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### Patent Search

Invention Title	INTERNET OF THINGS (IOT) WITH AI-BASED RAILWAY CROSSING TRAFFIC MONITORING USING DEEP LEARNING
Publication Number	41/2022
Publication Date	14/10/2022
Publication Type	INA
Application Number	202241056842
Application Filing Date	03/10/2022
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	COMPUTER SCIENCE
Classification (IPC)	G06N0003080000, G06N0003040000, G16H0050200000, H04L0067120000, B61L0023040000

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#### Abstract:

INTERNET OF THINGS (IOT) WITH AI-BASED RAILWAY CROSSING TRAFFIC MONITORING USING DEEP LEARNING Abstract:- AI-based approaches have the potential to make driven IT services and new IoT services much safer and more effective. This article looks at how deep learning techniques can be used to make railroad crossings safer and secure. This is one type of ITS (intelligent transportation system). In this study, we came up with a way to use artificial intelligence to keep an eye on traffic near train crossings. This system is based on a combination of detection and classification algorithms that focus on multiple image processing inputs, such as the presence of a vehicle, the presence of a pedestrian, the path of a vehicle, railway barriers at railway crossings, railway warnings, and light signalling systems. At each railroad crossing, the cameras in the system are set up so that they can get a full picture of the crossing area. Using GPUs and deep neural networks to speed up image processing, the system can find potentially dangerous situations at railroad crossings on its own and in real time. Before more analysis can be done, the data from the camera modules must be sent to a central server, or interested parties may be notified. The system's architecture also uses best practices for privacy-by-design and security-by-design to ensure the security of all communication interfaces. The privacy of people like pedestrians and drivers, and the protection of sensitive data. Lastly, we talk about what we found out about field-based detection techniques. When using the YOLO tiny model technique, we might get an average recall rate of 89%. The results show that our method is a good way to figure out how often things and events happen and it could be used at railroad crossings. Think about how it weighs each type of event as proof.

#### Complete Specification

Description:Complete Specifications:

Many of the things that railroad administrations do are meant to make sure that grade crossings are safe. Several studies have found that RLCs cause more than a third of all railroad deaths. Roads and trains will be monitored by sensors that will be put in place. As sensors in sensing systems, you can use monitoring cameras, depth cameras, infrared cameras, radar, ultrasonic, and LIDAR sensors. The devices give a lot of information about the traffic going through the RLC. The goal is to get a reliable assessment of the RLC's state while using as little processing power as possible. This will make it possible for the solution to work well with the traffic management systems that are already in place. When you combine data from multiple sensing systems, you can make an operation more reliable. You can figure out what's going on if you look at all the relevant information sources. Even though RLCs have cameras for surveillance, they are rarely used for anything other than that. Instead of using cameras outside of the video stream, it is important to come up with a way to get the RLC state from the video stream itself. An RLC is only safe for a train to go through if there are no obstacles on the tracks or nearby. For a traffic control system to work, it needs a signal that shows what the RLC is doing right now. The goal of analysing the video feed is to find and fix any problems with the train track. Changes in how much light there is have a big effect on how well the standard image processing technique used for this purpose works. Deep learning techniques can be used to process photos taken in different lighting conditions. In this study, this method is used to figure out how well the RLC is doing right now. The goal is to use a trained and calibrated CNN to classify the area around the RLC. The focus of figuring out the status of the RLC shifts from removing objects from the observation scene to classifying the objects that are already there. This is because removing objects from the observation scene is easier than classifying the objects that are already there. A look at the papers in the field shows that object detection is the most common method. This method works better

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Government of India

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### Application Details

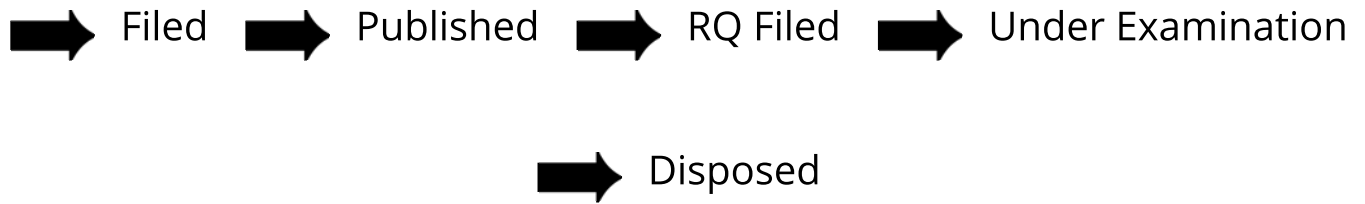
APPLICATION NUMBER	202241056842
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	03/10/2022
APPLICANT NAME	1 . G Sandeep V Padmakar 2 . Manas Madine 3 . Dr Sonika Malik 4 . Mr. Annam Karthik 5 . Dr.G.Venkatakotireddy 6 . Dr.Shashi Kant Gupta 7 . Sanjay Kumar Nayak 8 . M.S.VINU 9 . Prof. Sneha Ramdas Shegar 10 . Mr.T R Arunkumar 11 . Dr. Harikumar Pallathadka
TITLE OF INVENTION	INTERNET OF THINGS (IOT) WITH AI-BASED RAILWAY CROSSING TRAFFIC MONITORING USING DEEP LEARNING
FIELD OF INVENTION	COMPUTER SCIENCE
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ADDITIONAL-EMAIL (As Per Record)	iprpatent2022@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

