TOUCH IOT WITH SAP LEONARDO PROTOTYPE CHALLENGE

Sense R
Smart management of Road Traffic, Safety and Accidents

Designer: Abyson Joseph
Summary

Real time intervention into road traffic, accidents and anomalies could save time and valuable human life. IoT and smart sensors could bring revolutionary positive results in the management of road accidents, traffic and safety.

Storyline

The road traffic departments currently depends on the live camera footages, speed sensors, traffic violation detecting sensors (which all are installed in roads), to monitor and manage the road traffic and other related incidents. In this method, preference is always given to high traffic prone areas and all areas cannot be manually monitored at same time. This will cause accidents/rash driving incidents unnoticed, which in turn delays the initiation of rescue/correction operations before something bad happens. Majority of offenses are left unidentified or unreported, only a few are getting registered. So instead of monitoring area wise, if we could monitor all individual vehicles simultaneously no accidents/incidents will be left unnoticed and makes timely intervention possible. And this will help the respective personnel to focus on traffic issues which need immediate attention, rather than checking everywhere to find issues.

Of course, nowadays all vehicles whether it’s big or small, are setup with a number of sensors basically fitted by its manufactures. Same way if all vehicles are fitted (by means of a government decision) with concealed devices with smart sensors (that can identify rash driving, collisions, fire, water, etc.), the respective traffic department could receive data emitted by those sensors. Since all vehicles are equipped with this sensors and they are all interconnected with the traffic department's IoT application, no accidents, offense will leave unnoticed and they could make timely interventions before some mishap happens. This system is basically for helping the fellow citizens and protect their valuable life and not meant to be just an iron fist of law.

The huge valuable data collected from all these vehicles sensors can be further used for analytics which could help in traffic prediction, risk analysis, risk spot detections, habitual offender detections and a lot more. Apart from the current systems which uses previous patterns for traffic prediction, this new system could make more accurate predictions based on real time data.
Persona

Sara Paul
Senior Road Traffic Controller

I need something that list me the issues that need immediate attention, than randomly checking a million things and find problems.

About
• 40, married, 9 years of Traffic management experience
• I need to quickly act on traffic issues before it flare up into a big issue. If we are late informed about any road accident cases, the rescue initiation will be delayed, risking valuable life of the injured
• I work with traffic wardens, police, rescue teams and civic officials.

Responsibilities
• Area based monitoring of road traffic
• Send alerts and notification to traffic warden based on the available data
• Send rescue alerts to rescue team, police and traffic wardens in case of accidents.
• Also my team has to submit periodic reports and improvement suggestions regarding traffic and road safety to the civic bodies.

Needs
• Immediate identification of road accidents, traffic congestions and traffic offenses
• Automated mechanism for sending rescue alert to respective rescue team, fire fighters, police and rescue equipment team.
• Requires issue based reports rather than just area based information.
• Traffic prediction

Main Goals
• Instant reporting of road accidents and initiation of rescue operation
• Reduce response delay
• Real time intervention to traffic offenses
• Reduce traffic congestions and improve overall road safety
• Stop accidents and traffic offenses left unidentified

Pain Points
• Public criticism for delayed rescue operation on accidents. In most of such cases, the incidents were informed late.
• Preference is always given to high traffic prone zones while monitoring, thereby a great chance for not identifying traffic related incidents/accidents in low traffic zones.
• As many traffic violation left unidentified and unnoticed, the public will get motivated to repeat it again.
• Traffic predictions based on previous patterns are not accurate always.
Point of View

As a Senior Toad Traffic Controller, I need a way to immediately identify and quickly act on traffic issues/accidents before it flare up into a big issues, so that so many lives can be saved and improve the overall standard and safety of road transport system.
UX Journey

Describe Actions, Mindset, Feelings and Touchpoints

Actions
What actions and activities does the Persona take while going through the journey to achieve their goal?

Mindset
What is on the Persona’s mind while taking the actions of their journey?

Feelings
How does the Persona feel each step of the journey? In the template you can color code the different bars. If all 4 bars are colored the persona is super happy, whereas if the persona is upset only one bar is colored.

Touch Points
What touch points does the Persona have? Those can be, for example, tools, channels, devices, conversations, and so on.
## User Experience Journey

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MINDSET</th>
<th>FEELING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Monitoring of road traffic</td>
<td>• Where all I will look for traffic jams and other issues?</td>
<td></td>
</tr>
<tr>
<td>• Identify and initiate rescue operation for accidents</td>
<td>• Aahh, I can’t check all areas simultaneously, let’s look the high</td>
<td></td>
</tr>
<tr>
<td>• Preventions of traffic offenses</td>
<td>prone zones first</td>
<td></td>
</tr>
<tr>
<td>• Entering the Traffic visualization system</td>
<td>• Oh, not all areas details are available</td>
<td></td>
</tr>
<tr>
<td>• Manually connect the traffic warden radio to know what is causing the</td>
<td>• Oh, even he doesn’t know, as it is not in his visibility area.</td>
<td></td>
</tr>
<tr>
<td>Jam</td>
<td>• Is it a major accident?</td>
<td></td>
</tr>
<tr>
<td>• Received a phone call requesting rescue operation for an accident.</td>
<td>• Do other rescue teams like fire brigade has to be alerted?</td>
<td></td>
</tr>
<tr>
<td>• Alerted the police and paramedics to reach the site immediately.</td>
<td>• Will it cause traffic jam in that area?</td>
<td></td>
</tr>
<tr>
<td>• Police requests help for finding a missing car by checking the CCTV</td>
<td>• Do any detour has to be executed?</td>
<td></td>
</tr>
<tr>
<td>footages</td>
<td>• Ohh, the CCTV’s have covered the car only up to city limits.</td>
<td></td>
</tr>
<tr>
<td>• Submit periodic reports and improvement suggestions regarding traffic</td>
<td>• Out of the numerous cases only a few incidents are registered or</td>
<td></td>
</tr>
<tr>
<td>and road safety to the civic bodies.</td>
<td>identified. Making reports and suggestions based on these partial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>data won’t be accurate.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TOUCH POINTS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Live CCTV visuals</td>
<td>• Computer</td>
<td>• Recorded CCTV visuals</td>
</tr>
<tr>
<td>• Traffic Wardens</td>
<td>• Traffic warden</td>
<td>• Computer</td>
</tr>
<tr>
<td>• Police radio</td>
<td>• Police radio</td>
<td>• Newspaper</td>
</tr>
<tr>
<td>• Cellphones</td>
<td>• Telephone</td>
<td>• Notes</td>
</tr>
</tbody>
</table>

