



Institute of Technology, Dhule.

Survey.No. 499, Plot No. 02, Behind Gurudwara, Mumbai - Agra Road, Dist. Dhule, Maharashtra, 424001

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Web : svkm-iot.ac.in

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➤ List of Patents

Sr. No.	Faculty Name	Department	Patent Status with Date	Title of Patent	Page No.
Academic Year 2022-2023					
1	Bhushan Chaudhari	IT Engineering	Granted on 10/07/2023	An IoT and Machine Learning Based Soil Fertility Detector	2 - 3
2	Deepksingh Baghel	Civil Engineering	Filed on 02/06/2023	Mechanical Ventilator	4 - 12
3	Yogesh Bafna	Civil Engineering	Granted on 23/05/2023	Compaction Test Apparatus	13 - 13
4	Makarand Shahade	Computer Engineering	Published on 05/05/2023	EHR With New Dimension to Effective Storage, Secure and Validate Record	14 - 15
5	Pratik Deore	Civil Engineering	Filed on 02/05/2023	Anti-Sleep Sensor Glass	16 - 17
6	Narayan Chandak	Civil Engineering	Granted on 03/03/2023	Powered Oral cleaner	18 - 18
7	Ashish Awate	Computer Engineering	Published on 13/01/2023	Real Time Surveillance System using AI to get Precise Insights and Results for Security and Surveillance Purpose	19 - 20
8	Nilesh Salunke	Mechanical Engineering	Granted on 26/12/2022	Centrifugal Pump	21 - 21
9	Tushar Shinde	Applied Sciences	Published on 23/09/2022	Benzoylation of Coconut Inflorescence Fiber Towards Development of Sustainable Composite Materials.	22 - 25
10	Shrikant Randhavane	Civil Engineering	Published on 09/09/2022	Wild Animal Detection System	26 - 26
11	Umakant Mandawkar	Computer Engineering	Granted on 22/06/2022	Ein Cloud-Computing-basiertes digitales forensisches Untersuchungssystem (A Cloud Computing Based Digital Forensic Investigation System)	27 - 27



Design Application Details

Application Number:	387475-001
Cbr Number:	206861
Cbr Date:	02/06/2023 16:06:50
Applicant Name:	<ol style="list-style-type: none">1. Hemraj Ramdas Kumavat2. Sunil Sahebrao Patil3. Yash B Thakur4. Aashutosh J Patil5. Deepak Singh Baghel6. Pratik Vilas Deore7. Pawan Dilip Desale8. Shivam S Bhaduka9. Tejassinh Y Sisodiya

Design Application Status

Application Status:	Application Under Process(wating for Technical Examination)
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Applicant

Sunil Sahebrao Patil
Hemraj R Kumavat
Yash B Thakur
Aashutosh J Patil
Deepak Singh Baghel
Pratik Vilas Deore
Pawan Dilip Desale
Shivam S Bhaduka
Tejassinh Y Sisodiya

Sunil Sahebrao Patil, Hemraj R Kumavat, Yash B Thakur, Aashutosh J Patil, Deepak Singh Baghel, Pratik Vilas Deore, Pawan Dilip Desale, Shivam S Bhaduka, Tejassinh Y Sisodiya, has invented a new design of a **MECHANICAL VENTILATOR** as set forth in the following specification. The claimed portion of the design of **MECHANICAL VENTILATOR** consist of Node MCU, Heart rate sensor, 12v Geared motor, potentiometer, piston mechanism, OLED display. The piston mechanism is used to provide oxygen supply, and a potentiometer is used to indirectly regulate voltage, causing the pumping rate to vary accordingly. The oxygen rate and SO₂ levels are displayed on the OLED display. The display values assist us in keeping the pressure up. It has provided a heart rate sensor that will continuously monitor the patient's heart rate and SO₂ level. It is very useful in the medical field because it is portable, light in weight, and inexpensive. There is no danger of overpressure. It can be operated directly in the home for children and senior citizens.

Figure 1 is a Front View of a “**MECHANICAL VENTILATOR**” of our new design;

Figure 2 is a Rear View thereof;

Figure 3 is a Top View thereof;

Figure 4 is a Bottom View thereof;

Figure 5 is a Left Side View thereof.

Figure 6 is the Right Side View thereof;

Figure 7 is the Perspective View thereof;

We Claim that:

The novelty resides in the shape & configuration of the “**MECHANICAL VENTILATOR**” as illustrated.

