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CHALLAN : TR-5
DOCKET NO:13253

Date/Time : 08/02/2023

To,

Agent Number:

SUMUGAN P N

61, MUTHUSAMY STREET, 4TH CROSS EXT, ODAKADU, TIRUPUR - 641602 sumugan.ad21@bitsathy.ac.in

Sr. No.	CBR No.	Reference Number /Application Type	Application Number	Title/Remarks	Amount Paid
1	5704	ORDINARY APPLICATION	202341008044	INTERNET OF THINGS BASED AIR QUALITY CLASSIFICATION DEVICE THROUGH INFRARED SPECTROSCOPY IN OUTDOOR	1750
2		E-2/500/2023-CHE	202341008044	Form2	0
Total :					1750

Received a sum of Rs. 1750 (Rupees One Thousand Seven Hundred & Fifty only) through

Payment Mode	Bank Name	Cheque/Draft Number	Cheque/Draft Date	Amount in Rs
Draft	Canara Bank	160161	04/02/2023	1750

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SPECIAL LAB (Code & Name) : SLB003 AI PRODUCT DEVELOPMENT

STUDENT NAME : SUMUGAN P N

ROLL No.: 7376212AD212

~~COMPETITION / PROJECT / PAPER /~~ PATENT

~~WINNER / RUNNER / PARTICIPATED~~

LEVEL : _____ / _____

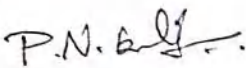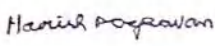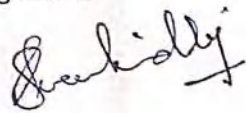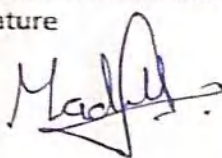Signature of Lab Incharge (with Name):

Dr.B.Gopala
Krishnan

FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 **APPLICATION FOR GRANT OF PATENT** (See section 7, 54 and 135 and sub-rule (1) of rule 20)	(FOR OFFICE USE ONLY)

	Application No.	
	Filing date:	
	Amount of Fee paid:	
	CBR No:	
	Signature:	

1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)

2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]

Ordinary (✓)		Convention ( )		PCT-NP ( )	
Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )

3A. APPLICANT(S)

Name in Full	Nationality	Country of Residence	Address of the Applicant	
Sumugan P N	Indian	India	House No.	61
			Street	Muthusamy street
			City	Tirupur
			State	Tamil Nadu
			Country	India
			Pin code	641602

3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]

Natural Person (✓)	Other than Natural Person		
	Small Entity ( )	Startup ()	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 in Full	Nationality	Country of Residence	Address of the Inventor	
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			Street	Muthusamy street
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			State	Tamil Nadu
			Country	India
			Pin code	641602
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			City	coimbatore
			State	Tamil Nadu
			Country	India
			Pin code	641659
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			City	salem
			State	Tamil Nadu
			Country	India
			Pin code	636007
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			City	Tiruvarur
			State	Tamil Nadu
			Country	India
			Pin code	610001
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			City	Kotagiri
			State	Tamil Nadu
			Country	India
			Pin code	643214
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			Street	Kotagiri
			City	kotagiri
			State	Tamil Nadu
			Country	India
			Pin code	643217

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			City	Erode
			State	Tamil Nadu
			Country	India
			Pin code	638001
Pravinraj M A	Indian	India	House No.	19AD
			Street	Teachers colony
			City	Coimbatore
			State	Tamil Nadu
			Country	India
			Pin code	641602
Dr. B. Gopalakrishnan	Indian	India	House No.	3
			Street	III, KRG Nagar
			City	Coimbatore
			State	Tamil Nadu
			Country	India
			Pin code	641 006

5. TITLE OF THE INVENTION

Internet of Things based Air Quality Classification Device through Infrared Spectroscopy in Outdoor Environment for Smart City Enforcement.

