INDUSTRY - SPECIFIC INTELLIGENT FIRE MAMAGEMENT SYSTEM

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PROJECT LINK: https://youtu.be/mVCBe937yxY

PROJECT TEAM MEMBERS

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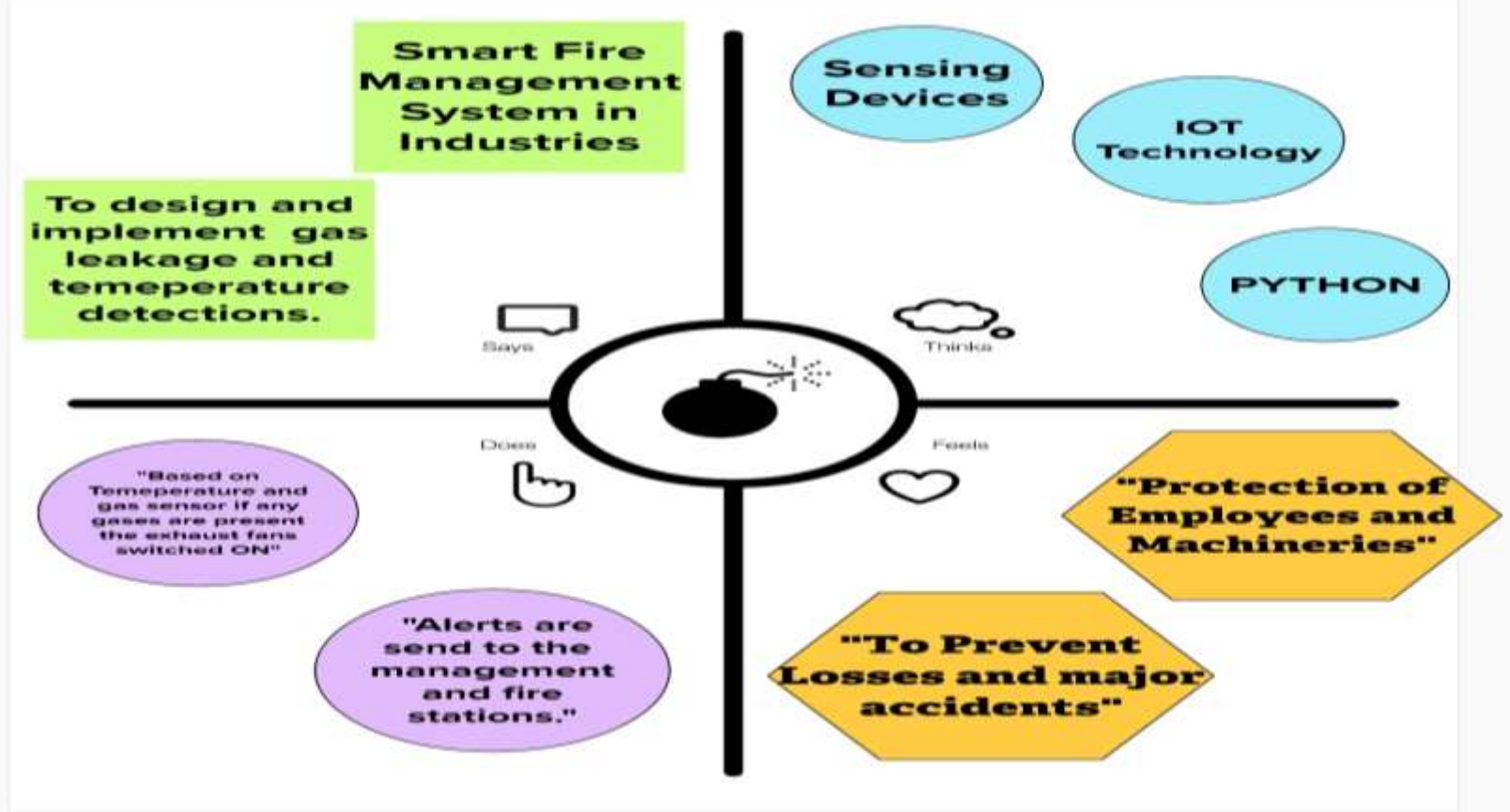
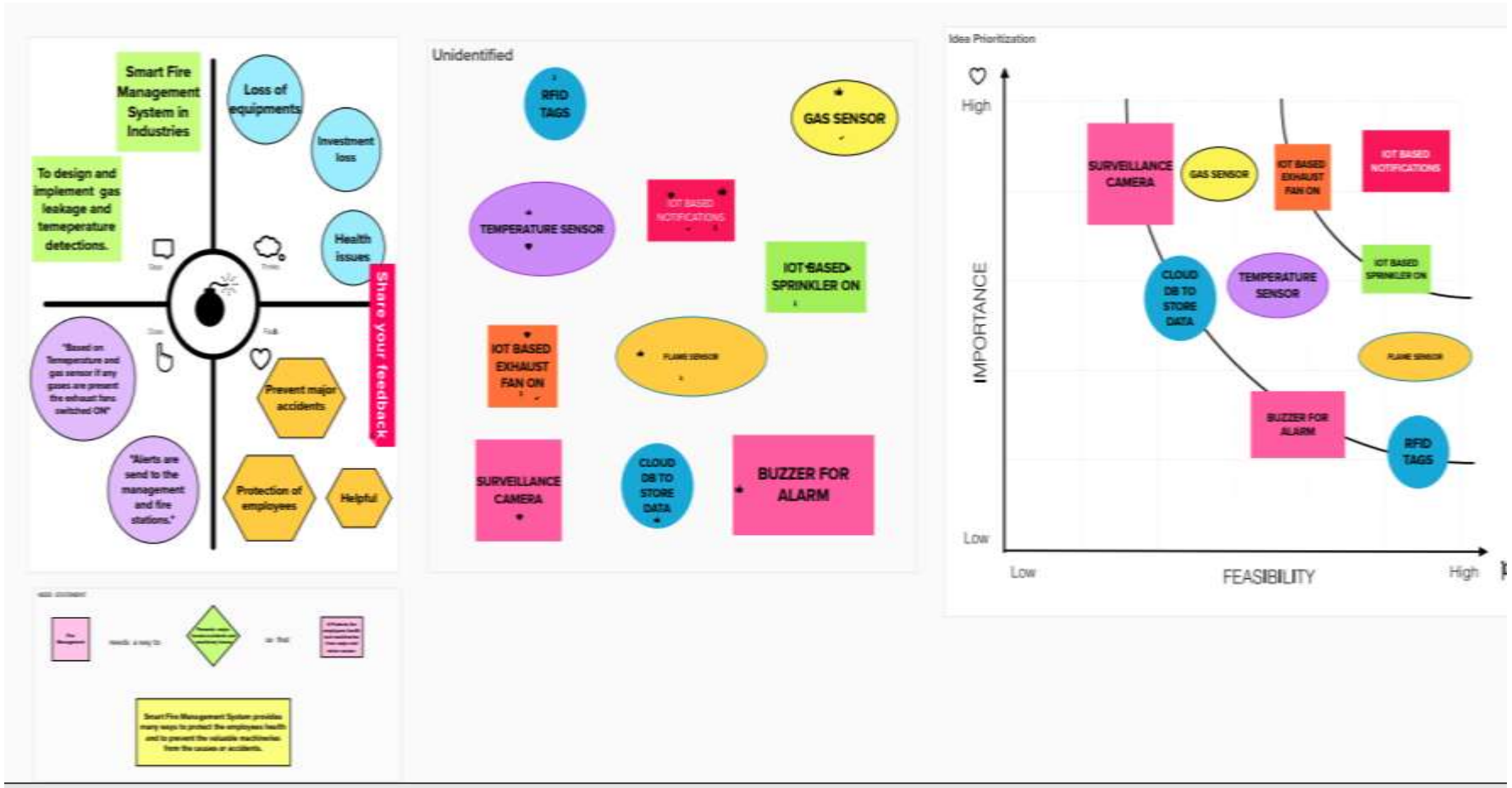
EMPATHY MAP