No claim is made by virtue of this registration in respect of any mechanical or other action of any mechanism whatever or in respect of any mode or principle of construction of the Article. No claim is made by virtue of this registration to any right to the exclusive use of the words, letters, numbers, or trademarks appearing in the representation.

Dated: 02 June 2023

For, (Applicant)

HEMRAJ R KUMAVAT

SUNIL SAHEBRAO PATIL

YASH B THAKUR

AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

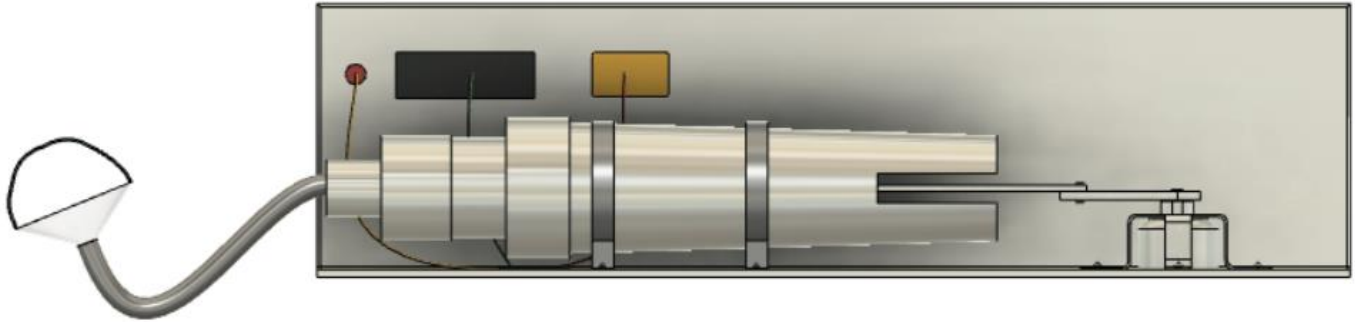
PAWAN DILIP DESALE

SHIVAM S BHADUKA

TEJASSINH Y SISODIYA

APPLICANT

Sunil Sahebrao Patil
Hemraj R Kumavat
Yash B Thakur
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Pawan Dilip Desale
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Front View

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Rear View

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AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

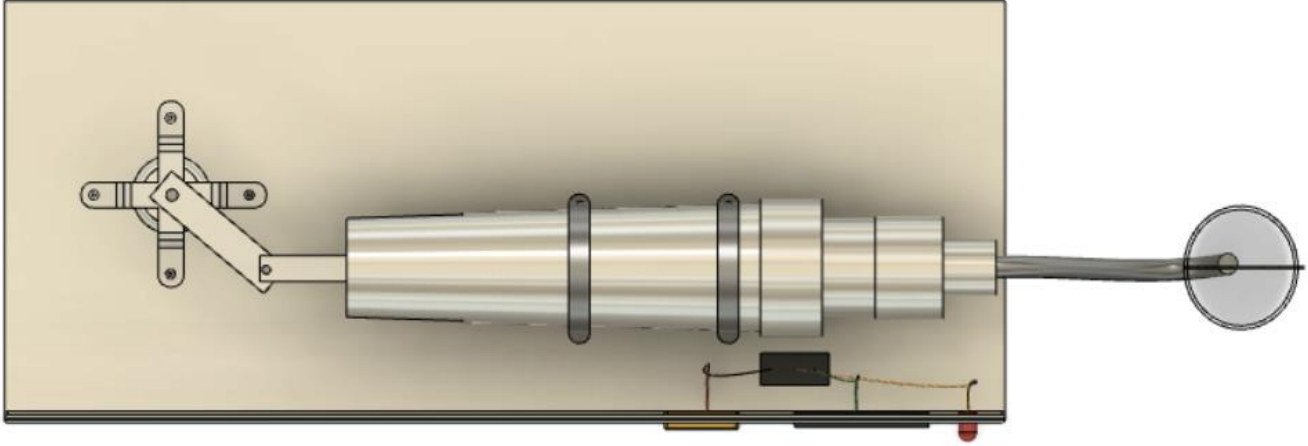
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Top View

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Bottom View

We Claim that:

The novelty resides in the shape & configuration of the “MECHANICAL VENTILATOR” as illustrated.

