

Project Report

Date	18 November 2022
Team ID	PNT2022TMID49512
Project Name	Signs with smart connectivity for better road safety.

INTRODUCTION

1.1 Project Overview

This project will concentrate on the detection of traffic congestion on highways. So it is important to detect the vehicle count properly. A traffic sign recognition method is proposed, which mainly aims at detecting traffic signs. By using NFC (Near Field Communication) technology, traffic sign detection, recognition, and this method can effectively detect and identify traffic signs.

1.2 Purpose

By implementing this project, we can avoid the traffic in the country and we can avoid the accidents and prevent human death or reduce the heavy injuries.

2. LITERATURE SURVEY

2.1 Existing problem

Accident due to human factors, heavy traffic congestion and poor road conditions.

2.2 References

1) Ching-Hao Lai, Chia-Chen Yu, "An Efficient Real-Time Traffic Sign Recognition System for Intelligent Vehicles with Smart Phones", IEEE International Conference on Technologies and Applications of Artificial Intelligence, 2010.

2) P. Shopa, Mrs. N. Sumitha, Dr. P.S.K Patra. (2014), Traffic Sign Detection and Recognition Using OpenCV", International Conference on ICICES2014 - S.A. Engineering College, Chennai, Tamil Nadu, India. Dr. D. Y. Patil.,,, Advanced NFC technology and the Recognition for Driver Assistance Systems"

2.3 Problem Statement Definition

In present systems the road signs and the speed limits are static. 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. Alcohol consumption is also the major reason for accidents to occur which might result in the loss of life of a driver

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

Gain insight and understanding on solving customer problems.

What do they HEAR?
what friends say
what bosses say
what influencers say

- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"

What do they SEE?
environment
friends
what the market offers

- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"

What do they SAY AND DO?
attitude in public
appearance
behavior towards others

- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"

PAIN
frustrations
obstacles

- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"

GAIN
sources of success
measures of success
obstacles

- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"
- to avoid being called "dirty" or "gross"
- to avoid being associated with "dirty" or "gross"

Share your feedback

[illegible]

3.3 Proposed Solution

**Project Design Phase-I
Proposed Solution Template**

Date	24 September 2022
Team ID	PN72022TMI049512
Project Name	IOT- Signs with smart connectivity for better road safety.
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> ❖ Arun is an car driver, he needs to control the vehicles speed by using NFC technology to avoid the accidents.
2.	Idea / Solution description	<ul style="list-style-type: none"> ❖ Using magnetic sensor for detection of vehicle count properly.To develop a protocol between sensor nodes for communication traffic congestion. ❖ Near Field Communication (NFC) tag must be placed in all vehicles.
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> ❖ Near Field Communication(NFC) is a technology that use for the purpose of identification and tracking using radio waves. ❖ NFC tags are passive devices that can be used to communicate with active NFC devices. ❖ NFC reader reads the data from NFC tags.
4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> ❖ Drivers can receive updated information on the road traffic, weather conditions and decreasing breakdowns and therefore prevent accidents. ❖ Reducing the rate of accidents. ❖ To provide more efficient travel to the peoples . ❖ It helps to reduce the accidental death rate.
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> ❖ NFC technology deals with traffic offences and improvement of both active and passive vehicle safety to the customers. ❖ NFC tags are available in low cost and it gives the more satisfaction to the customers. ❖ Simultaneous multiple detection of vehicles are possible using NFC. ❖ This technology will improves better road safety performance to the society.

6.	Scalability of the Solution	<ul style="list-style-type: none"> ❖ Multi task convolution neutral network and ROI based system could be accelerated using the GPU,to improve efficiency. ❖ Ultrasonic sensor used to detect object distance and vehicles speed will control through object distance level. ❖ NFC technology brings more benefit to the customers satisfaction.
----	-----------------------------	---