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Prototype

The sensors fitted in vehicles will identify the speed, driving patterns, collision, fire, etc. and send those data to the IoT application. The application process that data and registers incidents, if it find anything unusual. The incidents could be accident, rash driving, over speed, traffic jams, etc. The IoT application will then automate the correction/rescue action by notifying the respective personnel.

Prototype screens for the IoT application

Home Screen

The home screen has a live traffic/anomalies map (you can navigate to the incident on clicking them in map) and also contains information like Average Traffic Index, Traffic Anomalies Index, links to critical alerts, medium priority alerts, track vehicle, risk analysis and rescue logs. It also provide a general traffic prediction and detour suggestions based on the live data emitted by sensors fitted in vehicles.
Area based Traffic/Anomalies/Accident Updates

If you click a particular area in the map in home screen, it will navigate to the details of that area. With the data received from sensors in vehicles, this screen will provide that particular area’s traffic issues/anomalies/accidents, provide traffic prediction and detour suggestions. The incidents are categorized into critical and medium and will list them separately for that area. If you point a specific incident shown in map, the details will be displayed in popup. For eg, below the user has pointed on an incident incident in the map, and it shows the details including the vehicles involved in that accident. If you click on the incident number, then you will be navigated to the incidents page, or if you click on the Vehicle ID, it will take you to that particular vehicles details. All texts displayed in blue are links to respective details.

Notification List

Critical Alerts

On clicking the critical notification tile in Home screen, you will be navigated to the notification list page and from there you can again navigate to the details by clicking the links. The medium priority notifications will also behave in the same way.
On clicking on the incidents (either from map or from incident list), you will be navigated to its details. The screenshot given below shows the details of an accident. The sensors in the two vehicles have identified a collision and it is sent to IoT application. The application automatically sends alerts to respective people like police, ambulance etc. The IoT application also identifies, that one of the vehicle is a gas tanker truck and it assumes a chance of fire by measuring the collision intensity figures sent by the vehicle sensors, and hence alerts are sent to fire brigade also. Also the sensor has identified that the fire has not started yet and the complication has been shown only as ‘leakage of gas’. Also in screen the action logs are displayed and detour suggestions are also provided to avoid traffic jams due to this incident.

Also you can make a live supervision on the incident spot, i.e. you can check whether the rescue team has reached the spot or whether they are near to it, since the rescue team vehicles are also equipped with the sensors.
Solving Traffic Issues

The application not only just notifies about the traffic jams, it also helps to identify the reason and initiates action by alerting the respective personnel (e.g., traffic warden). For e.g., the popup in below screen shot tells the reason for traffic jam – ‘Parking of vehicle CYP289 in Napier Road’ is creating the issue. The traffic warden has been alerted with this details and he could easily go to it and correct it. The data from sensors of vehicle CYP289 and other surrounding vehicles helped the IoT application to find the issue.

Traffic Prediction

The Traffic Prediction page will provide predictions based on the real-time data receiving from the vehicle sensors. You can filter the output based on zone, area, road, time, etc. Also, the top critical prediction list will be displayed in the left pan.
Track Vehicle

You can track a vehicle, by entering its ID (Reg no) and the application will show its current location with map coordinates. This will be useful in tracking missing people, vehicle theft, etc. Normally the CCTV footages will be available in city limits only, but using the vehicle sensor data we can track the vehicle always. Also in the page, incident history of the vehicle will be displayed.
Risk Analysis

The huge valuable data collected from all these vehicles sensors can be further used for analytics which could help in traffic prediction, risk analysis, risk spot detections, habitual offender detections and a lot more.

For example, vehicles may skid, sudden break, jerk at specifics spots, due to unscientific road construction or road damage, etc. and the sensors in vehicles detects those unusual behaviors. The application could find those risk spots (where majority of issues take place) by analyzing the collected data and could alert the responsible team for correction. In the screen shot below, there is a graph ‘Top 10 accident spots’, which shows the spots (with map coordinates) where maximum accidents occurred. Other examples are finding common rash driving areas, over speed areas, pedestrian offence areas (by correlating signal cameras/sensors data and vehicles sensor data) and we can put more wardens to specially supervise and correct that area. Normally all these type of issues come to notice only if some mishap happens. Through these sensors all traffic violations are automatically registered to the system and corrective measures can be taken before someone falls into accidents.