TEAM ID –PNT2022MID06432 Project Report

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# INTRODUCTION

* 1. **Project Overview**

The project implemented using IOT that predict traffic , rainfall ,ambulance dectection ,human present in road , any alert sound . Using arduino UNO interface with sensors, buzzer, LED etc. Sensor such as Ultrasonic sensor , Temperature sensor , PIR sensor. The user will see the display on SMART SIGNS on the road . The device we designed UI (WEB based Application) given to the traffic controller. They display on SIGNS. The main advantages of the project is prevent the traffic ,give path to ambulance , in rainy days give instruction to the driver about weather using open weather app they go fast or slow.

* 1. **Purpose**

The purpose of the project is make easy road travel with IOT devices. It also save lives. In this UI we have information of temperature , sound ,human dectection . It makes travel easer.

# LITERATURE SURVEY

* 1. **Existing Problem**

In present Systems the road signs and the speed limits are Static. But the road signs can be changed in some cases. We can consider some cases when there are some road diversions due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalized.

The early effects to prevent road accidents and to ensure road safety includes the use of speed detection devices,CCTVs,speed limiters and emergency accident units as the first phase.Despite achieving the state-ofthe- art performance, the existing systems suffer from two main problems.

* + - Over Speed : These systems cannot control speed at some specific zones.
    - Exact location of accident occured: These systems cannot give the precise location of accident .
  1. **References**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Authors** | **Type** | **Avail ability** | **Research** | **Findings** |
| Houser  ,Pierowicz  ,& Fuglewicz (2005) | FMC SA  repo rt | Pub lic | Areporttoprovideabett erunderstandingofthef un ctionofon- boardsafetysystemsa ndprovideinsightintoth esa  fetyandefficiencybenefitsof usingsuchsystems. | Describestheconceptofoperationsandthe voluntaryrequirementsfortheuseofVSS forlargetrucksgreaterthan10,000 pounds GVWR . |
| Berg  ,Nie woh ner, Burk le,& Mor schh euse r  (2001) | Jour nal articl e | Pub lic | Aninvestigationof109real lifetruckcrashesandacra s  htestinvolvingaMerce des- BenzActros. | Safetybeltsinheavytruckshaveapotentialto savedriversandpassengers.Ejected truck occupant shave the greatest probability of beingk ill lEdina crash. |
| Trevorrow &Eady(20 10) | Austr alian road s repor t | Pub lic | Areporttoimproveknowl edgeandunderstanding of heavyvehiclebrakesafet yonlongsteepandveryst e eproads. literature review ,review of crash data  ,and a vehicle test | Advancedbrakingsystemsofferincreaseds afetyinanemergencyonsteeproadsduet otheautomaticapplicationoftheserviceb rakespreventingroll-overorrun-off- roadcrashes.  Whilebrakefailurecrashesaccountedfo rlessthanonequarteroffataltruck crashes  ,break failure crashes were found to be mores curious.  Fatal break failure crashes were more likely on horizontal curves ,how ever brake failure crashes on acombination of horizontal curveandverticalgradeweremoreseriousth anthoseoccurringonverticalgradealon e. Themainsafetyissuehighlightedwasth edrivers'interactionwiththeauxiliarybra ki ngsystem.Inadequateownersman ualinformationandalackofreal- timedriverfeedbackregardingtheperfor mance(orlackthereoofbrakeswereiden  ti |
| Lam bert & Rech nitzer (2002  ) | MU ARC  repo rt | Pub lic | A review and report of the Issue of rear and side under run crashes. | Twomajoreffectsofunderrunontheoutc omesofcrasheswereidentified:underru n canexposelightvehicleoccupantstothe rigidstructuresofthetruckbeforethesaf et yfeaturesofthelightvehiclecomeintoeff ect;anddamagetoheavyvehiclecompo |

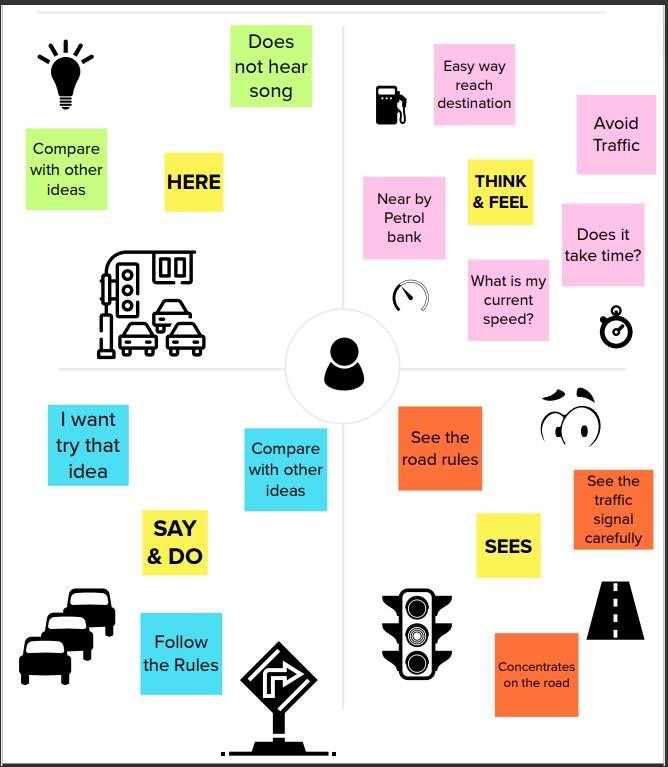
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | n ents(e.g.,steering,braking,etc.) can reduce the controllability of the truck during or after the crash.  Thereislittleevidencesuggestingthatimprov ementsintruckunderrunprotectioncan notbeachieved.  Thereissomeevidencethatenforcementofunde rrunrequirementsandstandardsislac king. Performanceoffrontbarriersmusthave asignificantlyhigherstandard,atleast twice that of rear under run barriers.  The requirements of barriers should extend to vehicles of 3.0tonnesGVM. |
| Hart(2010  ) | Conf eren ce  pape r | Pub lic | Describesthedevelopmentof theAustralianbrakebal ancecodeofpracticetoguidet heintermixingofbraket echnologiesonheavyvehicle combinationvehicles. | Awiderangeofbrakingtechnologiescannow beintermixedoncombinationvehicles,e. g.,advancedelectroniccontrolsarebeingco nnectedtobasicvehicles.Therecommen dedperformancelevelsetoutbythecodeisth atacombinationvehiclebeabletoachieve aninstantaneousdecelerationlevelonase aled60km/h |