3.4 Problem Solution fit

Problem-Solution fit canvas 2.0

Purpose / Vision

Understand, understand AS	1. CUSTOMER SEGMENT(S) Who is your customer? Those who are facing risk from road traffic are pedestrians, drivers and vehicle passengers.	4. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices? Customers are hesitate to use NFC, because the power consumption is comparatively more in NFC enabled devices. NFC is not so advantageous for some users due to complex procedures which programmed in this device.	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem to target the job done? What have they tried in the past? What worked? This NFC technology can effectively detect and identify traffic sign. In the past, they used speed reduction system PROS: It reduce traffic fatalities, serious injuries. CONS: Sometimes this speed reduction will cause more traffic	Explore AS
	2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customer? Our job is to make the customers to install the NFC tag in their vehicles to avoid accidents and reduce death rates.	9. PROBLEM ROOT CAUSE What is the root cause that this problem? Main cause of accidents and crashes are due to human errors. Over speeding, inadequate road markings, broken vehicles can be avoided by using some tracking sensors with the help of NFC technology.	7. BEHAVIOUR i.e. directly extend: find the right sensor panel installer, activate usage and The customer needs to create a larger loop in the reader antenna to increase the read range.	
Focus on J&P, use into BE	3. TRIGGERS What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. NFC works without battery and connect instantly for data exchange.	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first, fit in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fit in the canvas and come up with a solution that fits within customer behaviour, solve a problem and matches customer behaviour. By using this NFC technology, accident can be detected early. Customers solve their problem by installing the NFC tag in their vehicles.	8. CHANNELS of BEHAVIOUR a. ONLINE What kind of actions do customers take online? Extract online channels from #7 Customers can buy this product online easily and they can also see the details and features of NFC reader in the website.	Focus on J&P, use into BE
	4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure, confident, in control - use it in your communication strategy & design. Before using this NFC technology, they face congestion in traffic, injuries and feel insecurity such as fatigue and fears. After using this technology, security becomes high and personalize their environments.	11. CHANNELS of BEHAVIOUR b. OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. People can buy this NFC reader in the stores and they will be given user manual on how to use this product and we are providing services also in case any damages occurs in future.		
Identify strong TR & EM			Extract online & offline CH of BE	

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	NFC tag	Connect to your car with an NFC tag via bluetooth.
FR-2	Smartphone	Smartphone will automatically connect to radio or headset.
FR-3	LCD Display	Used to display the locations.
FR-4	Arduino	Control and transfer the data to NFC module.
FR-5	NFC reader	Read the data from NFC tag and send the details to controller.
FR-6	Ultrasonic sensor	Vehicles speed will control through object distance level.

4.2 Non-Functional requirements

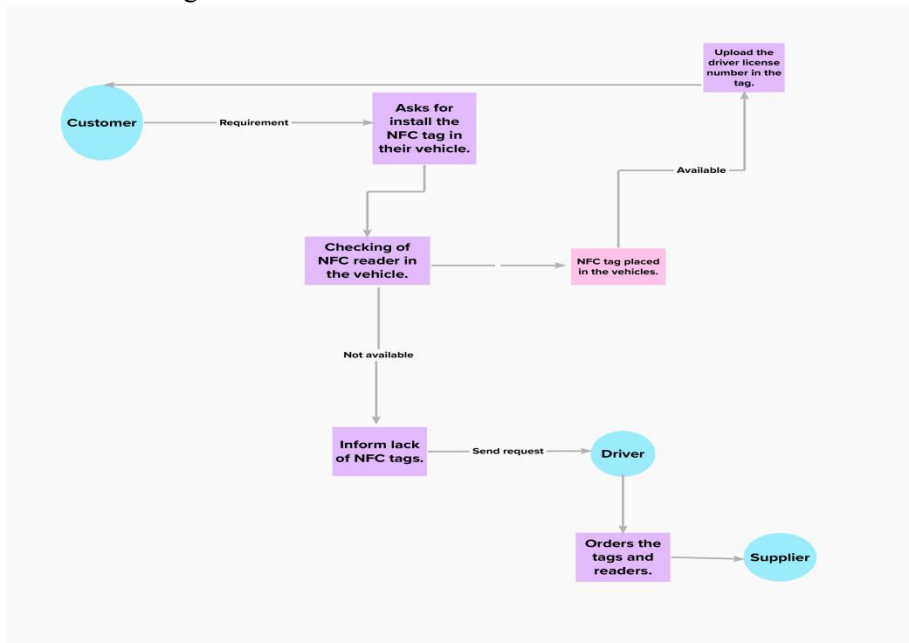
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	NFC makes connecting devices easy and intuitive.No data entry required.
NFR-2	Security	NFC technology is safe.It's also incredibly difficult to hack.
NFR-3	Reliability	NFC tags can be used to absolutely prove a person's presence at a specific place.
NFR-4	Performance	NFC tags work without a battery.It requires much less power.Also it lasts for 10 years.It works over a very short distance.
NFR-5	Availability	Short range NFC tags are available in cheapest price.It guarantee the security of the customers data.
NFR-6	Scalability	These NFC tags are pre-configured at manufacture and they can be either read,re-writable or read only.