Smart Fire Management System in Industries
To design and implement gas leakage and temeperature detections.
Sensing Devices
IOT Technology
PYTHON
Says
Thinks
Does
Feels
"Based on Temeperature and gas sensor if any gases are present the exhaust fans switched ON"
"Alerts are send to the management and fire stations."
"Protection of Employees and Machineries"
"To Prevent Losses and major accidents"

IDEATION


Smart Fire Management System in Industries
Loss of equipments
Investment loss
Health issues
To design and implement gas leakage and temeperature detections.
Share your feedback
Prevent major accidents
Protection of employees
Helpful
"Alerts are send to the management and fire stations."
Unidentified
RFID TAGS
GAS SENSOR
TEMPERATURE SENSOR
IOT BASED NOTIFICATIONS
IOT BASED SPRINKLER ON
IOT BASED EXHAUST FAN ON
FLAME SENSOR
SURVEILLANCE CAMERA
CLOUD DB TO STORE DATA
BUZZER FOR ALARM
Idea Prioritization
High
Low
IMPORTANCE
Low
FEASIBILITY
High
SURVEILLANCE CAMERA
GAS SENSOR
IOT BASED EXHAUST FAN ON
IOT BASED NOTIFICATIONS
CLOUD DB TO STORE DATA
TEMPERATURE SENSOR
IOT BASED SPRINKLER ON
FLAME SENSOR
BUZZER FOR ALARM
RFID TAGS

LITERATURE SURVEY

LITERATURE SURVEY

INDUSTRY SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

TEAM LEADER: B.ATCHAYA

TEAM MEMBER 1: G.BHARATHE

TEAM MEMBER 2: P.HEMAPRIYA

TEAM MEMBER 3: T.JANANI

PAPER 1:

TITLE: Urban Fire Risk Evaluation Based on 2-tuple AHP—Taking the 8th Division with Shihezi City for Example
AUTHOR : Caihong Yin; Kaixuan Qi; Kunze Li; Qiangling Duan; Lijing Gao; Jinhua Sun
Published in: 2019 9th International Conference on Fire Science and Fire Protection Engineering (ICFSFPE)

DESCRIPTION:

The evaluation of urban fire risk was an important gist of scientific and effective urban firefighting management, planned and constructed. This study, took the 8th division with Shihezi city (Shi-City) as an example, an evaluation index system of urban fire risk was first built through analyzing the influential factors of fire risk in urban areas, which contained four first-class indexes and twenty-two second-class indexes. Then, to overcome the weaknesses of the analytic hierarchy process (AHP), 2-tuple fuzzy linguistic representation model was incorporated into AHP to calculate the weights of indexes. After that, an urban fire risk evaluation model was proposed. Finally, the developed model was applied into the fire risk evaluation of Shi-City and the fire risk rating of Shi-City was derived as slightly higher than medium, which offered significant guidance for fire control and safety management.