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Dated: 02 June 2023

For, (Applicant)

HEMRAJ R KUMAVAT

SUNIL SAHEBRAO PATIL

YASH B THAKUR

AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

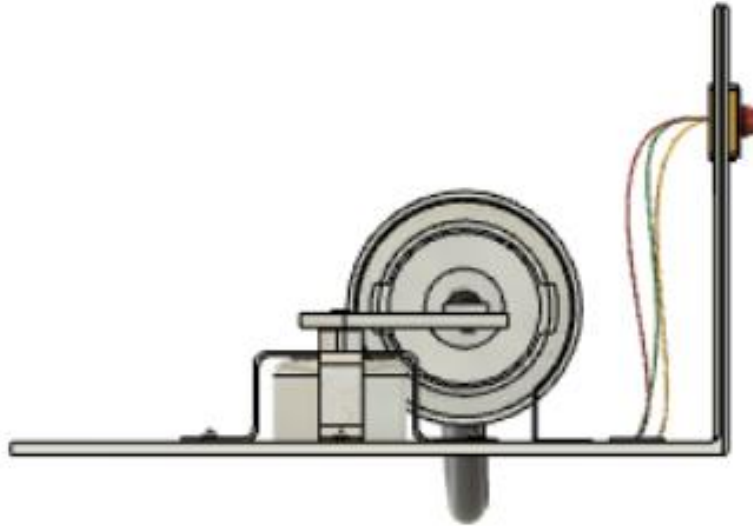
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TEJASSINH Y SISODIYA

APPLICANT

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Tejassinh Y Sisodiya



Left Side View

We Claim that:

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AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

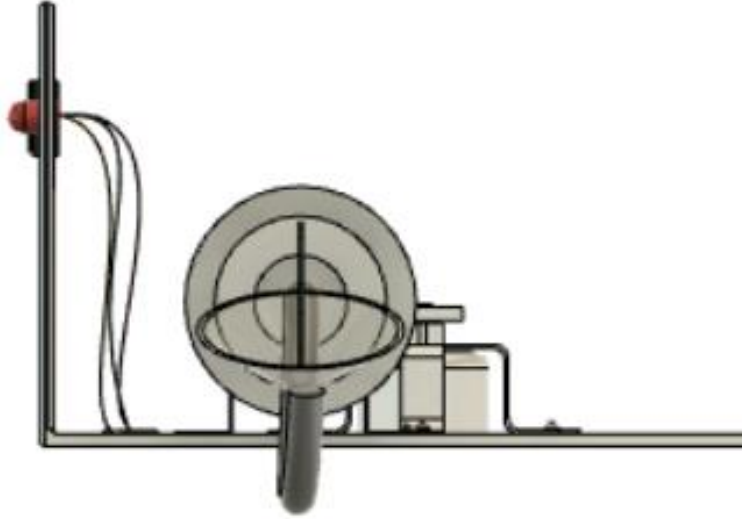
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APPLICANT

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Deepak Singh Baghel
Pratik Vilas Deore
Pawan Dilip Desale
Shivam S Bhaduka
Tejassinh Y Sisodiya



Right Side View

We Claim that:

The novelty resides in the shape & configuration of the “**MECHANICAL VENTILATOR**” as illustrated.

No claim is made by virtue of this registration in respect of any mechanical or other action of any mechanism whatever or in respect of any mode or principle of construction of the Article.

No claim is made by virtue of this registration to any right to the exclusive use of the words, letters, numbers, or trademarks appearing in the representation.

Dated: 02 June 2023

For, (Applicant)