* 1. **Problem Statement Definition**

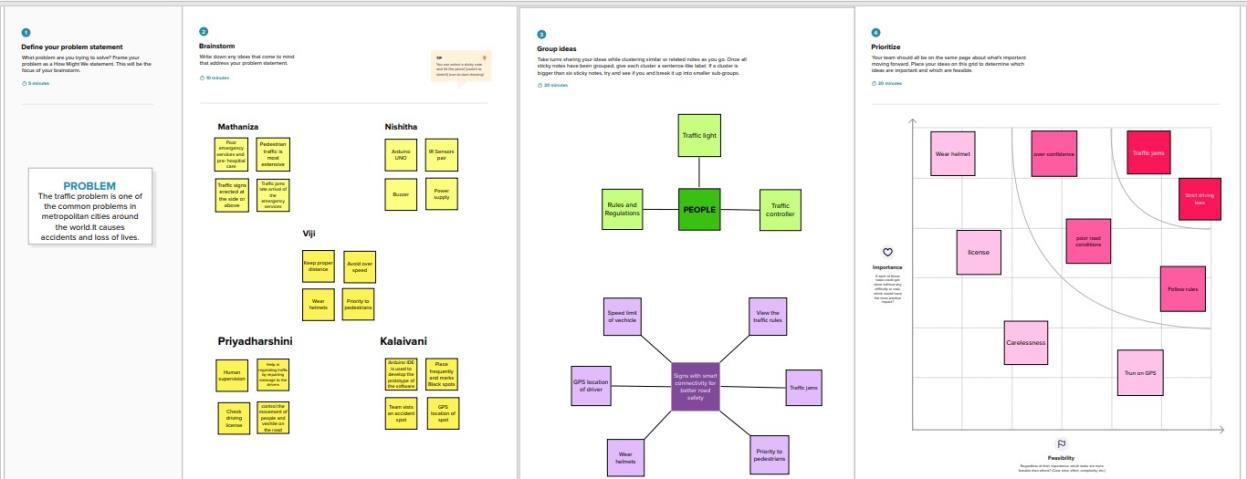
The traffic problem is one or the common problems in metropolitan cities around the world. It causes accidents and loss of lives .We cannot control the occurrences of accidents but taking precautions to avoid life threatening injuries due to road accident is in our hands-by wearing helmet.