PAPER 2:

TITLE: Application of PHM Technology in the Design of Tank Fire Control System
AUTHOR: Jing Xu;Yang Lei; Bin Liu; Chao Ji; Lijun Nan
Published in: 2018 Prognostics and System Health Management Conference (PHM-Chongqing)

DESCRIPTION:

Combined with the process of Prognostics Health Management (PHM), the technology and application of armored vehicle fire control system PHM were discussed. The architecture of the health management system for tank fire control system was researched. According to the information characteristics of tank fire control system, the dual redundant bus transmission technology of FLEXRAY and CAN was applied, and the corresponding software and hardware systems were designed. Through the vehicle test, it was proved that the health management system will be effective for locating the fault, comparing the aim and assisting the soldier training. The data and video collected by this system were convenient for both maintenance and further study as the basic data.

PAPER 3:

TITLE: Fire Safety Management in Transportation of Municipal Wastes with the Use of Geographic Information System
AUTHOR: O.P. Savoshinsky; A.A. Zakharova; A.V. Pak
Published in: 2018 IEEE International Conference"Management of Municipal Waste as an Important Factor of Sustainable Urban Development" (WASTE)

DESCRIPTION:

Fire safety management is one of the main tasks in the field of waste safety. The transportation of municipal waste was a complex management task that requires a highly skilled decision maker. The current management technique is based on the approach to the construction of systems based on the analysis, by assessing the set of initial factors, which does not allow to achieve the management goal. The proposed approach based on synthesis was devoid of this drawback. The application of the system was shown by the example of the use of geo information systems to the problem of fire safety in the transportation of municipal waste.

PAPER 4:

TITLE: Fire incidents Management System in the city of Manila through Geo-Mapping
AUTHOR: Maricor Y. Ingal; Ralph Louisse T. Tolentino; Mico J. Valencia; Francis F. Balahadia; Arlene R. Caballero
Published in: 2016 IEEE Region 10 Symposium (TENSYMP)

DESCRIPTION:

Fires had become a concern in recent years in the city of Manila, posing a threat to the entire community. Manila Fire District was facing problems in their internal transactions between different sub-stations. The study served as an automated fire incidents management system that can provide a chart and a summary based on the input data of each sub-station and can provide a map of all the fire incidents through geo-mapping in districts of Manila. This study, Manila Fire District implemented appropriate programs and lead awareness campaign to the community to help lessen fire incidents and mitigated its damages.

PAPER 5:

TITLE: Discussion of Society Fire-Fighting Safety Management Internet of Things Technology System
AUTHOR : Wang Jun; Zhang Di; Liu Meng; Xu Fang; Sui Hu-Lin; Yang Shu-Feng

Published in: 2014 Fifth International Conference on Intelligent Systems Design and Engineering Applications

DESCRIPTION:
IOT is regarded as another information industry wave following computer, Internet and mobile communication network, and had become one of strategic dominant positions of new economic and technological development all over the world. The society fire-fighting safety management was an important application field of Internet of Things (IOT) technology. This paper combines application features of IOT technology according to fire-fighting business requirement to discuss the fire-fighting IOT systematic frame, plan society fire-fighting safety management IOT technology system, and proposed priority development points of society fire-fighting safety management IOT technology, thereby provided reference for technology research and development of IOT technology in society fire-fighting safety management field.

PAPER 6:

TITLE: Fire Safety Management Information System Design for Key Social Organizations
AUTHOR: Xu Fang; Zhang Di; Wang Jun

Published in: 2014 Fifth International Conference on Intelligent Systems Design and Engineering Applications

DESCRIPTION:

Aimed at the actual fire safety management needs of key social organizations and units, this paper introduced the design and implementation of the fire safety management information systems of the networked key organizations and units, provide information sharing and services on fire-fighting facilities' operating conditions, fire alarm information, and fire management information to the networked users, fire maintenance enterprises, and the fire supervision and administrative authorities so as to improve the fire safety management efficiency for these organizations and units, offered a scientific tool to the organizations to improve their fire safety management level, extended the functions of fire remote monitoring control system, and promoted fire prevention and controlled capability of the whole community.