Application Status

APPLICATION STATUS

**Awaiting Request for Examination**

[View Documents](#)



In case of any discrepancy in status, kindly contact [ipo-helpdesk@nic.in](mailto:ipo-helpdesk@nic.in)

<b>FORM 1</b>  <b>THE PATENTS ACT 1970</b> <b>(39 of 1970)</b> <b>&amp;</b> <b>The Patents rules, 2003</b>  <b>APPLICATION FOR GRANT OF PATENT</b>  <b>[See section 7, 54 &amp; 135 and rule 20 (1)]</b>	<b>(FOR OFFICE USE ONLY)</b>  <b>Application No:</b>  <b>Filing Date:</b>  <b>Amount of Fee Paid:</b>  <b>CBR No:</b>  <b>Signature:</b>																				
<b>1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)</b>																					
<b>2. TYPE OF APPLICATION [Please tick (√) at the appropriate category]</b>																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 5px;">Ordinary (√)</td> <td colspan="2" style="padding: 5px;">Convention ( )</td> <td colspan="2" style="padding: 5px;">PCT-NP ( )</td> </tr> <tr> <td style="padding: 5px;">Divisional ( )</td> <td style="padding: 5px;">Patent of Addition ( )</td> <td style="padding: 5px;">Divisional ( )</td> <td style="padding: 5px;">Patent of Addition ( )</td> <td style="padding: 5px;">Divisional ( )</td> <td style="padding: 5px;">Patent of Addition ( )</td> </tr> </table>	Ordinary (√)		Convention ( )		PCT-NP ( )		Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )									
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Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )																
<b>3. (3A) APPLICANT</b>																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Name</th> <th style="width: 15%;">Nationality</th> <th style="width: 15%;">Country of Residence</th> <th style="width: 40%;">Address</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">G Sandeep V Padmakar</td> <td style="text-align: center; padding: 5px;">Indian</td> <td style="text-align: center; padding: 5px;">India</td> <td style="padding: 5px;">Assistant Professor Department of Electronics &amp; Communication Engineering Ramachandra College of Engineering, Eluru Vatluru., Pin 534007 Andhra Pradesh India</td> </tr> <tr> <td style="text-align: center; padding: 5px;">Manas Madine</td> <td style="text-align: center; padding: 5px;">Indian</td> <td style="text-align: center; padding: 5px;">India</td> <td style="padding: 5px;">Software Engineer IIT Kharagpur, Paschim midhinapur , Pin: 721302 West Bengal India</td> </tr> <tr> <td style="text-align: center; padding: 5px;">Dr Sonika Malik</td> <td style="text-align: center; padding: 5px;">Indian</td> <td style="text-align: center; padding: 5px;">India</td> <td style="padding: 5px;">Asst. prof. Maharaja Surajmal institute of Technology , C-4 Janakpuri, Delhi Pin: 110058 Delhi India</td> </tr> <tr> <td style="text-align: center; padding: 5px;">Mr. Annam Karthik</td> <td style="text-align: center; padding: 5px;">Indian</td> <td style="text-align: center; padding: 5px;">India</td> <td style="padding: 5px;">Assistant Professor Institute of Aeronautical Engineering, Dundigal, Hyderabad Medchal</td> </tr> </tbody> </table>		Name	Nationality	Country of Residence	Address	G Sandeep V Padmakar	Indian	India	Assistant Professor Department of Electronics & Communication Engineering Ramachandra College of Engineering, Eluru Vatluru., Pin 534007 Andhra Pradesh India	Manas Madine	Indian	India	Software Engineer IIT Kharagpur, Paschim midhinapur , Pin: 721302 West Bengal India	Dr Sonika Malik	Indian	India	Asst. prof. Maharaja Surajmal institute of Technology , C-4 Janakpuri, Delhi Pin: 110058 Delhi India	Mr. Annam Karthik	Indian	India	Assistant Professor Institute of Aeronautical Engineering, Dundigal, Hyderabad Medchal
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Dr. Harikumar Pallathadka	Indian	India	Director and Professor Manipur International University, Ghari, Imphal, Imphal West, Pin: 795140 Manipur India
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**3B. CATEGORY OF APPLICANT** [Please tick (√) at the appropriate category]