# IDEATION & PROPOSED SOLUTION

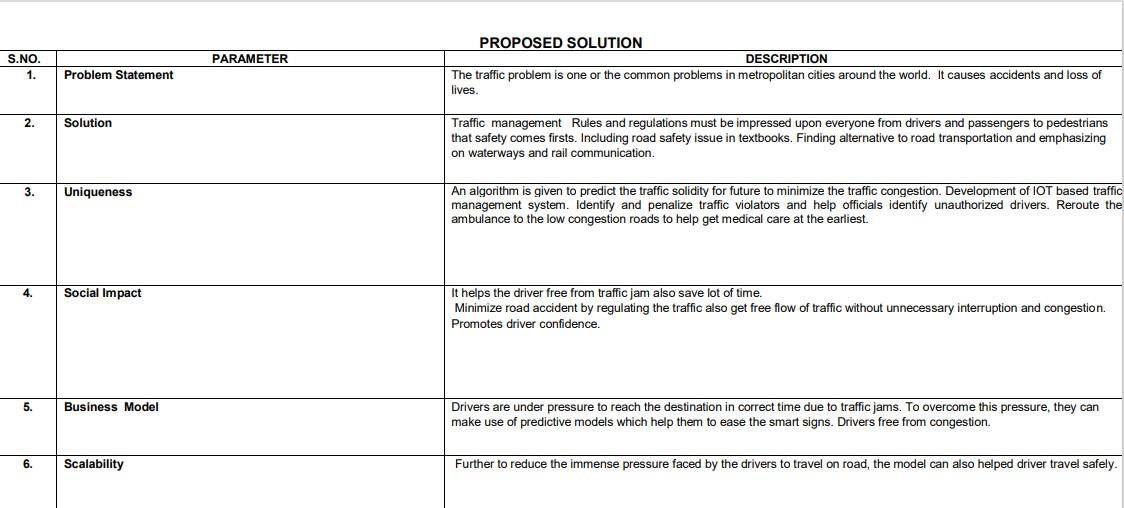
* 1. **Empathy Map Canvas**



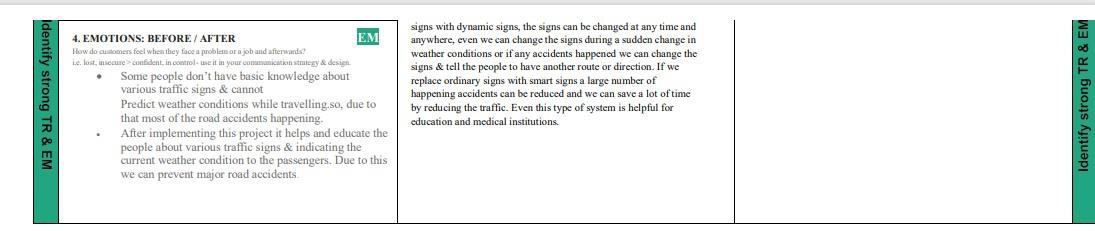
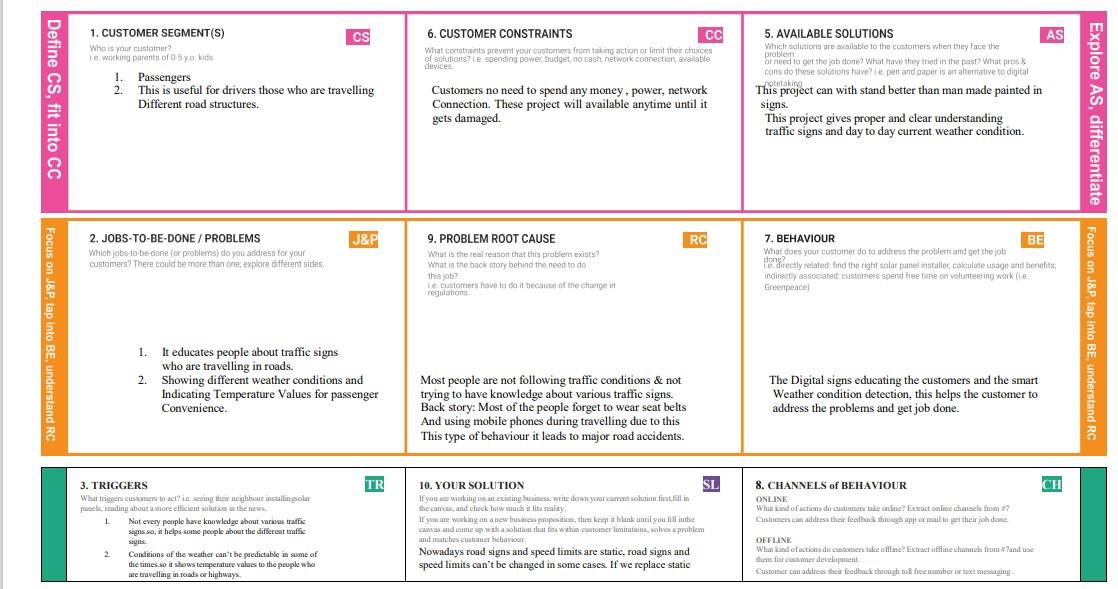
* 1. **Ideation and Brain storming**



* 1. **Proposed Solution**



* 1. **Problem Solution Fit**



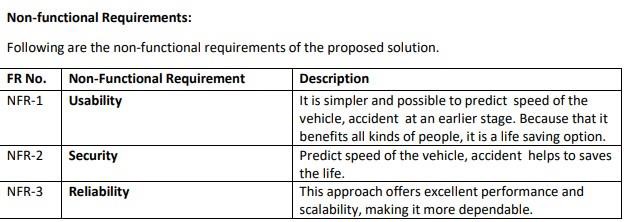
# REQUIREMENT ANALYSIS

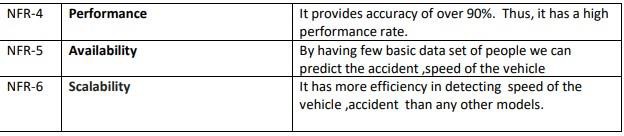
* 1. **Functional Requirement**

|  |  |  |
| --- | --- | --- |
| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub- Task) |
| FR No.1 | Drivers and number of passenger on the vehicle | Number of passenger on the vehicle are noted |
| FR No.2 | Predicting vehicle speed using sensors | IR sensor, Proximity sensor etc |
| FR.No.3 | Pre-processing the speed of vehicle | Determination of Moving Vehicle speed using Image Processing |

|  |  |  |
| --- | --- | --- |
| FR.No.4 | Classification of sensor | A few examples of analog sensors are: accelerometers, pressure sensors, light, and sound sensors. Digital Sensors (also known as electronic or electrochemical sensors) convert |
|  |  | the data transmission, digitally.  Examples include digital accelerometers, pressure, and temperature sensors |
| FR.No.5 | Building and training the system | The proposed system uses a set of ultrasonic sensors and has two modules: one for vehicle monitoring and other for priority management. |
| FR.No.6 | Testing the model | In this phase, we tested the accuracy of the models with the test dataset that was formed in previous phase and the most accurate model is figured out. |

