

AI-Enabled Smart Road Monitoring: Integrating Citizen Feedback and Data Analytics for Infrastructure Maintenance

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Abstract

The issue of road accidents is regarded as the most significant one, which is experienced by the population because it causes many injuries and deaths across the globe. Mortal error causes utmost accidents, one should be conservative. The rate of similar accidents is among the highest in India, one of the developing countries. Therefore, the external authorities and the public alongside transportation authorities are wrapping chains on the measures needed to minimize the rigidity of these accidents in order to minimise the number of deaths. Bad roads, extreme rainfall, similar as thick fog, inordinate rain, heavy winds, potholes etc are some of the causes of road accidents. This is because this design is largely based on the sphere (Android operation Development). The ordinary citizens who have been under the control of the government external authorities are to present their complaints regarding the daily road issues and accidents on the roads. In India, there is no effective way of communication between the government and citizens in a direct manner to enable working out of the issues. The citizen feedback will be a valuable feature which will facilitate Government authorities to act in time on roads which are not well maintained and pose a risk to the travel. This operation is offered to dismantle this issue, the citizens are supposed to submit their grievances to the government. It will provide an ordinary man to submit his grievances and issues to the outside authorities, who will then transfer them to the government external authorities to solve the road accident in a limited time frame. It is a channel of registering a complaint and following it through. It also offers a complaint module where the citizens can choose to click an image of any road issue that people are experiencing and upload the image, road condition and position as well as the complaint. Besides that it will also encompass the feedback forms that will allow them to interact with the government.

Keywords: Accidents, Roads, Authorities, Problem, Feedback, Complaints, Upload, Location, roadcategory, local body, Tokens, status check, email validation, register, resolve.

Introduction

India does not have any direct communication between the government and the people in solving issues i.e. trying to have a problem solved in our country we need to go to the authorities and take months to get the solution when it would have taken us a week or even a month. Government should reconsider the potential of using technology to enhance the end-to-end experience of the citizens with the government services. One of the means to make sure that the needs of citizens are addressed first are the establishment of the culture of citizen-first. The final one is enhancing the service and quality we give, to facilitate open effective relationships and to increase the trust of the people on the government. By means of this we can improve the solutions of the issues of the people. Social media and mobile technologies are taking over the traditional channels of communication with the segment of the government, reporting problems, and supplying feedback. Mobile services such as apps and SMS enable people to receive the services that they require.

More personalized and easier way of addressing their needs. These participation tools also enhance the level of citizen participation through the integration of them in problem- working and service co- design. As a remedy to this, the National Informatics Centre initially came up with a site named Prajavani, on which the citizens can place their requests or businesses and get them fulfilled within a specific period, also due to its ineffectiveness and absence of stoner goodwill, it was not widely used by the citizens and its limited translucency worked against it in its inability to be fashionable. The significant aspect of this design is that it

assists the people in not only learning their location, but also getting their businesses resolved online instead of visiting the officer in the spot on frequent basis until the situation gets resolved. With this the public will be able to save time through this system. Besides the fact that the road network is the lifeline of the Nation and a significant part of the socioeconomic growth and development in India, the road network has the highest contribution to the number of accidents resulting in deaths in the country with road accidents contributing 36- 38% (There were a normal of deaths due to other causes during the period between 2015- 19.) to the number of accidental deaths in the country. Road accidents have been the cause of greatest number of deaths in the world during the past thirty years in which it has been the number- one killer in the highest countries. Roads are characterized with such similarities as straight stretches, twisted roads, and crossovers position of acquiesce, potholes etc., some of the conditions of road accidents. Not only will weather conditions affect the condition of only the road face, but also the visibility of the road hence contributing to the possibilities of road accidents. The heavy rain, thick fog and hail storm lowers down the visibility and the road becomes slippery, hence creating imminent pitfalls to the road. The transportation authorities and the people are strapping on solutions of diminishing the rigidity of such accidents in an effort to lower the death toll. Mortal crimes, Extreme rainfall similar as thick fog, inordinate rain, heavy winds are some of the causes of road accidents.

Literature Survey

[1] Devendra Yadav, Akhilesh Kumar Yadav “Municipality Complaint Redressal System-A Review” The ordinary people who fall under the governance of the external authorities must deliver their enterprises regarding day- to- day problems in their ward. In India, there is no effective direct connection between the government and the general public. External Complaint Redressal System will be a Mobile grounded operation. This operation will allow citizens to use a mobile operation to file enterprises about day- to- day difficulties in their ward. This operation will allow the average person to register his or her enterprises and difficulties with external authorities and will allow external authorities to handle the issue as snappily as doable. This system provides a user-friendly interface for filing a complaint, allowing citizens to voice their enterprises and follow their progress. To help overloading officers with false complaints, we enforced a machine learning algorithm to distinguish between fake and genuine complaints. This system will also have a dashboard that allows a director to track the performance of each department grounded on active complaints and complaints resolved, as well as the average time it takes to handle a complaint. Once registered, this complaint will be encouraged to a specific department of the Municipal Corporation, for illustration, a complaint regarding a broken road will be diverted to the Public Works Department. When a complaint is encouraged to the applicable ward, officers may take the necessary way and trace the problem.