HEMRAJ R KUMAVAT

SUNIL SAHEBRAO PATIL

YASH B THAKUR

AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

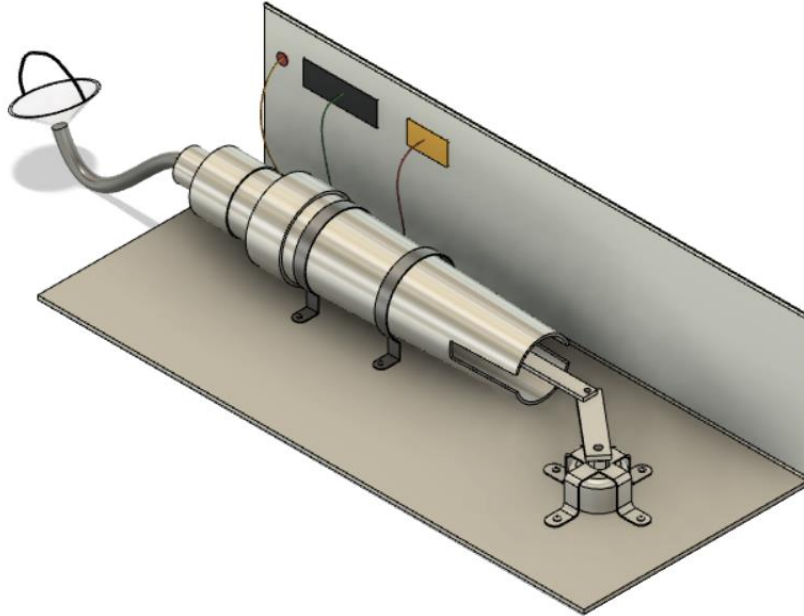
PAWAN DILIP DESALE

SHIVAM S BHADUKA

TEJASSINH Y SISODIYA

APPLICANT

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Deepak Singh Baghel
Pratik Vilas Deore
Pawan Dilip Desale
Shivam S Bhaduka
Tejassinh Y Sisodiya



Perspective View

We Claim that:

The novelty resides in the shape & configuration of the “**MECHANICAL VENTILATOR**” as illustrated.

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Dated: 02 June 2023

For, (Applicant)

HEMRAJ R KUMAVAT

SUNIL SAHEBRAO PATIL

YASH B THAKUR

AASHUTOSH J PATIL

DEEPAK SINGH BAGHEL

PRATIK VILAS DEORE

PAWAN DILIP DESALE

SHIVAM S BHADUKA

TEJASSINH Y SISODIYA



ORIGINAL

मूल/No : 136796



भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE

डिजाइन के पंजीकरण का प्रमाणपत्र
CERTIFICATE OF REGISTRATION OF DESIGN

डिजाइन सं. / Design No. : 377360-001
तारीख / Date : 13/01/2023
पारस्परिकता तारीख / Reciprocity Date* :
देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो **COMPACTION TEST APPARATUS** से संबंधित है, का पंजीकरण, श्रेणी **10-05** में 1.Hemraj Ramdas Kumavat 2. Mahesh Suresh Kumawat 3.Ankesh Dilip Samare 4.Yogesh Devidas Wadile 5.Yogesh Nandkumar Bafna के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

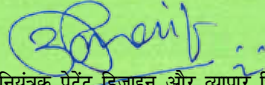
Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class **10-05** in respect of the application of such design to **COMPACTION TEST APPARATUS** in the name of 1.Hemraj Ramdas Kumavat 2. Mahesh Suresh Kumawat 3.Ankesh Dilip Samare 4.Yogesh Devidas Wadile 5.Yogesh Nandkumar Bafna.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अध्याधीन प्रावधानों के अनुसरण में।

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

INTELLECTUAL
PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

निर्गमन की तारीख/Date of Issue : 23/05/2023


महानियंत्रक पेटेंट डिजाइन और व्यापार चिह्न
Controller General of Patents, Designs and Trade Marks

पारस्परिकता तारीख (यदि कोई हो) जिसकी अनुमति देश के नाम पर की गई है। डिजाइन का सत्त्वाधिकार पंजीकरण की तारीख से दस वर्षों के लिए होगा जिसका विस्तार, अधिनियम एवं नियम के निबंधनों के अधीन, पाँच वर्षों की अतिरिक्त अवधि के लिए किया जा सकेगा। इस प्रमाण पत्र का उपयोग विधिक कार्यवाहियों अथवा विदेश में पंजीकरण प्राप्त करने के लिए नहीं हो सकता है।

*The reciprocity date (if any) which has been allowed and the name of the country. Copyright in the design will subsist for ten years from the date of Registration, and may under the terms of the Act and Rules, be extended for a further period of five years. This Certificate is not for use in legal proceedings or for obtaining registration abroad.

पेटेंट कार्यालय
शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 18/2023
ISSUE NO. 18/2023

शुक्रवार
FRIDAY

दिनांक: 05/05/2023
DATE: 05/05/2023

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

(54) Title of the invention : EHR WITH NEW DIMENSION TO EFFECTIVE STORAGE, SECURE AND VALIDATE RECORD

(51) International classification :G16H0010600000, G16H0040670000, G06Q0010100000, H04L0009080000, G16H0050200000

(86) International Application No :NA
 Filing Date :NA

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
 Filing Date :NA

(62) Divisional to Application Number :NA
 Filing Date :NA

(71)Name of Applicant :
1)Dr. Makarand Shahade
 Address of Applicant :Associate Professor, Department of Computer Engineering SVKM's Institute of Technology, Mumbai Agra Highway, Near Gurudwara Dhule, Maharashtra India Dhule -----