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

```

graph TD
    User((User)) --> CarDriver[Car driver]
    CarDriver --> VoiceSearch[voice search]
    VoiceSearch --> WatsonService((Watson service))
    WatsonService --> STT[speech to text]
    STT --> LT[language translator]
    LT --> KG[knowledge graph extraction]
    KG --> NLU[Natural language understanding]
    NLU --> SQL[SQL on Cloud]
    SQL --> DB[(SQLTAG App)]
    Admin((Admin)) --> DB
  
```

User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story /Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	NFC tag	USN-1	Connect to your car with an NFC tag via bluetooth.	I can access my NFC tag via bluetooth.	High	Sprint-1
		USN-2	Install an NFC tag writing application.	I can install an NFC tag application via google play store.	High	Sprint-1
		USN-3	As a user, I can download for the application through NXP.	I can access the application through NXP.	Low	Sprint-2
		USN-4	I can register for the application through google tag assistant.	Once installed,visit website and click the icon to enable recording of data.	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering PIN.	I can access the login page via QR-Patrol mobile application.	High	Sprint-1
	Dashboard	USN-6	As a user, I can access the NFC tag through dashboard.	I can access the login via email.	Low	Sprint-2
Customer (Web user)	Smartphone	USN-7	I can use the web page through Facebook URL,Email and linked in URL.	I can access the website via URL.	High	Sprint-1
Customer Care Executive	NFC tag	USN-8	Customer experience of NFC tag include healthcare and transportation.	Better solutions for customers.	Medium	Sprint-2
Administrator	NFC business card	USN-9	Enable NFC-On ios NFC tools will automatically enable NFC business card.	I can access the card through NFC tools.	High	Sprint-1

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

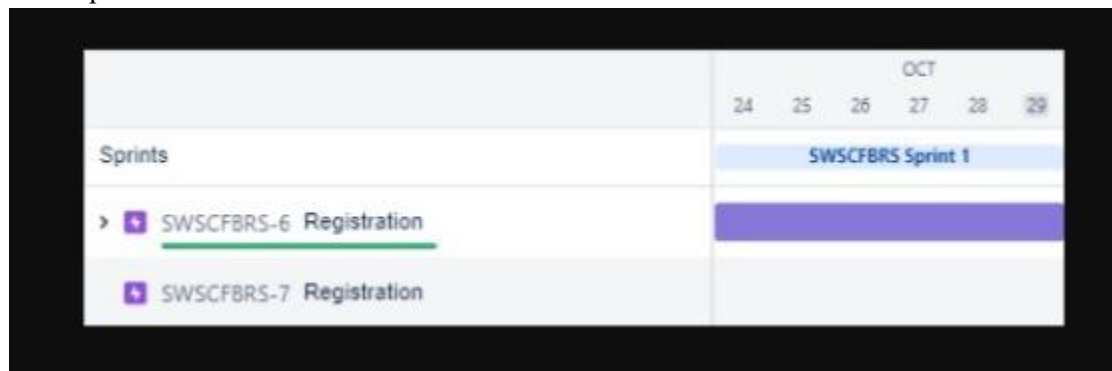
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Detect and display	USN-1	LCD display used to display the locations.	2	High	Dharani K, Gayathri S
Sprint-1	Traffic sign detection	USN-2	By using NFC technology can effectively detect and identify traffic signs.	2	High	Dharani K, Gayathri S
Sprint-2	NFC tag	USN-3	Connect to your car with an NFC tag via bluetooth. Data can be read or written to this tag.	2	High	Annappoorani P, Logeshwari K
Sprint-2	Ultrasonic Sensor	USN-4	Vehicles speed will control through object distance level.	2	High	Dharani K, Annappoorani P
Sprint-3	Preventing the road accidents.	USN-5	Lower speed limit around school and hospital zones.	2	High	Logeshwari K, Annappoorani P
Sprint-4	Notification	USN-6	The NFC tag to facilitate data transfer between nearby mobile phones.	2	Medium	Dharani K, Gayathri S