PAPER 7:

TITLE: A System design of the Tahe's forest -Fire -prevention Management System
AUTHOR: Xindan Gao; Nihong Wang; Jun Li
Published in: 2010 The 6th International Conference on Networked Computing and Advanced Information Management

DESCRIPTION :

This article paper aimed to introduces how a system was designed for Tahe's forest-fire-prevention management in Northeast China after a brief introduction to

the overall functional characteristics, the overall function flow chart and the operating environment of the forest -fire -prevention management system. firstly, and then This system design consists of seven function modules, which were geographic information system module, fire-risk each function module of the system in detail, including geographic information system module, fire forecast module, forest -fire -alarm receiving module, blazes fire-put-out-aided decision-making module, forest-fire-put-out troops sending module, loss evaluation module, forest -fire -prevention office and information management module and as well as GPS real-time monitoring module. Among all modules, the geographic information system module was the core of those fire -prevention -management system, and other various modules were carried out various functions through links with the core module, based on its function, realized link. In conclusion, that this paper summarized the whole system design work done by this paper and as well as the advantages and disadvantages of this system.

PAPER 8:

TITLE: Automatic fire alarm and fire control linkage system in intelligent buildings
AUTHOR: Wang Suli; Liu Ganlai
Published in: 2010 International Conference on Future Information Technology and Management Engineering

DESCRIPTION:

This paper described a comprehensive program of an office building intelligent systems Fire Control Linkage System subsystem design, At the same time, it described the following: the idea of the system design, the system components, selecting equipment, the linkage of alarming and controlling gas extinguishing, and the technical features. Projects under this program have been completed, can realize the intelligent prediction of fire, automatic fire alarm and linkage functions.

PAPER 9:

TITLE: Building fire rescue with evacuation management information system and its application
AUTHOR: Xu Tao; Mao Guozhu; Li Xin; Zhao Lin
Published in: 2009 16th International Conference on Industrial Engineering and Engineering Management

DESCRIPTION:

Building Fire Rescue with Evacuation Management Information System (BFREMIS) was established. And the evacuation model of BFREMIS was analyzed and presented in this paper. Based on the constructed network model, the evacuation of the teaching building in the university was analyzed by using the software EVACNET4. The analysis items included: the total evacuation time, the floor clear time, evacuation bottleneck, and the visual path of the evacuation on MAPGIS platform. BFREMIS was valuable in building safety assessment and building fire rescue.

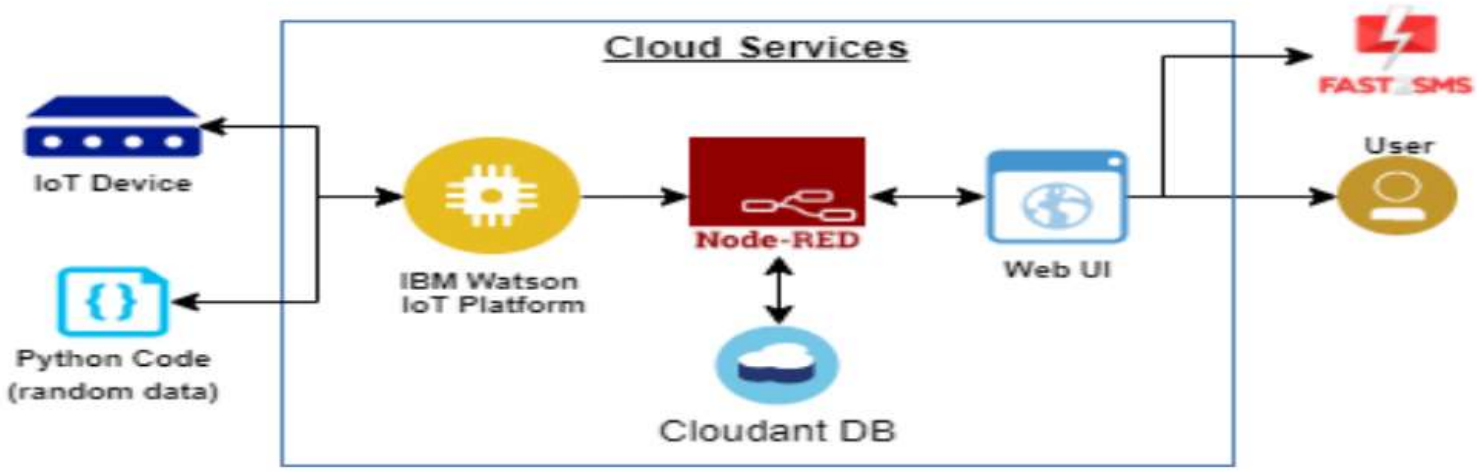
PAPER 10:

TITLE: Forest Fire Management at Aggtelek National Park Integrated Vegetation Fire Management Program from Hungary
AUTHOR: Agoston Restas
Published in: 2006 First International Symposium on Environment Identities and Mediterranean Area

