. W. Yang and G.Xiao, "Manufacturing Automation", International Journal of Computer Applications (11-15), vol. 9, No.11, 2013.
- [4] Hakala, Harri, "Integration of Motor and Hoisting Machine Changes the Elevator Business, international Conference on Electrical Machines", IEEE request to warranty the safety of lifts, vol. 44, no. 7, 2000.
- [5] Philip Koopman, "Elevators 18-649 Distributed Embedded Systems", using the elevator monitoring system with IOT, vol. 6, p. 22-12, 2015.
- [6] MARK, "Controller Board Hardware Installation and Configuration", International Journal of Futuristic Science Engineering and Technology, vol. 1 Issue 3, ISSN 320 – 486, 2004
- [7] Gunda, Kiran K, "Adjustable Speed Drives Laboratory Based on dSPACE Controller", MS Thesis, Louisiana State University, Baton Rouge, vol. 1, p. 2-8, 2008.
- [8] Feng Wang, Dan Wang, Jiangchuan Liu, "EleSense: Elevator-Assisted Wireless Sensor Data Collection for High-Rise Structure Monitoring", IEEE elevator system also facing many problems and damage in its system, vol. 1, p.1297-1304, 2012.
- [9] Shivani Tiwari, Ritu Dubey, Sapna Rai, Shobhit Verma, "Automatic Elevator Management and Control System Using Microcontroller", IEEE Elevator Control System, vol. 7, p. 2, 2012.
- [10] McBeath. B, "IOT Distributed Intelligence Examples", internet of thing with environment, vol.11, p.12, 2016
- [11] Akyildiz, I.F. T. Melodia, K.R. Chowdhury, "A survey on wireless multimedia sensor networks", IEEE wireless sensors, vol.9, p.921-960, 2007.
- [12] Alkar, A. U. Buhur, "An Internet based wireless home automation system for multifunctional devices" International Journal of Computer Applications(1169-1174), vol.4, p. 3, 2005.