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3 Reports from JIRA



7. CODING & SOLUTIONING (Explain the features added in the project along with code)


```
pyprogram.py - C:\Users\PC\Downloads\pyprogram.py (3.7.0)
File Edit Format Run Options Window Help

import time
import sys
import ibmiotf.application
import ibmiotf.device

#Provide your IBM Watson Device Credentials
organization = "xywyid"
deviceType = "Dharani"
deviceId = "1502"
authMethod = "token"
authToken = "dharanidharu"

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint
deviceCli.connect()

while True:
    print("\nInput must given between the range of 0 to 150 \nSensor sensing the distance is")    #Unavailable of sensors in the wokwi and tinkercad, we give inputs ma
    detect = input()
    Sensing = ()
    if detect == "100cm":
        Sensing = "school zone"
    elif detect == "101cm":
        Sensing = "hospital zone"
    else:
        Sensing = "sign is not detected"

    data = { 'Sensing' : Sensing }
    #print data
    def myOnPublishCallback():
        print ("Published Sensing data is %s " % Sensing, "to IBM Watson")

Ln: 1 Col: 0
```

```
pyprogram.py - C:\Users\PC\Downloads\pyprogram.py (3.7.0)
File Edit Format Run Options Window Help

import time
import sys
import ibmiotf.application
import ibmiotf.device

#Provide your IBM Watson Device Credentials
organization = "xywyid"
deviceType = "Dharani"
deviceId = "1502"
authMethod = "token"
authToken = "dharanidharu"

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint
deviceCli.connect()

while True:
    print("\nInput must given between the range of 0 to 150 \nSensor sensing the distance is")    #Unavailable of sensors in the wokwi and tinkercad, we give inputs ma
    detect = input()
    Sensing = ()
    if detect == "100cm":
        Sensing = "school zone"
    elif detect == "101cm":
        Sensing = "hospital zone"
    else:
        Sensing = "sign is not detected"

    data = { 'Sensing' : Sensing }
    #print data
    def myOnPublishCallback():
        print ("Published Sensing data is %s " % Sensing, "to IBM Watson")

Ln: 1 Col: 0
```


1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	15	2	2	1	20
Duplicate	2	0	1	0	3
External	2	2	0	1	5
Fixed	12	2	6	22	42
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	3	2	2	7
Totals	31	9	13	27	80

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
Client Application	55	0	0	55
Security	2	0	0	2

Outsource Shipping	4	0	0	4
Exception Reporting	7	0	0	7
Final Report Output	6	0	0	6
Version Control	2	0	0	2

9. RESULTS

9.1 Performance Metrics

NFT - Risk Assessment									
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volumen Changes	Risk Score	Justification
1	Signs with smart con	New	Low	Moderate	High	low	>5 to 10%	ORANGE	Speed performance, Better scabiility

10. ADVANTAGES & DISADVANTAGES

Advantages:

The main advantage of using this nfc lets devices communicate wirelessly.

By using this technology,accident can be detected early. It provide efficient travel to the people.

Ultrasonic sensor used to detect object distance level and vehicle speed levelwill control through the object distance level. This is highly accurate and can be detect very small alterations in position.

Disadvantages:

NFC can just work on more limited distances which around 10 to 20 cm.

It is extravagant for the organizations to embrace the NFC empowered gadgets.

11. CONCLUSION

Nowadays,road traffic is an important problem in a lot of industrialized countries.This fact make essential to build a road and transport system characterized by high dynamicity and low congestion and incidents.

The advantages of technology applied to the traffic control allow designing and developing systems with a high level of autonomy and intelligent.

12. FUTURE SCOPE

In future,we can implement this project using new,innovative and primitive technology and devices to enhance this project more effectively and user friendly with accurate results and identification.We can use more valuable sensor nodes to identify the all school zones,hospital zones very quickly and control the speed of all vehicle automatically.

13. APPENDIX

GitHub & Project Demo Link:

<https://github.com/IBM-EPBL/IBM-Project-20798-1659763505>

<https://drive.google.com/file/d/1qc2BnotsZvz5B4JkCprtV0-iyauhDa7x/view>