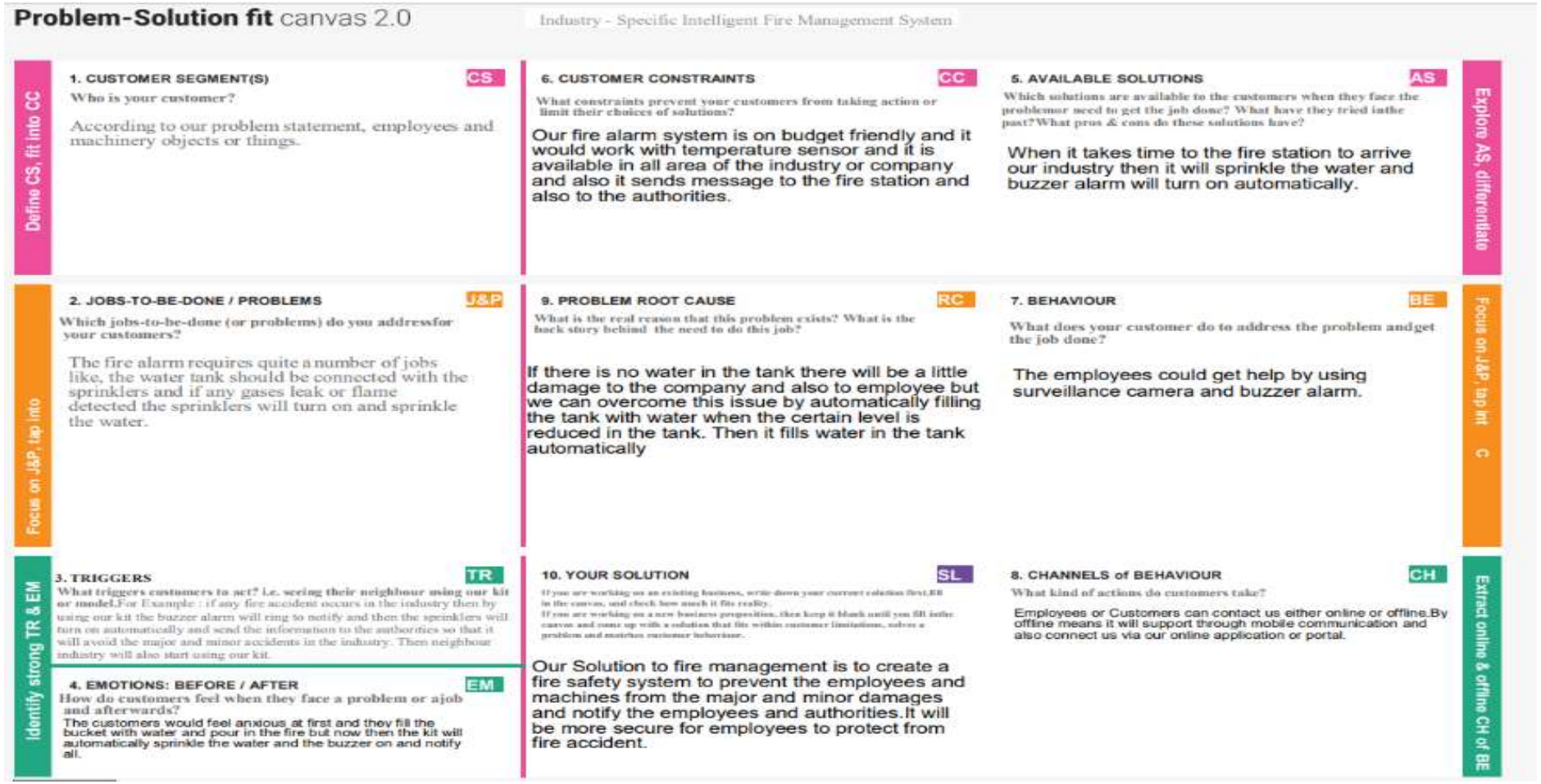
DESCRIPTION :

Szendro Fire Department is located in the northeastern part of Hungary. The main task was to fight against wildfire and mitigate the impact of fire at the Aggtelek National Park - which belongs to the UNESCO World Heritage list. In 2004 the Fire Department started a project named Integrated Vegetation Fire Management (IVFM). The IVFM consist of two main parts: Peripheries and Modules. The Modules are: Tower based environment monitoring and fire detection system, Mobile command control unit and Static and dynamic decision support system. The Tower based environment monitoring and fire detection system addressed the Fire Department by hot information. The Static and dynamic decision supported system was based on robot reconnaissance aircraft (UAV-RRA)- dynamic parts; and the GIS - static parts. The data supplied by the robot reconnaissance aircraft was combined with the GIS based fuel model and other information to predict the fire activity. The environment monitoring and fire detection system and the Dynamic part (UAV-RRA) of Decision support system based on remote sensing.