2)Ms. Mayuri Kulkarni
3)Mr. Ashish Awate
 Name of Applicant : NA
 Address of Applicant : NA

(72)Name of Inventor :
1)Dr. Makarand Shahade
 Address of Applicant :Associate Professor, Department of Computer Engineering SVKM's Institute of Technology, Mumbai Agra Highway, Near Gurudwara Dhule, Maharashtra India Dhule -----

2)Ms. Mayuri Kulkarni
 Address of Applicant :Assistant Professor, Department of Computer Engineering SVKM's Institute of Technology, Mumbai Agra Highway, Near Gurudwara Dhule, Maharashtra India Dhule -----

3)Mr. Ashish Awate
 Address of Applicant :Assistant Professor, Department of Computer Engineering SVKM's Institute of Technology, Mumbai Agra Highway, Near Gurudwara Dhule, Maharashtra India Dhule -----

(57) Abstract :
 The present invention EHR with New Dimension to Effective Storage, Secure and Validate Record. In the healthcare sector the important and prime element is to have availability of the patient's data called patient medical history. This patient's history is available from his/her records which is nothing but clinical reports or prescriptions. These records of patient is known as medicinal history of the patient. This medicinal history is maintained in the form of Electronic forms. This data availability of the patient's data yet not made available to all the healthcare practitioners on the centralized platforms in secured manner in India. Due to this healthcare system in India is not enough strong such as developed countries. This non-centralized system of storing of EHR (Electronic Health Record)

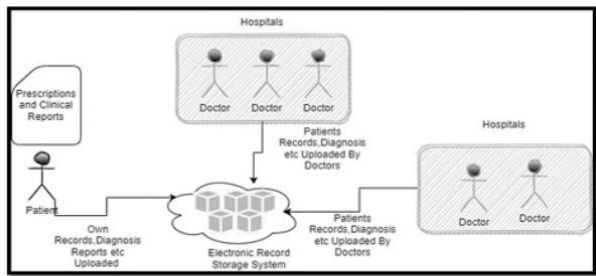


Figure 1: EHR storage system

No. of Pages : 9 No. of Claims : 4

FORM – 1 Application for Registration of Designs. Sections 5 and 44	
You are requested to register the accompanying in;	
Class No 29-02 in the name, ;	
Hemraj Ramdas Kumavat	05, Shirpur Phata, Amode, Tal: Shirpur, Dist: Dhule, MS, 425405
Pratik Vilas Deore	3/A Chandravel Phase 3, Nakane Road, Deopur, Dhule, Maharashtra, 424002
Deepak Singh Baghel	10, Khairhan, Sirmour, Rewa, MP
Charudatta Prakash Thosar	G N. 159/01, P N.24, Primpala Shivar, Girna Pumping Road, Jalgaon, 425001
Yogesh Nandkumar Bafna	94-B, Arihant, Shivparvati Colony, Dattamandir, Deopur, Dhule 424005
Achal Agrawal	FN103, Shubh Labh Avenue, Chandrabhaga, 58-59, Jun Indore, Indore, MP 442007
Dhananjay Jitendra Jadhav	24/B, Shubham Park , Tal, Dist: Nandurbar, 425412
who claim(s) to be the proprietor(s) thereof	
Four exactly similar DRAWINGS of the design accompany this request.	
The design is to be applied for a new design of the ANTI SLEEP SENSOR GLASS	
The design has been previously registered in Classe(s) _____ Under No _____ Details of first application in UK or convention country or group of countries or	
Address For Service In India Is –	Hemraj Ramdas Kumavat, 05, Shirpur Phata, Amode, Tal: Shirpur, Dist: Dhule, Maharashtra, 425405 Email Id: kumavathr1981@gmail.com Phone No: 9689521450
Declaration : The applicant claims to be the proprietors of the design and that to the best of their knowledge and belief design is new or original	

Dated: 02 May 2023

For, (Applicant)

HEMRAJ RAMDAS KUMAVAT

PRATIK VILAS DEORE

DEEPAK SINGH BAGHEL

CHARUDATTA PRAKASH THOSAR

YOGESH NANDKUMAR BAFNA

ACHAL AGRAWAL

DHANANJAY JITENDRA JADHAV















TO
THE CONTROLLER OF DESIGNS,
THE PATENT OFFICE, KOLKATA



ORIGINAL

मूल/No : 130207



भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE
डिजाइन के पंजीकरण का प्रमाणपत्र
CERTIFICATE OF REGISTRATION OF DESIGN