* 1. **Functional Requirement**

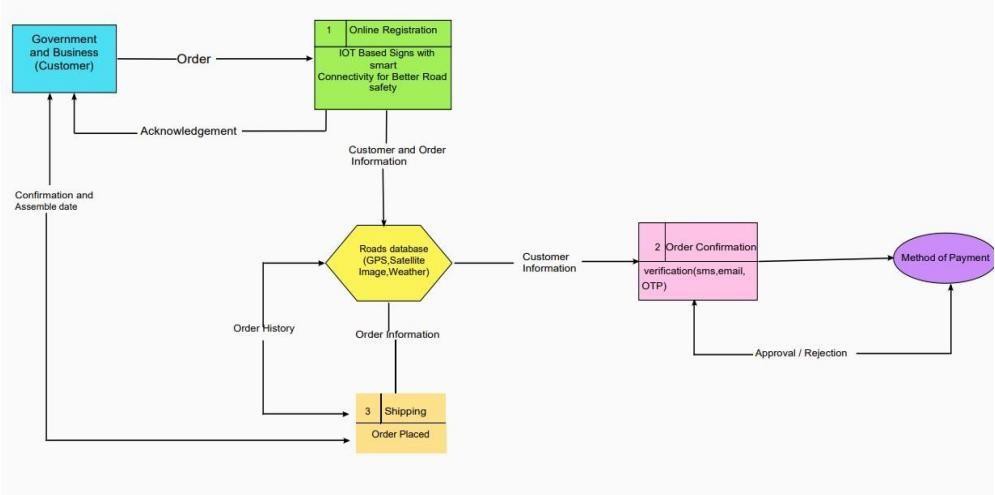




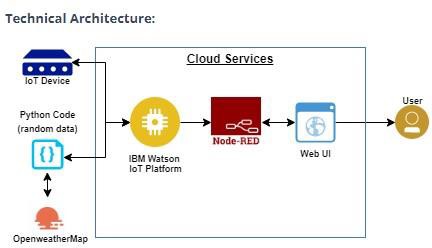
# PROJECT DESIGN

* 1. **Data Flow Diagram**

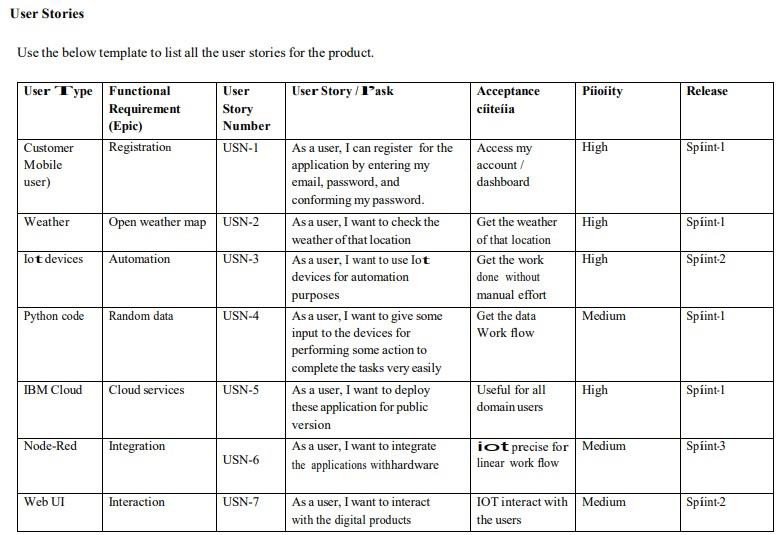
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the light amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



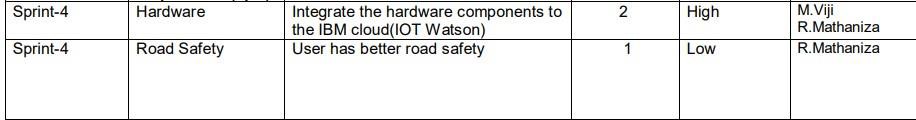
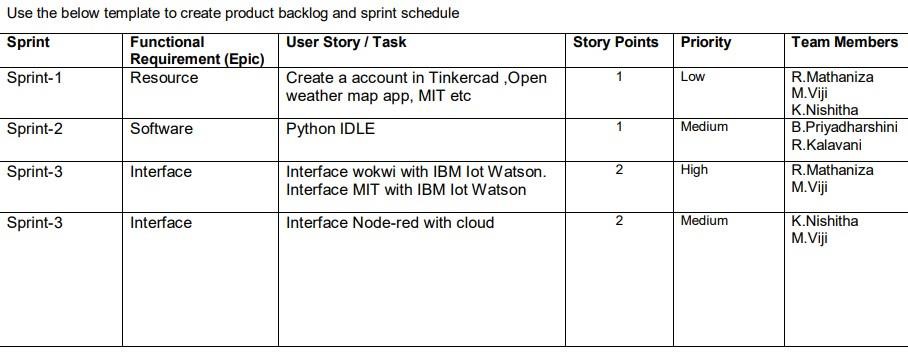
* 1. **Solution and Technical Architecture**



