A Web Based Software App of Building Inspection for Fire Safety

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Abstract— We are creatures of reason who are programmed to preserve energy and maintain equilibrium in nature. However in this era of technology it is important to not merely survive but to thrive, we must occasionally consider the role of autonomous machine at times of disaster. Building is place where human being lives, can be used for different purposes. As the population increasing with the advances in the technology, the factors of susceptibility and complexity of fires, explosions and hazards which these buildings are exposed to have increased. These hazards give new challenges to planners, architects and fire protection services. To overcome these problems, we propose a novel approach by developing, A Web based Inspection App for Fire Safety enabling Fire Service authorities to conduct inspections of various buildings and capturing images of mandatory fire and life safety systems, maintaining database and generating reports. This software enables fire service authorities to view collected data and apply corrections or trigger actions as necessary .The system provides information for other building inspection, such as fire protect and fire safety.

Keywords: FRS, Software App, Fire Safety

I. INTRODUCTION

Fire is crucial for the development of human society, and it has become important part of human civilization. From different types of disasters, fire constitutes a significant threat to life and property in areas like urban and rural. Fire development inside buildings is generally divided into four stages: growth stage, flashover stage, post flashover stage and decay stage.

Smoke generated during fire contain dangerous gases which poses threat to life. Society has responded to the threat of fire in buildings in many ways, including fire department intervention, insurance, building regulations, education on fire hazards, controls on the use of materials and products in buildings, and the design of buildings to resist the effects of fire. Safety of public buildings has become an important issue for fire authorities.

Today's generation is very advanced, everything is available easily and in less amount of time. So it is easy to make forms and inspection with this technology. Building inspection is usually carried out at specific stages corresponding to building progress and based on the submitted plans and specifications. In this software we will provide on-line service to the customers like fire safety measures, precautions and procedure. And along with that on their request we also provide inspection of their building & Fire safety certificate. Such types of software available in JAPAN and UK. According to the rule of 2009, Maharashtra Fire Prevention and Life Safety Measures, made it mandatory for building owners and residents to conduct half-yearly fire safety audits and submit the report to the fire department. So by introducing new way for inspecting the buildings we can help fire authorities in their inspection.

II. OBJECTIVE

A. Motivation and Initial Research

In India according to survey, every year, about 25,000 persons die due to fires and related causes. Percentage of female killed in fire accident is 66%. It is estimated that about 42 females and 21 males die every day in India due to fire. According to the statistics released by the National Crime Records Bureau, fire accounts for about 5.9% (23,281) of the total deaths reported due to natural and un-natural causes during the year 2012.Many of these deaths could have been prevented, had we taken enough fire protection measures. A fire is thing which can be happen at any time at any place irrespective of its occupancy status. You can predict a fire at any structure, may be at your home or at your workplace or in a hospital or in public places like theatres, malls, etc. Fire has the possibility to cause harm to its occupants and severe damage to property.

Motive of this project is to protect the life and buildings, as after being caught by the fire. So by using this app fire building inspecting authorities will get to know how to tackle the difficulties they have been faced while reconstruction, and to be alert for the future accidents. This web based software will provide safe workplace ,security and will ensure to that the premises has all fire safety and fire suppression equipment in place and in good working order. This app will be an excellent tool to perform inspections and capture required data easily and quickly.

The results of this project will be:

- It will help fire service authorities to create easy to reports that can be quickly uploaded online.
- It will eliminate the need for papers and reduces manual input errors.
- The app will get the real time analysis for virtually deign check list to carried out inspection or audit for fire safety.

B. Aim

The main objective of this project is to help Fire Service authorities to conduct inspections of various buildings and capturing images of mandatory fire and life safety systems, maintaining database and generating reports. The software is easy to use for fire authorities and help them to conduct inspections online. The interaction between customers and user should be more precise with help of this software. As this software will perform inspection online so there will be need of image capturing so we are providing android based app along with this software which will help fire officer to click images of particular allotted building through this app and send to admin via android application. The system will deals with the different types of users i.e. General users and Fire service authorities.