[2] Panjamani Anbazhagan, “Classification of road damage due to earthquakes”

Earthquakes Beget massive road damage which in turn causes adverse effects on the society. Former studies have quantified the damage caused to domestic and marketable structures, still not numerous studies have been conducted to quantify road damage caused by earthquakes. Further In this study, an attempt was made to propose a new scale to classify the road damage due to earthquakes based on the data collected from major earthquakes in the past. This paper presents different road damages due to the earthquakes based on MMI scale. The study shows that MMI scale has limited operation to classify damaged road due to earthquake. Further, a new RDS had been proposed for the classification of damaged road due to earthquakes. The proposed scale called as RDS, have identified five situations of road damages on different parameters and reported how earthquake had damaged the roads.

[3] Jun Li1, Qiming Qin1, “Study on Road Damage Assessment using RS and GIS”

A different and new approach for road damage evolution is presented in this paper. The proposed system is applied in the damage assessment of roads. The input data of the damage assessment process is the devastated region of road that is the difference between the pre-disaster road area and the post-disaster complete road area. The devastated region is segmented into small damage blocks. The segmentation process is like to cut every pixel to search for the damaged pixels. When identified a damaged pixel it is used as a seed point to trace the whole damage block with region growing system. We will keep on searching unless

every damaged pixel has been covered. At last, the devastated region is segmented into a number of independent damages carrying the values of assessment indicators. The damage position is graded by the assessment model. This paper states the assessment results at three situations — damage block position, single- road position and region position. At damage block position, the detailed information of damage blocks is affair, which helps to conduct and instruct the post-disaster reconstruction work. A new approach of road damage assessment is presented in this paper.

[4] Hiroya Maeda, Hiroshi Omata, “Road Damage Detection and Classification Using Deep Neural Networks with Smartphone Images”

In this paper a check of damage discovery of roads using image processing ways have been conducted. This study makes three benefactions to address road damage discovery issues. First, to our knowledge, a large-scale road damage data set is set, comprising, 53 road damage images captured using a smartphone installed on an auto, with, 435 cases of road face damage included in these. They've used state- of- the- art object discovery styles using convolution neural networks to train the damage discovery model with their data set and compared the delicacy and runtime speed on both, using a GPU garcon and a smartphone. [13] Eventually, in this paper they have demonstrated that the type of damage can be classified into eight types with high delicacy by applying the proposed object discovery system.

Proposed System

We want to replace existing manual RCS (ROAD COMPLAINT SYSTEM) with an android application. This will change the way that road complaints are maintained, improve efficiency, and save us time. By using this application people can register their complaints in an easy and proper format and give their location so that authorities can easily find them when they need help. We hope that these improvements will benefit everyone who uses our service more easily. The system will also acknowledge about their complaints progress. The user posts feedback about this RCS and an admin can view that feedback. User facilities are available for officers to solve their problems in an efficient manner, with a complete picture of the place shown. The user can suggest solutions for solving problems in a better way, and can give their opinion on government decisions. It accepts the complaint request from citizens and routes it to a specific department for processing. A request may contain one or more of the following: an image, text and location.

The system proposed offers the following advantages: It can be used to comply with the requirements of any user at any time. The processing is done in the minimum time possible, so that our services are better and more efficient. The system is user friendly, so that it is easy to use, without having to read many instructions. It requires minimal effort on the part of users and minimizes manual data entry.

Proposed System

The proposed model, AI-Enabled Smart Road Monitoring: Integrating Citizen Feedback and Data Analytics for Infrastructure Maintenance, aims to create an intelligent and adaptive system for efficient road condition assessment and maintenance prioritization. The model leverages artificial intelligence, Internet of Things (IoT) sensors, and real-time citizen participation to enhance the reliability and responsiveness of urban infrastructure management. Data from multiple sources—such as on-road sensors, satellite imagery, vehicular vibration data, and user-reported feedback via mobile applications—are collected and transmitted to a centralized platform. This data undergoes preprocessing to remove inconsistencies, followed by feature extraction techniques that identify indicators of road degradation such as cracks, potholes, or uneven surfaces.