* 1. **User Stories**



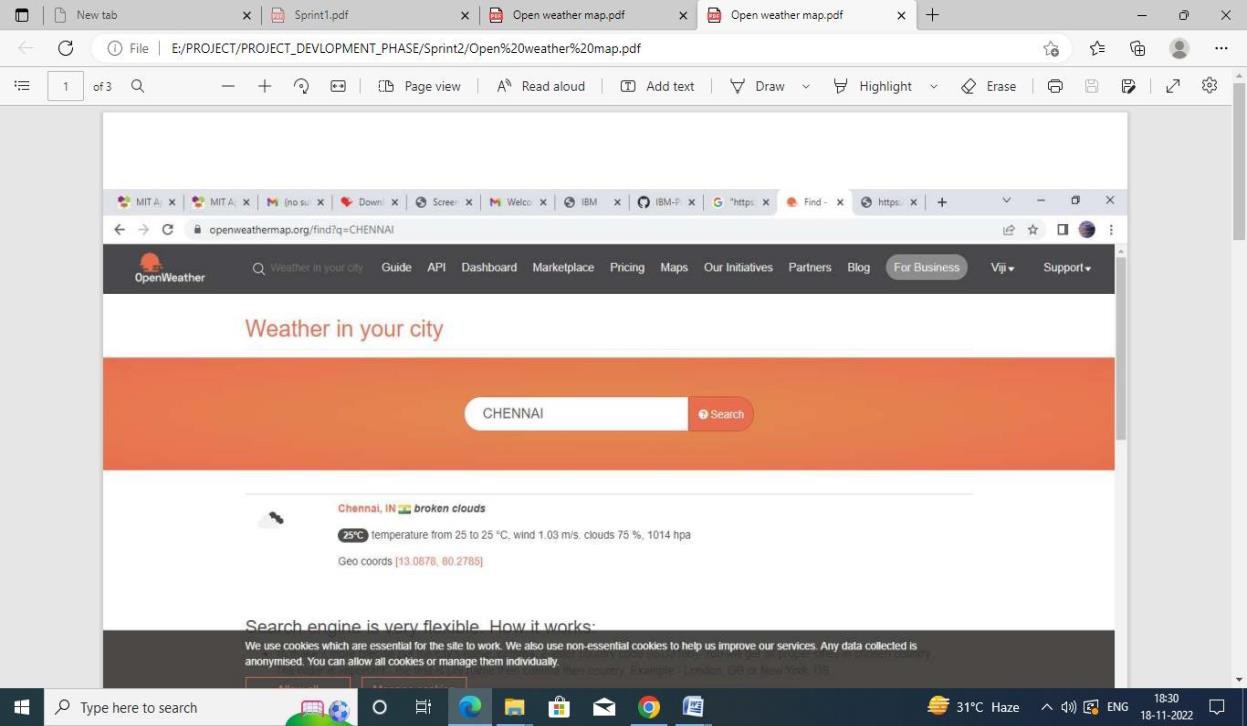
# PROJECT PLANNING & SCHEDULING

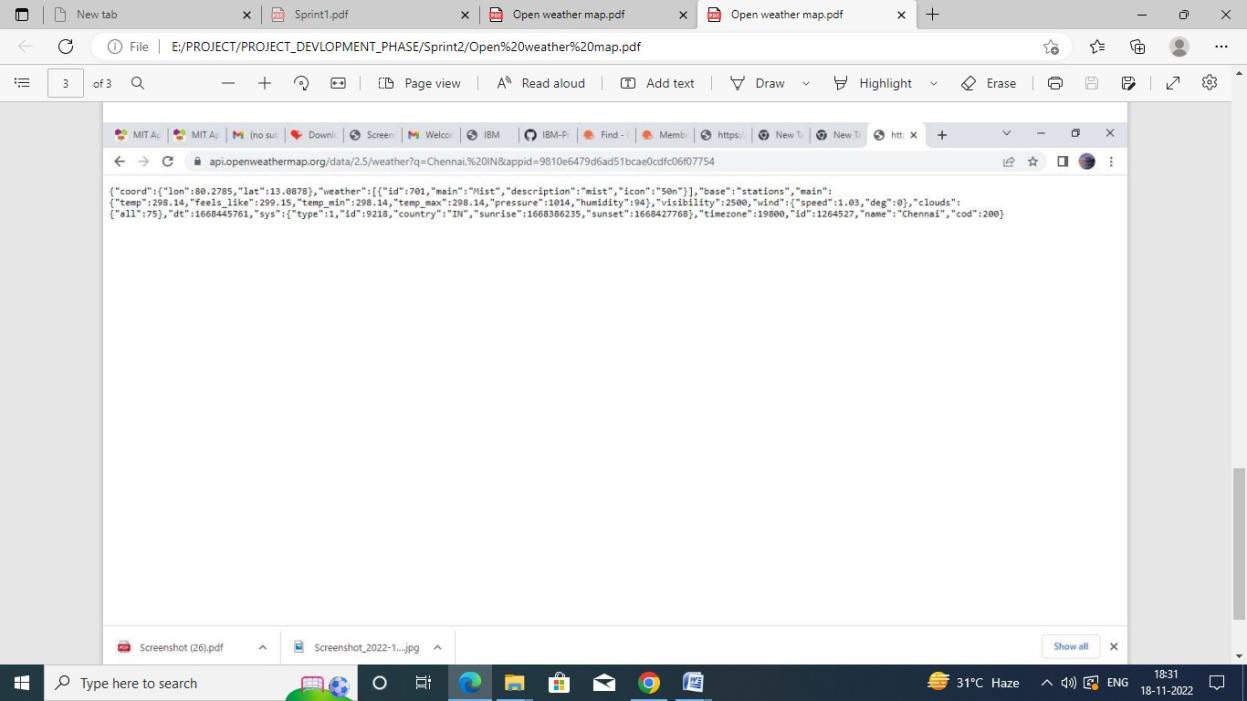
* 1. **Sprint Planning and Estimation**
  2. **Sprint Delivery Schedule**



1. **CODING & SOLUTIONING (Explain the features added in the project along with code) 7.1 Feature1**

# OPEN WEATHER MAP





**Coding**

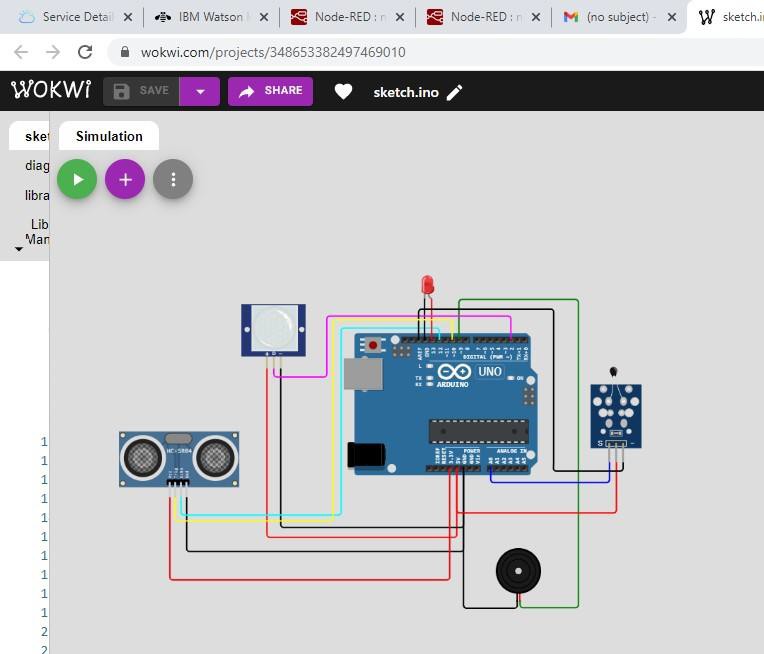
import requests #importing a library #replace the url and it should be in ""

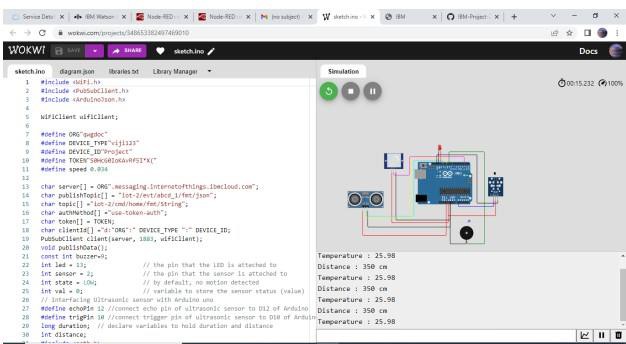
a="https://api.openweathermap.org/data/2.5/weather?q=Chennai,%20IN&appid=bc453a0b339cb9ee1ad10 d2dd64d0bc0"

r=requests.get(url=a) print(r)

**7.2 Feature2**

**Wokwi**





**Coding**

#include <WiFi.h> #include <PubSubClient.h> #include <ArduinoJson.h>

WiFiClient wifiClient; #define ORG"qwgdoc"