6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	
	Name	
	Mobile No.	
7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA	Name	Sumugan P N
	Postal Address	61, Muthusamy street, 4th cross ext, odakadu, tirupur-641602
	Telephone No.	9360989859
	Mobile No.	9360989859
	Fax No.	
	E-mail ID	sumugan.ad21@bitsathy.ac.in

8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION
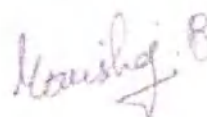
Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention

9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)

International application number	International filing date

10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION

Original (first) application No.	Date of filing of original (first) application

11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT

Main application/patent No.	Date of filing of main application

12. DECLARATIONS

  (i) **Declaration by the inventor(s)**
   (**In case the applicant is an assignee**: 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).

  I/We, the above named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

   Date: 03-02-2023

   Name: SUMUGAN P N   Name: HARISH RAGHAVAN S
   Signature   Signature

   P.N. [signature]   *Harish Raghavan* [signature]

   Name: SHREENHIDHI N   Name: MADHESH SOORYA R
   Signature   Signature

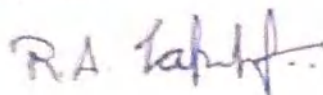   [signature]   [signature]

Name: MANJU H
Signature

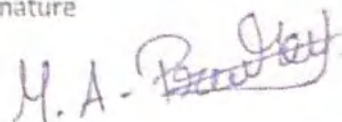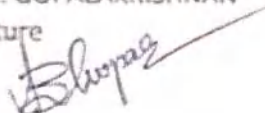Name: MONISHA B
Signature

Name: LAKSHAN R A
Signature

Name: PRAVINRAJ M A
Signature

Name: GOPALAKRISHNAN
Signature

(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)
(c) Name(s) of the signatory

(iii) Declaration by the applicant(s)

I/We the applicant(s) hereby declare(s) that: -

    ϒ   I am/ We are in possession of the above-mentioned invention.

    ϒ   The provisional/~~complete~~ specification relating to the invention is filed with this application.

    ϒ   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.

    ϒ   There is no lawful ground of objection(s) to the grant of the Patent to me/us.

    ϒ   I am/we are the true & first inventor(s).

    ϒ   I am/we are the assignee or legal representative of true & first inventor(s).

    ϒ   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).

    ϒ   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.

    ϒ   My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph-9.

    ϒ   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.

    ϒ   The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph-11.

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
~~Complete~~/ provisional specification)#	No. of pages		
No. of Claim(s)	No. of claims and No. of pages		
Abstract	No. of pages		
No. of Drawing(s)	No. of drawings and No. of pages		

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.

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

(c) Sequence listing in electronic form

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

(e) 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.

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

(g) Statement and Undertaking on Form 5

(h) Declaration of Inventorship on Form 5

(i) Power of Authority

(j) ....

Total fee ..₹.1.7.5.0..in Cash/ Banker's Cheque /Bank Draft bearing No..160161...............

Date.04/02.23.on ...Canara.. Bank.

I/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......................day of......................20........................

    Signature: P N. b̶u̶ḻ̶f̶.

    Name: bumugan P N

To,

The Controller of Patents

The Patent Office, Chennai

Note: -

* Repeat boxes in case of more than one entry.

* To be signed by the applicant(s) or by authorized registered patent agent otherwise where mentioned.

* Tick (✓)/cross (x) whichever is applicable/not applicable in declaration in paragraph-12.

* Name of the inventor and applicant should be given in full, family name in the beginning.

* Strike out the portion which is/are not applicable.

* For fee: See First Schedule";

PROVISIONAL SPECIFICATION
DEFECTIVE MANUFACTURED PRODUCT IDENTIFICATION USING DEEP LEARNING

Product defect detection is critical in manufacturing quality control. This research looks at deep-learning methods for defect detection. First, we categories product defects such as electronic components, pipes, welded parts, and textile materials. Second, recent mainstream techniques and deep-learning methods for defect detection are reviewed, along with their characteristics, strengths, and weaknesses. Third, by focusing on method and experimental results, we summaries and analyze the application of ultrasonic testing, filtering, deep learning, machine vision, and other technologies used for defect detection. We investigate the functions and characteristics of existing defect detection equipment to better understand the difficulties in the field. The fundamental concepts and codes of studies concerning high precision, high positioning, and rapid detection, complex background, object detection, and object association is provided. Finally, we outline the current achievements and limitations of existing methods, as well as current research challenges, to assist the defect detection research community in developing a future research agenda.