III. LITERATURE REVIEW

A brief survey of related work in the area of building inspection for the fire safety is presented by the Indian author, R. R. NAIR suggest that, according to one estimate the major losses reported by the Indian Insurance Companies in the year 2007-2008 indicate, that about 45% of the claims are due to fire losses. According to another estimate about Rs. 1000crores are lost every year due to fire. Not only industrial but also non-industrial premises like hospitals, commercial complexes, institutions, assembly halls, hotels, residential buildings, etc. are reported by fire loss. According to Fire Risk Survey (FRS) 2013, carried out by Federation of Indian Chambers and Industry, in India, fire accounted for 8.45% of the overall ranking of risks. FRS also revealed that fires has been rated as the 5th highest risk in industry in 2013.Indian fire risk survey also revealed that in industry wise risk ranking, fire take 2nd place in hospitality, 4th place in IT/ITES, Manufacturing, Security Service Providers and 6th place in infrastructure exercise but taken in isolation, they are insufficient in educating employees / occupants in all the important matters.

There are a lot of rating systems for sustainable building in the worldwide, but there no such effective systems for rating of buildings according to their safety. This online system proposed a risk-based assessment system of public buildings with target to classify these in common way. However, housing environment, quality of housing, and energy saving are receiving increased attention. Safety inspections in Korea need to include items for lighting, ventilation, presence of asbestos, firefighting, escape, and energy saving in order to respond to current issues.

IV. SYSTEM ANALYSIS

A. Software Specification

1) Language used - Java Enterprise Edition

The Enterprise Edition of java is a computing platform that is based on the Java programming language. The aim of the Java EE platform is to provide developers with a powerful set of APIs while shortening development time, reducing application complexity, and improving application performance. Java is simple, platform independent architectural neutral, portable, multithreaded language. Java contains qualities like distributed, networked, and robust and object oriented programming language.

2) Software used – NetBeans and MySQL

NetBeans is an integrated development environment for Java. Applications based on NetBeans, including the NetBeans IDE, can be extended by third party developers.

MySQL is an open-source relational database management system. It is used to save databases and work on it in our project.

V. IMPLEMENTATION AND OPERATION

Like any communication or control system, a software will have:

- Input-It will be documents upload by user to perform inspection.
- Output-Generated safety certificate by officers.
- Processing-It means officers will perform building inspection.

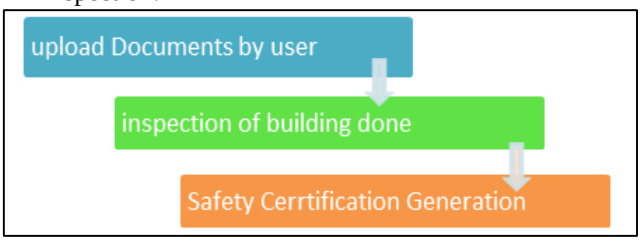

Fig 1: Flow of Software

Working of this software is easy to understand. In this software we are providing on-line service to the customers like fire safety measures, precautions and procedure. And along with that on their request we also provide inspection of their building & Fire safety certificate. We have categories our customers as Institutional building-colleges, hospitals, and government buildings, commercial building and residency buildings.