ARCHITECTURE



PROBLEM SOLUTION FIT

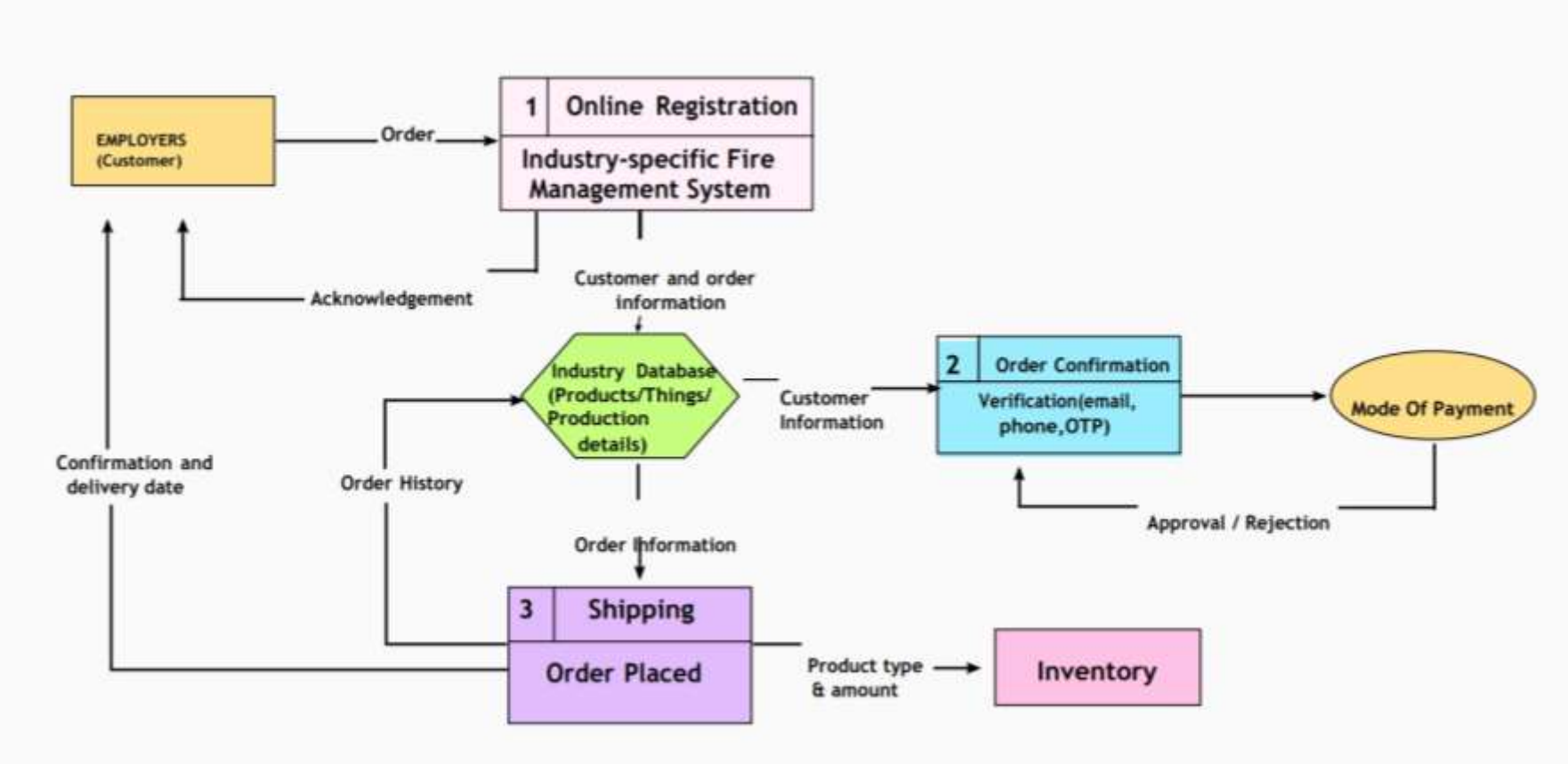


CUSTOMER JOURNEY MAP

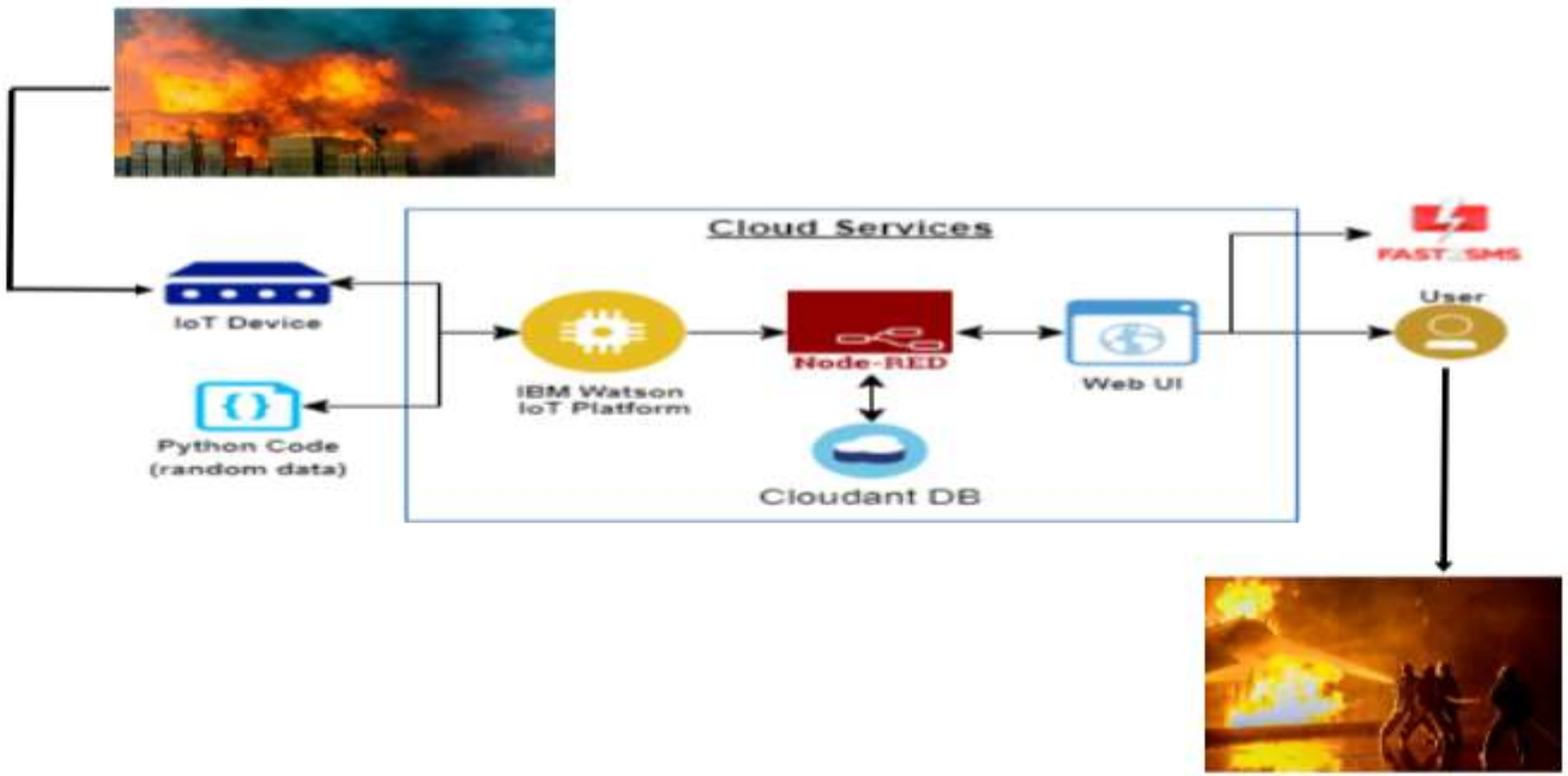
Customer Journey Map

PHASES	Motivation	Information gathering	Analyzes various products	chooses the most efficient product	Payment
Actions	Need to improve the safety from fire accident.	Wants to choose a good product to control fire accident.	Similar products to conquer or detect the fire	Smart boards are more efficient compared to static board	Satisfaction of the product
Touch points	The buyers feel stirred	After installation, the government no need to worry much about the fire safety	Customers will get attracted by multi-tasking and automation process.	After getting this the government won't worry about the fire accident	After find the product admirable, the government get's it.
Customer Feeling					
Customer Thoughts	Customer think that it will helpful to control the fire accident.	Customer thinks that it will take more time	Customer feel safeand secured by direct fire automatically	The product choosing will be easy and comfortable for customers.	They think the product will be user friendly
Opportunities	Customer gets the safety from major and minor fire accident	Customer known about the prowedure of product	The customer will be aware of other product	The customer comes to know which product is best one	The customer will enjoy the journey