Natural Person (√)	Other than Natural Person		
	Small Entity ( )	Start up ( )	Others ( )

**4. INVENTOR (S)** [Please tick (√) at the appropriate category]

Are all the inventor(s) same as the applicant(s) named above?	Yes (√)	NO ( )
If "No", furnish the details of the inventor(s)		

Name	Nationality	Country of Residence	Address

**5. TITLE OF THE INVENTION**

**INTERNET OF THINGS (IOT) WITH AI-BASED RAILWAY CROSSING TRAFFIC MONITORING USING DEEP LEARNING**

**6. AUTHORISED REGISTERED PATENT AGENT(S)**

IN/PA No.	
Name	
Mobile No.	

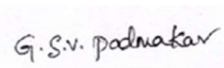

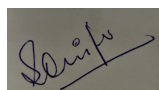


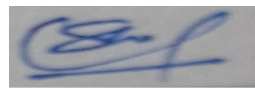
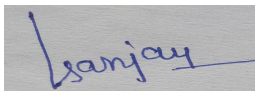
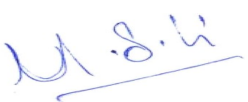
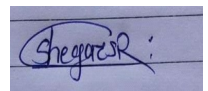
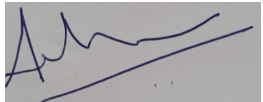
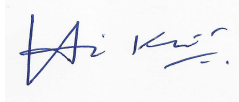
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**Mobile No.** +91- 6369794362  
**E-mail:** [iprpatent2022@gmail.com](mailto:iprpatent2022@gmail.com)

**8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION**



Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention country)
-NA-	-NA-	-NA-	-NA-	-NA-	-NA-
<b>9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)</b>					
International application number			International filing date		
-NA-			-NA-		
<b>10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION</b>					
Original (first) application No			Date of filing of original (first) application		
-NA-			-NA-		
<b>11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT</b>					
Main application/patent No.			Date of filing of main application		
-NA-			-NA-		
<b>12. DECLARATIONS:</b>					
<b>(i) Declaration by inventor (s)</b>					
<p><b>(In case the applicant is an assignee:</b> the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).</p> <p>I/We, the above-named inventor(s) is/are the true &amp; first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.</p>					
(a) Date: 03/10/2022					
(b) Signature:					
(c) Name:					
					
G Sandeep V Padmakar	Manas Madine	Dr Sonika Malik	Mr. Annam Karthik		
					
Dr.G.Venkatakotireddy	Dr.Shashi Kant Gupta	Sanjay Kumar Nayak			
					
M.S.VINU	Prof. Sneha Ramdas Shegar	Mr.T R Arunkumar	Dr. Harikumar Pallathadka		

**(ii) Declaration by the applicant(s) in the convention country**

**(In case the applicant in India is different than the applicant in the convention country:** the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date

(b) Signature(s) -----NA-----

(c) Name(s) of the signatory

**(ii) Declaration by the applicant:**

**I/We, the applicant hereby declares that:-**

- I am /we are in possession of the above-mentioned invention
- The ~~provisional~~/complete specification relating to the invention is filed with this application.
- ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.~~
- There is no lawful ground of objection to the grant of the patent to me/us.
- I am/we are the true & first inventor(s).
- I am/we are the assignee or legal representative of true & first inventor(s).
- ~~The application or each of the applications, particulars of which are given in Paragraph 8, was the first application in convention country/countries in respect of my/our invention(s).~~
- ~~I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.~~
- ~~My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph 9.~~
- ~~The application is divided out of my /our application particulars of which is given in Paragraph 10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.~~
- The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph 11.

**(d) Following are the attachments with the application:**

(a) Form 2

Item	Detail	Fee	Remark
Complete specification	No. of pages: 07	<b>1, 600</b>	
No. of Claim(s)	No. of claims: 08 No. of pages: 02		
Abstract	No. of pages: 01		
Drawings	No. of drawings: 0 No. of Pages: 0		
Priority	No. of Priorities:		

# ~~In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.~~

~~(a) Provisional specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).~~

~~(b) Sequence listing in electronic form~~

~~(c) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).~~

~~(d) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.~~

~~(e) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.~~

~~(f) Statement and Undertaking on Form 3~~

~~(g) Declaration of Inventorship on Form 5~~

Total fee Rs. in Cash/ Banker's Cheque /Bank Draft bearing No.....  
date.....on Bank

We hereby declare that to the best of my/our knowledge, information and belief the fact and matters slated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 3<sup>rd</sup> day of October, 2022



Saurabh Kumar Jain  
(IN/PA-3637)  
Agent for Applicant

To,  
The Controller of Patents  
The Patent Office, At Delhi/Mumbai/Chennai/Kolkata, India.