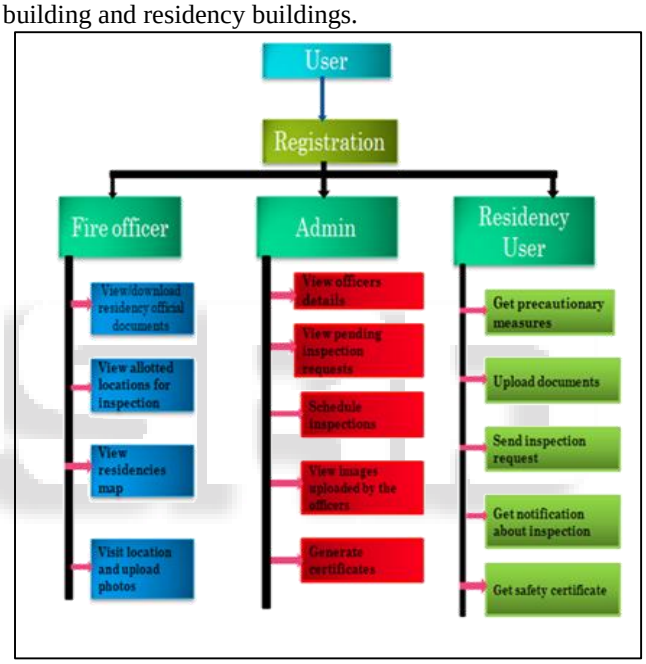

Fig. 2: Flowchart of Building Inspection Survey

The image shown above is the image of Home Page of this web based application .Home page of our web application contains various kinds of tabs .They are Home Tab, Residency Registration Tab ,Login Tab, Safety Rules & Requirements and Safety Documents Tab. Each tab has its own specification.

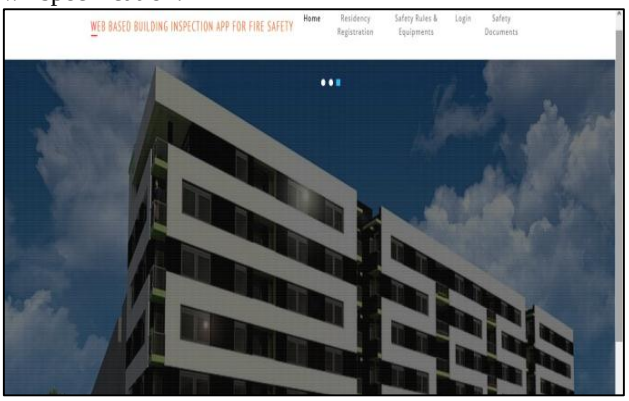

Fig. 3: Home Page

A. Home Tab

Home Tab is available on every page of our application. Suppose, Admin account is open and he is working on other screen then he can back to home page of his own home page of account then he will simply click on home tab then he will return back on his home page of profile.

B. Residency Registration Tab

By using this tab any residency user can register himself on our web application. This form contains fields like Residency Name, Residency Representative Name, Residency Builder Name, Address, City, Email, Userid, Mobile, Password and there is one submit button is available as shown in image. From all these fields residency name is not mandatory field as every residency has not name compulsorily. Mandatory fields contain email-id, mobile no, address etc. Once registration done successfully user can login himself and able to send inspection request to fire authority.

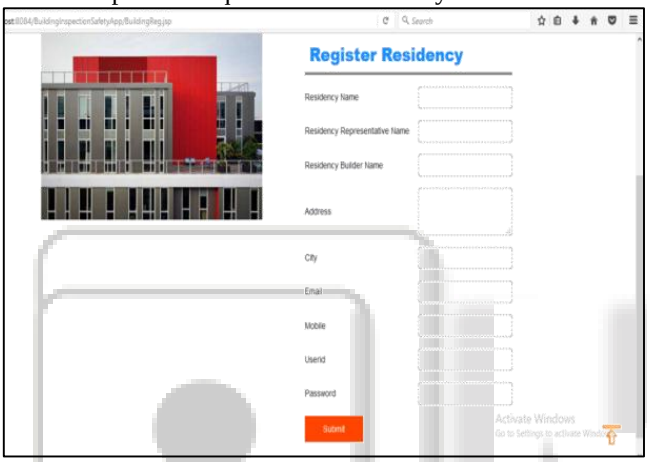

Fig. 4: Registration Form Page

C. Login Tab

As the name shown it contains login page of this web application which is built for building inspection for fire safety. Anytype of user residency user, fire officer or admin can be login by using this tab. It contains two fields i.e Userid and Password. If any user forget his password then to recover it we have link of forget password available on this page. If by mistake new visitor of our site goes in login page then signup button is available which will redirect to registration form. So, first he will register and can login to get benefit of this fire services for inspection of building.