#define DEVICE\_TYPE"viji123"

#define DEVICE\_ID"Project" #define TOKEN"S0HcG0IoKAvRf5I\*X(" #define speed 0.034

char server[] = ORG".messaging.internetofthings.ibmcloud.com"; char publishTopic[] = "iot-2/evt/abcd\_1/fmt/json"; char topic[] ="iot- 2/cmd/home/fmt/String"; char authMethod[] ="use-token-auth"; char token[] = TOKEN; char clientId[] ="d:"ORG":" DEVICE\_TYPE ":" DEVICE\_ID; PubSubClient client(server, 1883, wifiClient); void publishData(); const int buzzer=9; int led = 13; // the pin that the LED is atteched to int sensor = 2; // the pin that the sensor is atteched to int state = LOW; // by default, no motion detected

int val = 0; // variable to store the sensor status (value)

// Interfacing Ultrasonic sensor with Arduino uno

#define echoPin 12 //connect echo pin of ultrasonic sensor to D12 of Arduino #define trigPin 10 //connect trigger pin of ultrasonic sensor to D10 of Arduino long duration; // declare variables to hold duration and distance int distance;

#include <math.h>

int sensorPin = A0; // select the input pin for the potentiometer

double Thermistor(int RawADC) { double Temp;

Temp = log(10000.0\*((1024.0/RawADC-1)));

Temp = 1 / (0.001129148 + (0.000234125 + (0.0000000876741 \* Temp \* Temp ))\* Temp );

Temp = Temp - 273.15; // Convert Kelvin to Celcius

//Temp = (Temp \* 9.0)/ 5.0 + 32.0; // Convert Celcius to Fahrenheit return Temp;

}

// the setup function runs once when you press reset or power the board void setup() {

// initialize digital pin LED\_BUILTIN as an output. pinMode(buzzer, OUTPUT);

// PIR Sensor pinMode(led, OUTPUT); // initalize LED as an output pinMode(sensor, INPUT); // initialize sensor as an input **Serial**.begin(9600); // initialize serial

pinMode(trigPin,OUTPUT); //set trigPin as output pin of Arduino pinMode(echoPin,INPUT); //set echoPin as output pin of Arduino

}

// the loop function runs over and over again forever void loop() { val = digitalRead(sensor); // read sensor value if (val == HIGH) { // check if the sensor is HIGH digitalWrite(led, HIGH); // turn LED ON

delay(500); // delay 100 milliseconds

if (state == LOW) {

**Serial**.println("Motion detected!"); state = HIGH; // update variable state to HIGH

} } else { digitalWrite(led, LOW); // turn LED OFF delay(500); // delay 200 milliseconds

HIGH){

if (state ==

**Serial**.println("Motion stopped!"); state =

LOW; // update variable state to LOW

}

}

digitalWrite(trigPin,LOW); //generate square wave at trigger pin

delayMicroseconds(2); digitalWrite(trigPin,HIGH); delayMicroseconds(10); digitalWrite(trigPin,LOW); duration=pulseIn(echoPin,HIGH);//calculation of distance of obstacle distance=(duration\*0.034/2); **Serial**.print("Distance : "); **Serial**.print(distance);

**Serial**.println(" cm "); delay(1000); int readVal=analogRead(sensorPin); double temp = Thermistor(readVal); **Serial**.print("Temperature : ");

**Serial**.println(temp); // display tempature

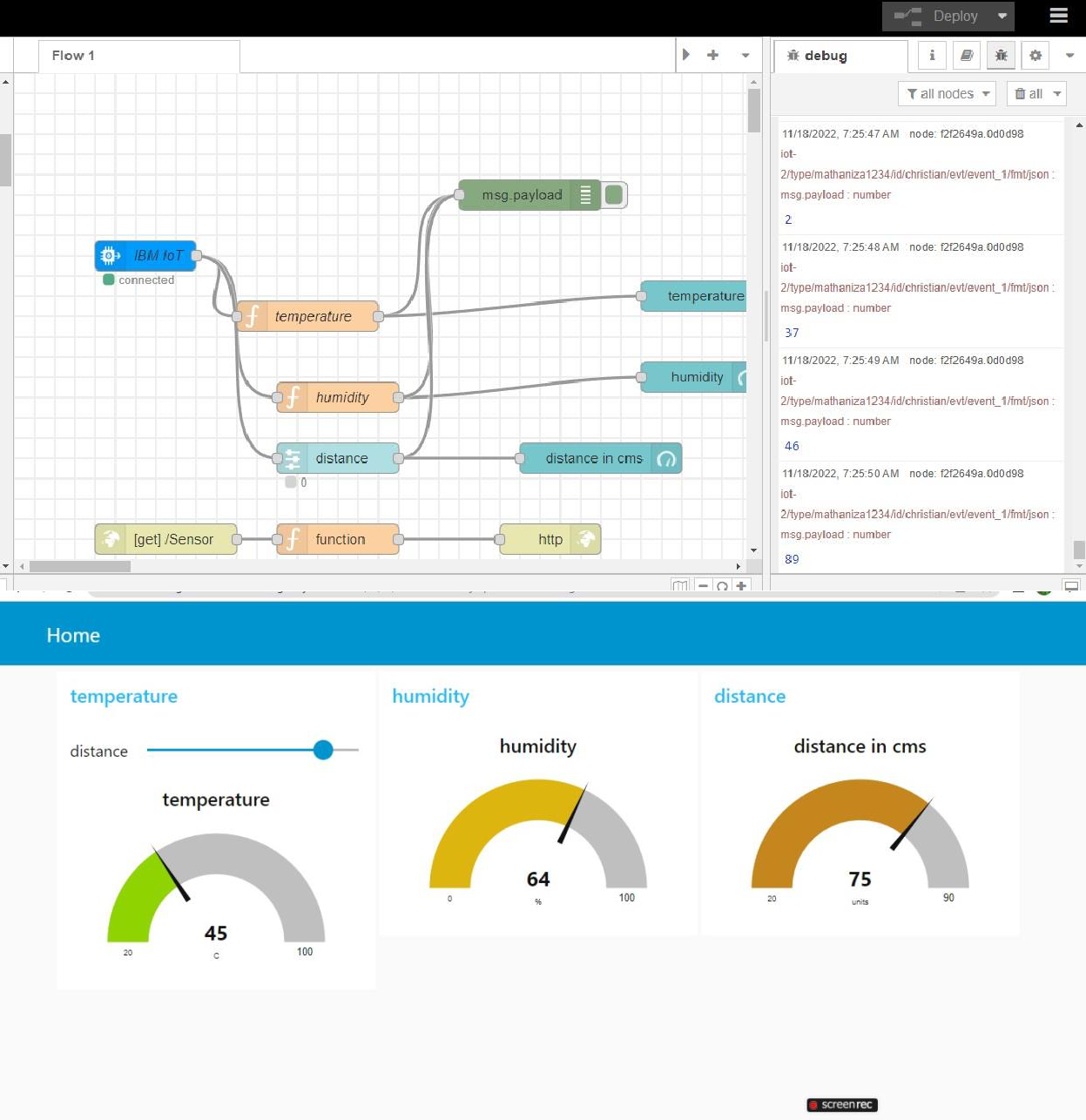
//Serial.println(readVal); // display tempature