डिजाइन सं. / Design No. : 375277-001
तारीख / Date : 08/12/2022
पारस्परिकता तारीख / Reciprocity Date* :
देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो **POWERED ORAL CLEANER** से संबंधित है, का पंजीकरण, श्रेणी **24-01** में 1.Narayan Ratanlalji Chandak 2. Anokhi Narayan Chandak 3.Jyotsna Narayan Chandak के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

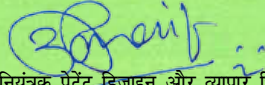
Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class **24-01** in respect of the application of such design to **POWERED ORAL CLEANER** in the name of 1.Narayan Ratanlalji Chandak 2. Anokhi Narayan Chandak 3.Jyotsna Narayan Chandak.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अध्याधीन प्रावधानों के अनुसरण में।

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

INTELLECTUAL
PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

निर्गमन की तारीख/Date of Issue : 03/03/2023


महानियंत्रक पेटेंट डिजाइन और व्यापार चिह्न
Controller General of Patents, Designs and Trade Marks

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निर्गमन सं. 02/2023
ISSUE NO. 02/2023

शुक्रवार
FRIDAY

दिनांक: 13/01/2023
DATE: 13/01/2023

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

(54) Title of the invention : REAL TIME SURVEILLANCE SYSTEM USING ARTIFICIAL INTELLIGENCE TO GET PRECISE INSIGHTS AND RESULTS FOR SECURITY AND SURVEILLANCE PURPOSE

(51) International classification :H04N0007180000, G08B0013196000, G06N0020000000, G06Q0050260000, G08B0025140000
 (86) International Application No :NA
 Filing Date :NA
 (87) International Publication No :NA
 (61) Patent of Addition to Application Number :NA
 Filing Date :NA
 (62) Divisional to Application Number :NA
 Filing Date :NA

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(57) Abstract :

The present invention is a Real Time Surveillance System Using Artificial Intelligence to Get Precise Insights and Results for Security and Surveillance Purpose, In Developed and Developing countries Specially India, although there is an increased focus on public Infrastructure and Mobility there is a large gap when it comes to sustainable, convenient and cost-effective modes of Security Surveillance and utilization, analysis of surveillance database (Smart Cities) for large sections of society. In every field observation is important key to analyse and understand before implementation of any decision, surveillance is part of that. To observe or survey continuously and manually in public and private places for security purpose or surveillance is hardly possible. To survey or to observe on public places needs technical persons and CCTV system for long time work. Despite this we are not getting efficient insights/data and not utilising the CCTV footage and data efficiently. So, we developed Surveillance System. It is Artificial Intelligence and Machine Learning based Camera Surveillance System service and Surveillance database provider which Detects, Analyses and Alerts in Real Time with help of Footages of Cameras that includes Human Activities, Vehicle Detections, Vehicle Counting and Vehicle Number Plate Extraction with the help of Camera Surveillance Footages and Data. It is a Virtual Observer or Analyzer having Low Running Cost.

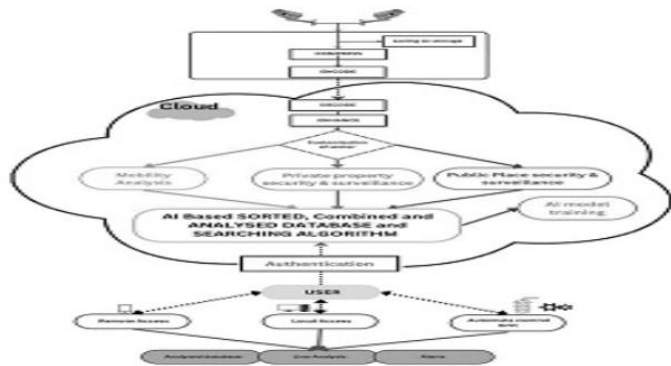


Figure 1: System Architecture

No. of Pages : 11 No. of Claims : 5



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डिजाइन के पंजीकरण का प्रमाणपत्र
CERTIFICATE OF REGISTRATION OF DESIGN

डिजाइन सं. / Design No. : 368957-001
तारीख / Date : 09/08/2022
पारस्परिकता तारीख / Reciprocity Date* :
देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो **CENTRIFUGAL PUMP** से संबंधित है, का पंजीकरण, श्रेणी **15-02** में 1.Dr. Nilesh Salunke 2. Dr. Hitesh Thakare 3.Dr. Amol Badgujar के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