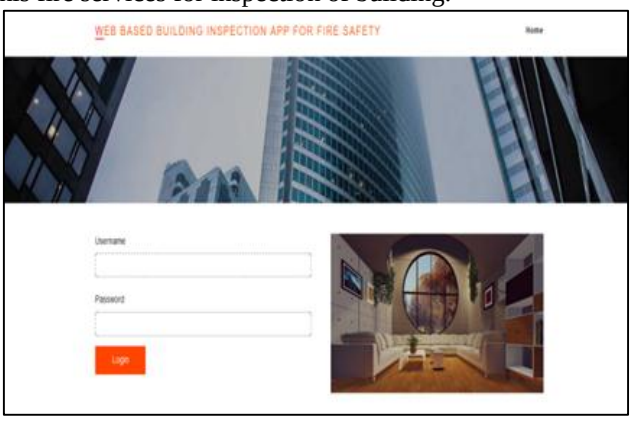

Fig. 5: Login Page Form

D. Safety Rules & Requirements

Admin is the main fire authority so he will manage some safety rules to prevent fire in the buildings. Some of the rules and equipment's needed are mentioned in figure shown below.

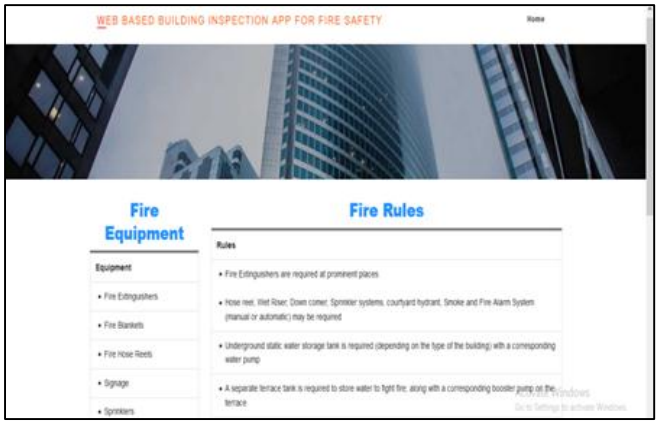

Fig. 6: Safety Rules & Equipment's Page

By using all these this software helps residency users to get their building inspected annually. Along with this software we have developed android app for fire officer to send report and photos of scheduled building to the admin by checking it admin will generate safety certificate for building and provide it to user. Specialty of this application is that it is very secure. When anyone wants to see uploaded documents he can't see it directly his authenticity is checked first then he will get OTP to download and see documents. So, documents and details is secure in this software. For this we have used TVES mechanism.

VI. ALGORITHM

A. TVES (Time Varying Encryption System)

TVES means time varying encryption system. Attack on anything can be happened anytime we can't predict it it so to reduce its chances we are going to use encryption system algorithm. This is new algorithm on which in California university research is going on. So on the basis of it .We are implementing it. As hacker can hack documents anytime if he knows the algorithm type or key for decryption he can easily hack it but if algorithm is based on time and date he can't all the data because it will be changing all the time. So this is the best technique to avoid loss of data.

In this type of systems, different control strategies are applied on the data during the time, and a more complex, flexible and practical control effect is acquired successfully In TVES every byte will be encrypted using separate key. In this technique, the key will be generated using random no, upload date and time. The algorithm pseudo code is as follows

1) Encryption

- Base Key=Random(999)+(upload date-upload time)
- Read bytes[] from uploaded file
- Set len=bytes[].len
- Generate random key kRand=Random(999)
- Generate base key
- Base Key=Random(999)+(upload date-upload time)
- Generate keys[] of length len