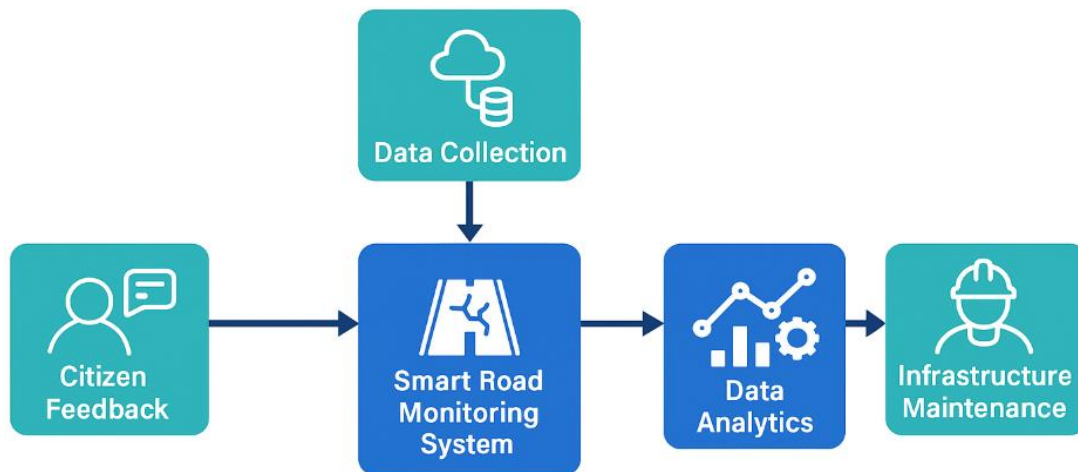


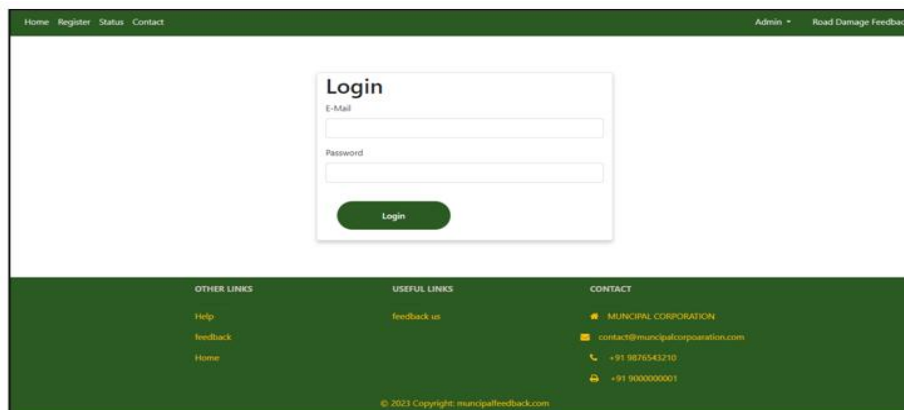
Fig.1. Block diagram model

A machine learning model is then applied to classify and predict road conditions, enabling early detection of potential infrastructure issues. Simultaneously, the citizen feedback module ensures community engagement, allowing users to report road damage, upload images, and validate automated detections. Data analytics dashboards visualize real-time road health metrics, maintenance trends, and severity indices to support decision-making by municipal authorities. The integration of predictive analytics further helps in scheduling proactive maintenance before severe deterioration occurs. Overall, the proposed system promotes data-driven, transparent, and cost-effective infrastructure management, contributing to safer roads and sustainable urban development.

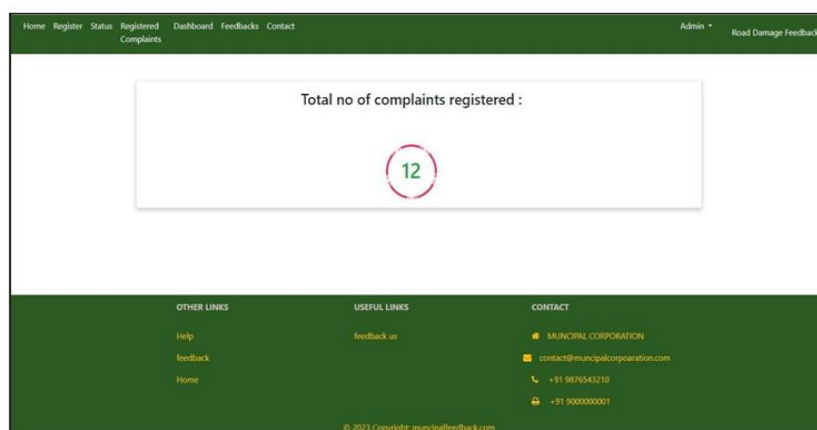
RESULTS AND DISCUSSIONS

ADMIN MODULE:

LOGIN PAGE



DASHBOARD



REGISTERED COMPLAINTS

Registered Complaint : 1003							
Name	Category	Loaction	District	Description	Image	Status	Change Status
teju	Others	View	noida	View	View	not checked	Rejected change
Registered Complaint : 1004							
Name	Category	Loaction	District	Description	Image	Status	Change Status
sudha	Others	View	viskhapatnam	View	View	not checked	Rejected change
Registered Complaint : 1005							
Name	Category	Loaction	District	Description	Image	Status	Change Status
sudha	Potholes	View	viskhapatnam	View	View	under processing	Rejected change
Registered Complaint : 1006							
Name	Category	Loaction	District	Description	Image	Status	Change Status
TEJASHWINI	Uneven Roads	View	viskhapatnam	View	View	under processing	Rejected change

FEEDBACK

Home Register Status Registered Complaints Dashboard Feedbacks Contact

Admin Road Damage Feedback

Feedback

Name
Email
Subject
Message

:tejashwini
:tejashwinisom@gmail.com
:Feedback
:token no : 1005 Kindly look into the complaint and help making it resolved early.As there is no proper action when I registered a complaint manually at the corporation. Thank you

OTHER LINKS
[Help](#)
[feedback](#)
[Home](#)

USEFUL LINKS
[feedback us](#)

CONTACT
MUNICIPAL CORPORATION
[contact@municipalcorporation.com](#)
+91 9876543210
+91 9000000001

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USER MODULE:

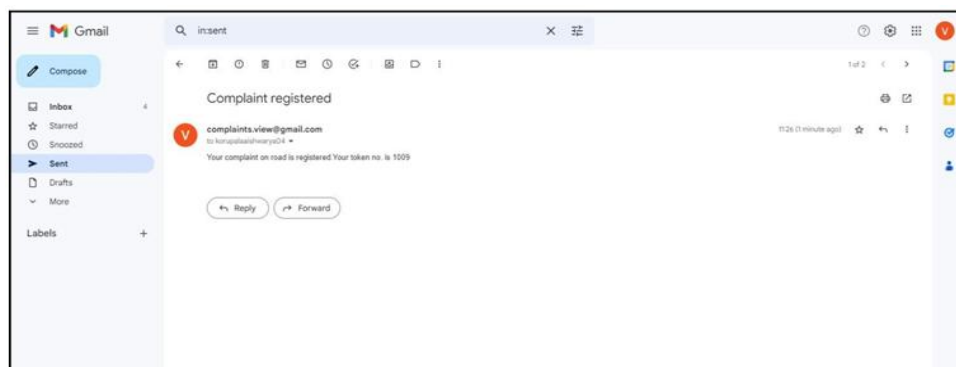
HOME PAGE



REGISTER COMPLAINT

The screenshot shows a mobile application interface for 'ROAD FEEDBACK'. At the top, there is a green header with the text 'ROAD FEEDBACK' and a sub-header 'Road Damage Feedback'. Below the header, there is a form with the following fields: 'Name' (text input), 'E-mail' (text input), 'Select Category' (dropdown menu with 'Muddy roads' selected), 'District' (text input), 'Local Body' (text input), 'Location' (text input), 'Description' (text input), and 'Upload images' (a button labeled 'Choose Files' and a text 'No file chosen'). At the bottom of the form is a green button labeled 'Register'.

EMAIL VALIDATION



FEEDBACK

The screenshot shows a mobile application interface for 'ROAD FEEDBACK'. At the top, there is a green header with the text 'ROAD FEEDBACK' and a sub-header 'Road Damage Feedback'. Below the header, there is a form with the following fields: 'Name' (text input), 'E-mail' (text input), 'Subject' (dropdown menu with 'Feedback' selected), and 'Message' (text input). At the bottom of the form is a green button labeled 'Send'. Below the form, there is a green bar with the text 'OTHER LINKS'.

CONCLUSION

In this model, it is explained about the working procedure of the system, the places involved in the system and the conditioning. It presents the overview of the analysis and development of the Municipal Corporation Road complaint operation system. There will be remarkable results attained by this design and also, they

help in encouraging the development of this type of road complaint operation systems. Generally, the complaints and other types of feedback play an important part in the development of any association and to interact with the authorities in a better way. This system can be taken as an inauguration for the systems which will be developed indeed more in future and which are related to road complaint operation systems.

FUTURESCOPE

As of now there is no proper existing system for feedback on maintenance of roads. The citizen should have to register his complaint manually and report at their respective municipality, to avoid this situation we have created this user friendly app in which the user need not sign up but directly register the complaint. There is a chance for the concerned authorities to neglect the complaints given by the citizens through this application, to overcome that we want to develop in future a grievance profile which will be under the control of the grievance department. By doing such the citizens can complaint to the grievance about the municipal authorities who are not responsible enough to resolve the problems of the citizens.

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