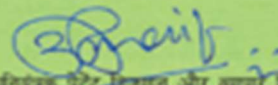
Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class **15-02** in respect of the application of such design to **CENTRIFUGAL PUMP** in the name of 1.Dr. Nilesh Salunke 2. Dr. Hitesh Thakare 3.Dr. Amol Badgujar.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अध्याधीन प्रावधानों के अनुसरण में।

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

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निर्गमन की तारीख/Date of Issue : 26/12/2022


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पारस्परिकता तारीख (यदि कोई हो) जिसकी अनुमति देश के नाम पर की गई है। डिजाइन का सार्वजनिक पंजीकरण की तारीख से दस वर्षों के लिए होगा जिसका विस्तार, अधिनियम एवं नियम के निबंधों के अधीन, पाँच वर्षों की अतिरिक्त अवधि के लिए किया जा सकेगा। इस प्रमाण पत्र का उपयोग विधिक कार्यवाहियों अथवा विदेश में पंजीकरण प्राप्त करने के लिए नहीं हो सकता है।

*The reciprocity date (if any) which has been allowed and the name of the country. Copyright in the design will subsist for ten years from the date of Registration, and may under the terms of the Act and Rules, be extended for a further period of five years. This Certificate is not for use in legal proceedings or for obtaining registration abroad.

(54) Title of the invention : BENZOYLATION OF COCONUT INFLORESCENCE FIBER TOWARDS DEVELOPMENT OF SUSTAINABLE COMPOSITE MATERIALS

<p>(51) International classification :C08K0009060000, C08J0005040000, C04B0018240000, D06M0013513000, B27N0003040000</p> <p>(86) International Application No :PCT// Filing Date :01/01/1900</p> <p>(87) International Publication No : NA</p> <p>(61) Patent of Addition to Application Number :NA Filing Date :NA</p> <p>(62) Divisional to Application Number :NA Filing Date :NA</p>	<p>(71)Name of Applicant : 1)SOUNDARRAJAN KARTHIK Address of Applicant :1/36, Main Road, Mangalam ----- 2)Divya Bajpai Tripathy 3)Dr Tushar Raghunath Shinde 4)Ashutosh Pandey 5)Shanthosh V 6)Seshanivash S 7)Abhishek Bhadola 8)Dhiksha Mathanagopal 9)Kajol Bhati 10)Rajeev Kumar 11)Priyanka Chhabra Name of Applicant : NA Address of Applicant : NA (72)Name of Inventor : 1)Divya Bajpai Tripathy Address of Applicant :Galgotias University, Greater Noida Greater Noida ----- 2)Dr Tushar Raghunath Shinde Address of Applicant :Shri Vile Parle Kelavani Mandal's Institute Of Technology, Dhule, Maharashtra. Dhule ----- 3)Ashutosh Pandey Address of Applicant :AKS University, Satna, Madhya Pradesh Satna ----- 4)Shanthosh V Address of Applicant :Sri Krishna College of Engineering and Technology, Coimbatore Coimbatore ----- 5)Seshanivash S Address of Applicant :Sri Krishna College of Engineering and Technology, Coimbatore Coimbatore ----- 6)Abhishek Bhadola Address of Applicant :Galgotias University, Greater Noida Greater Noida ----- 7)Dhiksha Mathanagopal Address of Applicant :Sri Krishna College of Engineering and Technology, Coimbatore Coimbatore ----- 8)Kajol Bhati Address of Applicant :Galgotias University, Greater Noida Greater Noida ----- 9)Rajeev Kumar Address of Applicant :Galgotias University, Greater Noida Greater Noida ----- 10)Priyanka Chhabra Address of Applicant :Amity institute of Biotechnology,Amity University, Noida Greater Noida -----</p>
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(57) Abstract :