delay(500); digitalWrite(buzzer, HIGH); // turn the LED on (HIGH is the voltage level) delay(1000); // wait for a second digitalWrite(buzzer, LOW); // turn the LED off by making the voltage LOW delay(1000); // wait for a second

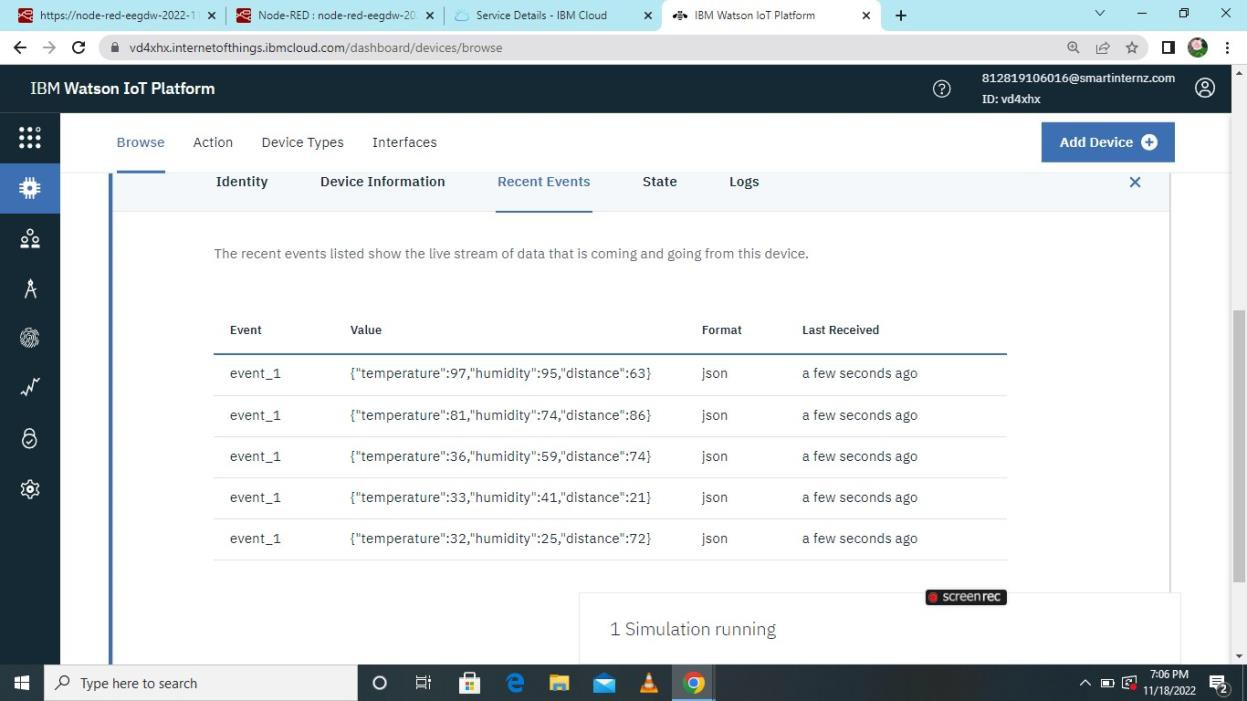
}

# TESTING

* 1. **Test Cases**

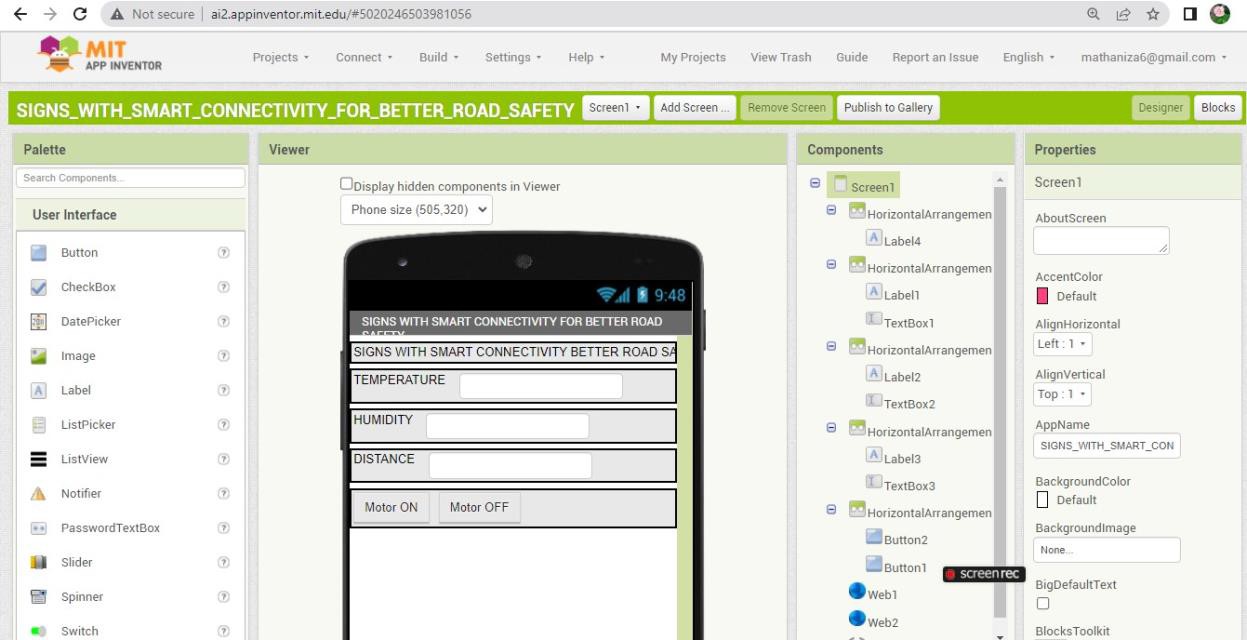


**IBM Cloud output**



* 1. **User Acceptance Testing**

**MIT APP Inventor**



# RESULTS

* 1. **Performance Metrics**

**Mobile view of user**

SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFEl



- - .....

- - - ...

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.. .. -

SIGNS WITH SMART CONNECTIVITY BETTER ROAD SAFETY TEMPERATURE 37

HUMIDITY *38*

DISTANCE ***44***

Motor ON Motor OFF

D <I

# ADVANTAGES AND DISADVANTAGES



1. **CONCLUSION**

We have presented a system, to alert the driver about the speed limits in specific areas and reduce the speed of the vehicles in sensitive public zones without any interference of the drivers where controls are taken automatically by the use of a wireless local area network. In the initial phase, we designed the basic block and circuit diagram for the system. In the implementation phase, we executed the Stimulation with the help of IoT connecting tecnologies such as MIT APP. Extensive experiments conducted on IoT and other connecting technologies.

# FUTURE SCOPE

We can be enhanced this system by implementing camera using Raspberri pi, GSM module in case of network unavailability and low RAM module/zigbee module for long range communication.

1. **APPENDIX Source code**

import time import sys

import ibmiotf.application import ibmiotf.device

#provide your ibm watson Device credentials organization = "vd4xhx" devicetype="mathaniza1234" deviceid="christian" authmethod="token" authtoken="JLJdQ8p?5Rizji2Xa"

#Initialize GPIO def

myCommandCallBack(cmd):

print("Command received: %s"% cmd.data('command') print(cmd)

/\*

PIR sensor tester

\*/

(9600);

} void loop() {int ledPin = 13; // choose the pin for the LED int inputPin = 2; // choose the input pin (for PIR sensor) int pirState = LOW; // we start, assuming no motion detected int val = 0; // variable for reading the pin status

void setup() { pinMode(ledPin, OUTPUT); // declare LED as output pinMode(inputPin, INPUT); // declare sensor as input

Serial.begin val = digitalRead(inputPin); // read input value if (val == HIGH) { // check if the input is HIGH digitalWrite(ledPin, HIGH); // turn LED ON