FLOW DIAGRAM



SOLUTION ARCHITECTURE DIAGRAM



SPRINT-1

5

WOKWI SIMLUATION OUTPUT:

```
#include <time.h>
bool exhaust_fan_on = false;
bool sprinkler_on = false;
float temperature = 0;
int gas = 0;
int flame = 0;
String flame_status = "";
String accident_status = "";
String sprinkler_status = "";
void setup() {
Serial.begin(9600);
}
void loop() {
//setting a random seed
srand(time(0));
//initial variable
temperature = random(-20,125);
gas = random(0,1000);
int flamereading = random(200,1024);
flame = map(flamereading,0,1024,0,2);
//set a flame status
switch (flame) {
case 0:
flame_status = "No Fire";
Serial.println("Flame Status : "+flame_status);
break;
case 1:
flame_status = "Fire is Detected";
Serial.println("Flame Status : "+flame_status);
break;
}
//Gas Detection
if(gas > 100){
```

```
Flame Status : No Fire
Gas Status : Gas leakage Detected
Sprinkler Status : not working
Exhaust fan Status : Working

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Flame Status : Fire is Detected
Gas Status : Gas leakage Detected
Sprinkler Status : working
Exhaust fan Status : Working

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Flame Status : Fire is Detected
Gas Status : Gas leakage Detected
Sprinkler Status : working
Exhaust fan Status : Working
```
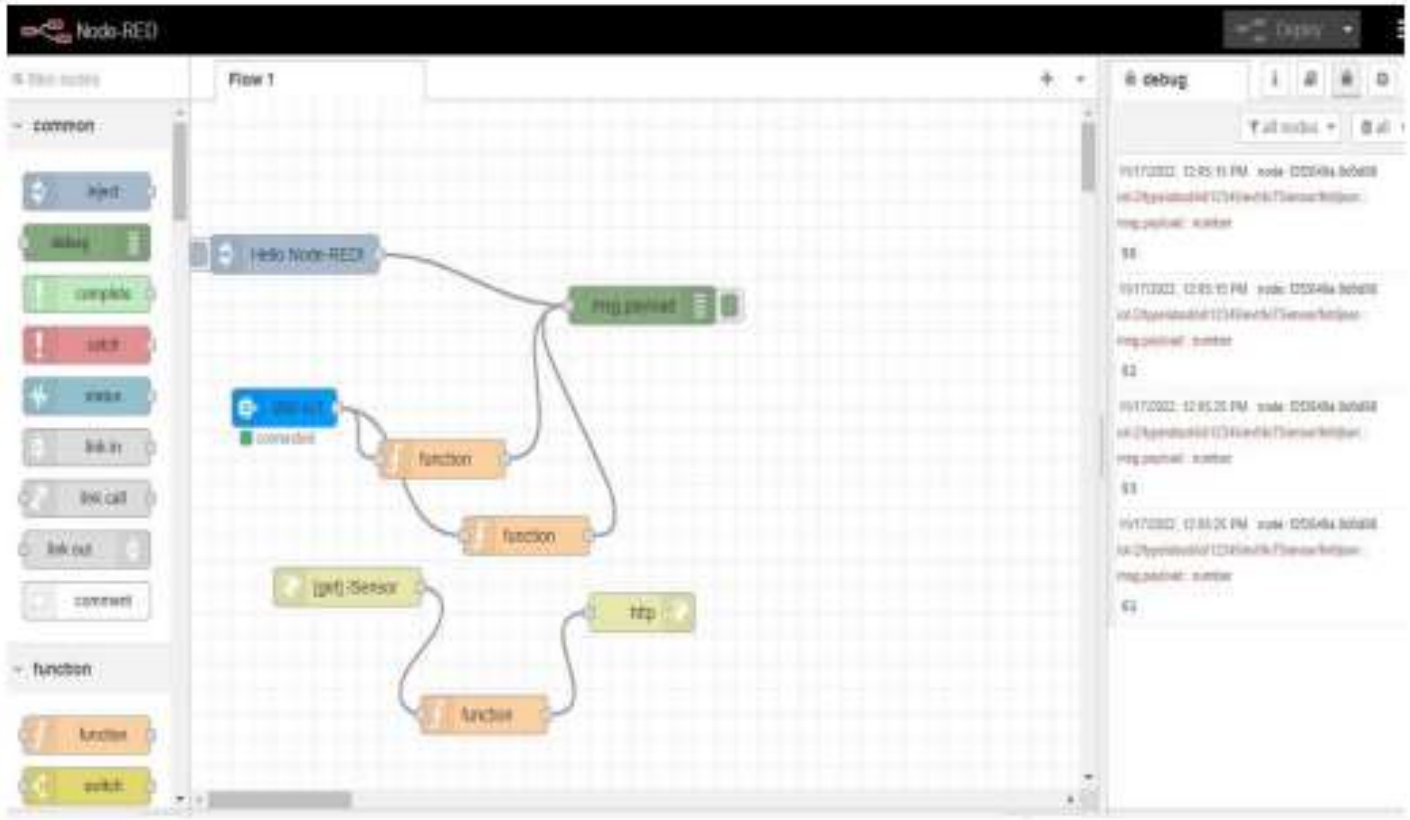
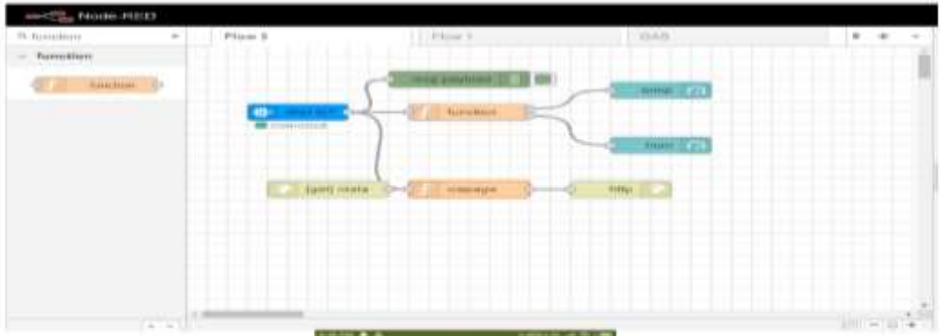
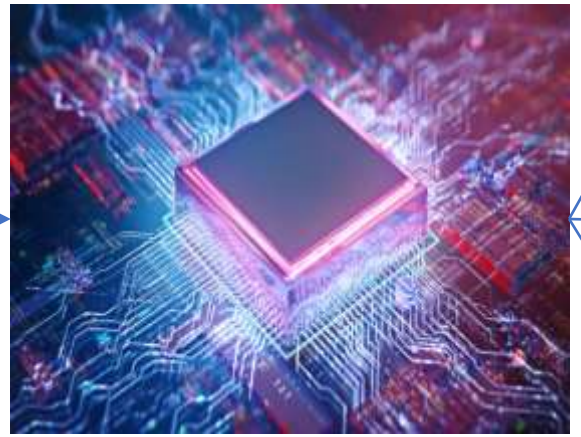

SPRINT-2


Node-RED
Flow 1
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
switch
Hello Node-RED!
msg.payload
function
function
[get] Sensor
http
function
debug

SPRINT-3



SPRINT-4




SMS
ALERTS


Thank
You