KEYWORDS : defect detection, quality control, deep learning, ultrasonic testing

NAME OF THE APPLICATION
SUMUGAN P N
SHREENHIDHI N
HARISH RAGHAVAN S
MADHESH SOORYA R
MANJU H
MONISHA B
LAKSHAN R A
PRAVINRAJ M A
GOPALAKRISHNAN B

FIELD OF THE INVENTION

The present invention relates to the identification of defective items using deep learning which can be used in industry that can reduce the manpower and especially this invention can identify defective items at its first place and customers can get their non-defective products to their hands.

BACKGROUND OF INVENTION

Many products has been checked whether it is defective or not when product arrive to retail market. So using deep learning technology we can detect defective products while in the process of manufacturing and replacing the defective item with a non-defective product.

SUMMARY OF INVENTION

The invention is a deep learning-based method for identifying defective manufactured products (DL). To analyse new products and determine if they are defective, the methodology uses a deep learning model trained on a dataset of both defective and non-defective products. The model's input could be images, audio, or any other type of product-related data, and the model's output could be a prediction of whether the product is defective or not. The invention's goal is to improve the accuracy and speed of defective product identification, assisting manufacturers in minimising waste, lowering costs, and increasing customer satisfaction. The deep learning model is trained on a large dataset of both defective and non-defective products, allowing it to learn the patterns and characteristics that differentiate the two. During the testing phase, new products are fed into the model, and the model predicts whether or not each product is defective. The method is intended to be highly accurate, quick, and low-cost, making it a valuable tool for manufacturers looking to improve their quality control processes.

DETAILED DESCRIPTION OF THE INVENTION

The invention described here is a method for automatically identifying defective manufactured products using deep learning (DL). The method employs a deep learning model that has been trained on a large dataset of both defective and non-defective products, allowing it to learn the patterns and characteristics that distinguish the two. The goal of this invention is to quickly identify and isolate defective products, lowering the risk of shipping

them to customers and lowering the costs of producing and disposing of defective products. The DL model is intended to be highly accurate, quick, and cost-effective, making it a useful tool for manufacturers looking to improve their quality control processes.

1. Deep Learning Model: To identify defective manufactured products, the invention employs a deep learning (DL) model. The deep learning model is trained on a large dataset of both defective and non-defective products, allowing it to learn the patterns and characteristics that differentiate the two.

2. Input Data: Any type of data relevant to the product being analysed can be used as input to the DL model, such as images, audio, or other data. To ensure that the input data is suitable for use by the DL model, it should be pre-processed.

3. Data for Training: The Deep Learning model is trained on a large dataset of both defective and non-defective products. This dataset should be carefully curated to ensure that it represents the types of products that the DL model will analyse in the future.

4. Defective Product Identification: During the testing phase, new products are fed into the DL model, which predicts whether or not each product is defective. The DL model is intended to identify defective products accurately by learning to recognise patterns and characteristics that differentiate between defective and non-defective products.

5. The DL model's output is a prediction of whether or not the product is defective. This prediction can be used to quickly identify and isolate defective products, lowering the risk of shipping defective products to customers and lowering the costs of producing and disposing of defective products.

6. Accuracy: The DL model is intended to be highly accurate, with a low rate of false negatives and false positives (i.e., defective products that are not identified as defective) (i.e., non-defective products that are identified as defective).

7. Speed: The DL model is designed to be fast, allowing manufacturers to analyse large numbers of products quickly and efficiently.

8. Cost-Effectiveness: The invention's method is intended to be cost-effective, allowing manufacturers to improve their quality control processes without incurring significant additional costs.

9. Integration with Existing Systems: Because the DL model can be integrated with existing systems and processes, manufacturers can leverage the power of DL in their current operations.

10. Robustness: The DL model is intended to be robust and reliable, capable of identifying defective products accurately even in the presence of noise and other types of data variability.