if (pirState == LOW) {

// we have just turned on Serial.println("Motion detected!");

// We only want to print on the output change, not state pirState = HIGH;

} } else { digitalWrite(ledPin, LOW); // turn LED OFF if (pirState == HIGH) {

// we have just turned of Serial.println("Motion ended!");

// We only want to print on the output change, not state pirState = LOW;

}

}

}

import

json

#replace the url and it should be in"" a="https://api.openweathermap.org/data/2.5/weather?q=chennai,%20IN&appid=bc453a0b339cb9ee1ad10d2dd64d0bc0" r=requests.get(url=a) print(r) data =r.json () tem=data ('main')('h') print(tem)

/\*

HC-SR04 Ultrasonic Sensor Example.

Turn the LED on when an object is within 100cm range.

Copyright (C) 2021, Uri Shaked

\*/

#define ECHO\_PIN 2

#define TRIG\_PIN 3

void setup() { Serial.begin(115200);

pinMode(LED\_BUILTIN, OUTPUT); pinMode(TRIG\_PIN, OUTPUT); pinMode(ECHO\_PIN, INPUT);

} float readDistanceCM() { digitalWrite(TRIG\_PIN, LOW); delayMicroseconds(2); digitalWrite(TRIG\_PIN, HIGH); delayMicroseconds(10); digitalWrite(TRIG\_PIN, LOW); int duration = pulseIn(ECHO\_PIN, HIGH); return duration \* 0.034 / 2;

} void loop() { float distance = readDistanceCM();

bool isNearby = distance < 100; digitalWrite(LED\_BUILTIN, isNearby);

Serial.print("Measured distance: "); Serial.println(readDistanceCM());

delay(100);

}

DEMO using the server test.mosquitto.org

You can use any MQTT client with the following settings Server : test.mosquitto.org no login / no password

port: 1883 or 8081 for websocket Topic: /AnnexTest

Subscribe: /AnnexTx

Or you can use the free MQTT online client https://[www.cicciocb.com/MQTT/](http://www.cicciocb.com/MQTT/)

this is already configured so just

* click on Connect
* write your message in "Publish Message"
* Press "Publish" to send your message that will be shown in the scrolling display
* Click on Subscribe to receive the temperature sensor data

# Disconnect the device and the application from the cloud devicecli.disconnect()

**GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-20790-1659763214 DEMO LINK:** [https://drive.google.com/file/d/1DTZk3AGML1iaFbhNa-](https://drive.google.com/file/d/1DTZk3AGML1iaFbhNa-Tm3wNQ6xPG6bbV/view?usp=share_link)

[Tm3wNQ6xPG6bbV/view?usp=share\_link](https://drive.google.com/file/d/1DTZk3AGML1iaFbhNa-Tm3wNQ6xPG6bbV/view?usp=share_link)