- Set Cnt=Int(kRand/2)
- For i=0 to len-1
- keys[i]=concat(base key,cnt)
- Cnt++
- End for
- Set ind =0
- For i=len-1 to 0
- Ebytes[ind]=bytes [i]^keys [ind]
- ind++
- End for

2) Decryption

- Convert Ebytes[] into file
- Store kRand in db
- Store file on server
- Read bytes[] from Encrypted file
- Set len=Ebytes[].len
- Fetch random key kRand from db
- Generate base key
- Base Key= kRand +(upload date-upload time)
- Generate keys[] of length len
- Set Cnt=Int(kRand/2)
- For i=0 to len-1
- keys[i]=concat(base key,cnt)
- Cnt++
- End for
- Set ind=0
- For i=0 to len-1
- Decbytes[i]=bytes[i]^keys[i]
- End for
- Reverse Decbytes[]
- Set dbytes[]=Reverse(Decbytes[])
- Convert dbytes[] into file
- Deliver file to user

VII. CONCLUSION

The successful use of any type of fire equipment depends upon the elements such as equipment, maintenance and training also identification of type of fire, location of fire through apps and description of fire accidents. Our aim is to ease the access of what to do after fire accidents. The management work of firefighting and security of the old remedy. With the help of this software it is easy to build simple or complex inspection for fire safety authorities and generalize users. As there are a lot of rating systems for sustainable building in the worldwide, but there no such effective systems for rating of buildings according to their safety. So with the help of this software we can reduce such incidents. It provides solution for apartment and site inspections for the multi-family industry. The app will get the real time analysis for virtually deign check list to carried out inspection or audit for fire safety. The app will help to manage assets and process for industrial and construction companies. It will help fire service authorities to create easy to reports that can be quickly uploaded online.

With the help of this software it is easy to build simple or complex inspection for fire safety authorities and generalize users. As there are a lot of rating systems for sustainable building in the worldwide, but there no such effective systems for rating of buildings according to their safety. So with the help of this software we can reduce such incidents. It provides solution for apartment and site inspections for the multi-family industry. The app will get the real time analysis for virtually deign check list to carried out inspection or audit for fire safety. The app will help to manage assets and process for industrial and construction companies. It will help fire service authorities to create easy to reports that can be quickly uploaded online.

REFERENCES

[1] Accidental Deaths and Suicides in India 2012 – National Crime Records Bureau, New Delhi, 2013
[2] Hegde Patil, S.B. and Nair, R.R. – Management of Industrial Hazards (CEP Publications) Bangalore, All India Council for Technical Education, 1997.
[3] Accident Cause Analysis and Evacuation Countermeasures on the High-Rise Building Fires Chen Haitaoa,b,* , Lou Leileic , Qiu Jiuzid,2012
[4] Chinese Historic Buildings Fire Safety and Countermeasure AN Zheng-yang*, LIU Bin Kunming Fire Service Training School, Kunming 650208, China
[5] Mehrbakhsh Nilashi, Rozana Zakaria, Othman Ibrahim, Muhd Zaimi Abd. Majid, Rosli Mohamad Zin, Muhammad Waseem Chugtai, NurIzieadiana Zainal Abidin, Shaza Rina Sahamir, Dodo Aminu Yakubu, A knowledge-based expert system for assessing the performance level of green buildings; Knowledge-Based Systems 86 (2015) 194–209
[6] J. Y. Jeon. Directions of Systemization and Development for Building Maintenance Field of Korea. Korea Institute of Construction Engineering and Management, 8, 19-21 (2007).
[7] Chinese Team Construction of Fire Association and Fire Speciality Committee.Fire Manual [M], Shanghai Scientific & Technical Press, 1998.
[8] The 'Safety Gap' in buildings: Perceptions of Welsh Fire Safety Professionals, 5-7 July 2017, Chania, Crete, Greece.
[9] Study on Safety Assessment of Fire Hazard for the Construction Site,Liu Huia, Wang Yongqinga, Sun Shimeia, Sun Baotiea (2012)