MECHANISM OF THE SYSTEM

The system for identifying defective manufactured products using deep learning (DL) has several interconnected steps. The first step is data collection, which involves gathering and pre-processing a large dataset of both defective and non-defective products to be used as input for the DL model. The pre-processed data is then used to train the DL model using a supervised learning approach, in which the model adjusts its parameters to minimise prediction error, allowing it to identify patterns and characteristics of defective and non-defective products. Finally, new products are fed into the DL model during the testing phase, and the model predicts whether each product is defective or not, providing valuable information to the manufacturer. This system aims to quickly identify and isolate defective products, lowering the risk of shipping them to customers and lowering the costs of producing and disposing of defective products. The DL model is intended to be highly accurate, quick, and cost-effective, making it a useful tool for manufacturers looking to improve their quality control processes. In summary, the mechanism of the defective manufactured product identification system based on deep learning entails data collection and pre-processing, training the DL model, testing new products, improving accuracy, integrating with the manufacturing process, providing a user-friendly interface, and being scalable. This system provides a highly accurate and quick

Summary of the Invention:

The invention's objective is to use deep learning to identify faulty produced items.

1. Method: The invention analyses product photos in real-time using deep learning algorithms and methodologies. The system's input is a picture of the created object as above.

2. Analysis: The deep learning model analyses the image and detects any flaws in the goods.

3. Output: The system outputs the analysis findings, including the location and kind of any flaws discovered.

4. Benefits: By utilising deep learning, the system is able to effectively identify flaws, even in complex and diversified items, decreasing manual inspection time and boosting product quality.

5. Limitations: The accuracy of the system may be restricted by the quality of the input photos and the availability of deep learning model training data.

6. Applications: The idea has potential applications in a wide range of industrial industries, including electronics, automotive, and consumer products.

7. Integration: The system may be seamlessly implemented and used by integrating it with current production processes and equipment.

8. Benefits: Using deep learning to identify faulty products improves quality control, boosts efficiency, and lowers costs for producers.

P.N. Bably

FORM 2

THE PATENT ACT 1970

(39 of 1970)

&

The Patents Rules, 2003

PROVISIONAL/COMPLETE SPECIFICATION

(See section 10 and rule13)

1. TITLE OF THE INVENTION

Defective Manufactured product Identification using Deep Learning

2. APPLICANT (S)

(a) NAME: SOMUGAN PN

(b) NATIONALITY: INDIAN

(c) ADDRESS: 61, muthusamy street, oda kadu, torupur - 641602

3. PREAMBLE TO THE DESCRIPTION

PROVISIONAL	COMPLETE
The following specification describes the invention.	The following specification particularly describes the invention and the manner in which it is to be performed.

4. DESCRIPTION (Description shall start from next page.)

Given on separate page

5. CLAIMS (not applicable for provisional specification. Claims should start with the preamble—
"I/we claim" on separate page)

——— N A ———

6. DATE AND SIGNATURE (to be given at the end of last page of specification)

7. ABSTRACT OF THE INVENTION (to be given along with complete specification on separate page)

Note: -

*Repeat boxes in case of more than one entry.

*To be signed by the applicant(s) or by authorized registered patent agent.

*Name of the applicant should be given in full, family name in the beginning.

*Complete address of the applicant should be given stating the postal index no./code, state and country.

*Strike out the column which is/are not applicable

Valid for three months only from the date of instrument

		9
		8
		7
		04.02.2023

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PERUMANNALLUR ROAD BRANCH, TIRUPPUR-641602 (TAMILNADU) (1510) **CB**

01510302.109   160161

यह लिखत जारी करने की तारीख से तीन महीने तक वैध है।

THE CONTROLLER OF PATENTS, CHENNAI

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प्राधिकृत हस्ताक्षरकर्ता
AUTH. SIGNATORY

ESWARAN. K
ऑफिसरपदनाम
नाम S.P. No. 68675
NAME   DESIGNATION   S.P. No.   इ.अ.सं.

प्राधिकृत हस्ताक्षरकर्ता
AUTH. SIGNATORY
नाम   पदनाम   इ.अ.सं.
NAME   DESIGNATION   S.P. No.

₹ एक लाख और इससे अधिक मूल्य वाले डी डी के लिए दो प्राधिकृत हस्ताक्षरकर्ता की जरूरत होगी।
Demand Drafts of ₹ 1 Lakh and above require signature of two authorised signatories.
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वह	TT
रिखा	OL
दरख	TL
OC	

NAI TEYNAMPET (416)
NAME
DRAWEE BRANCH, D.P. CODE

⑆1601610⑆ ⑆540015109⑆   16

1	2	3	4	5