Synthetic fiber reinforced polymer matrix has several disadvantages such as high density, non-degradable and also leads to other major issues like diminishment of fossil fuels and waste management. The need for environment friendly composite resulted in extraction of several natural fibers which are found to be used as potential reinforcement material. So there comes the need to identify biodegradable and sustainable source of fibrous materials namely natural ligno cellulose fibers to be reinforced with polymer matrix. Augmenting concern towards effective utilization of agro waste into useful products has formented the scientific community to look for alternate source of materials. On a circular economy contemplation, natural fibers extracted from agro waste has a potential headway towards evolution of newer materials. The ligno cellulose fibrils extracted from coconut inflorescence were subjected to three type of silane modifications namely KH550 (amino silane), KH560 (epoxy silane) and KH570 (methyl silane) before hybridization. The effect of silane modification on the functional groups were investigated. The KH570 silane modified inflorescence fiber hybridized with glass fiber and fortified epoxy composites was found to exhibit utmost tensile and flexural strength of 102.6 MPa and 166.89 MPa. FTIR analysis confirmed KH570 silane modification leads to condensation reaction between interface of fibers and matrix. SEM analysis also confronted the elimination of functional groups present in the coconut inflorescence fibers.

No. of Pages : 7 No. of Claims : 4

Benzoylation of Coconut Inflorescence Fiber towards development of Sustainable Composite Materials

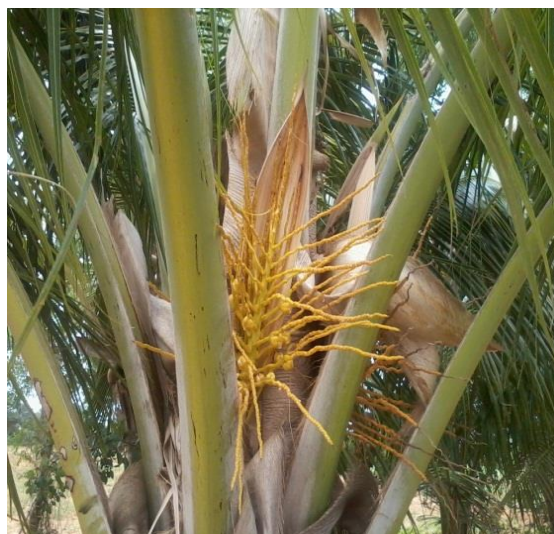
Abstract

Synthetic fiber reinforced polymer matrix has several disadvantages such as high density, non-degradable and also leads to other major issues like diminishment of fossil fuels and waste management. The need for environment friendly composite resulted in extraction of several natural fibers which are found to be used as potential reinforcement material. So there comes the need to identify biodegradable and sustainable source of fibrous materials namely natural lingo cellulose fibers to be reinforced with polymer matrix. Augmenting concern towards effective utilization of agro waste into useful products has formented the scientific community to look for alternate source of materials. On a circular economy contemplation, natural fibers extricated from agro waste has a potential headway towards evolution of newer materials. The ligno cellulose fibrils extracted from coconut inflorescence were subjected to three type of silane modifications namely KH550 (amino silane), KH560 (epoxy silane) and KH570 (methyl silane) before hybridization. The effect of silane modification on the functional groups were investigated. The KH570 silane modified inflorescence fiber hybridized with glass fiber and fortified epoxy composites was found to exhibit utmost tensile and flexural strength of 102.6 MPa and 166.89 MPa. FTIR analysis confirmed KH570 silane modification leads to condensation reaction between interface of fibers and matrix. SEM analysis also confronted the elimination of functional groups present in the coconut inflorescence fibers.

Description

The southern part of India is famous for coconut tree which is an prominent source for lignocellulose fibrils and several natural fibers have been extracted from its different parts namely husk, coir .In this connection one more lignocellulose fiber is identified from the coconut tree which is known as inflorescence. A spadix which can also be known as double sheath encloses the inflorescence which is present in each leaf axil. The length of the inflorescence may vary from 200 mm to 350 mm. The inflorescence is collected from the coconut tree and subjected to retting over a period of ten days. The primary walls of the coconut inflorescence would get softened by the process. Retting by which the water gets penetrated into the central stalk section of the inflorescence, the inner cell walls gets swollen enough, the outermost layer gets softened and decay of primary walls of the inflorescence happens. Then the inflorescence is beaten with mallet to remove the primary fleshy layers thereby fibers present inside the inflorescence is extracted. Fig 1 shows the inflorescence (yellow colour membrane) present in the coconut tree. In a single stack around 20-25 inflorescence will be present in the tree. The inflorescence is then placed in water to soften the primary walls of the

inflorescence and then with the help of mallet the primary walls are broken to extract the lignocellulose fiber.



Coconut Inflorescence

The inflorescence fiber before reinforcement is exposed to surface treatment with 5% wt/vol of NaOH solution. Then the fibrils are washed well with water to remove the alkali contents in the fibrils. Then the fibrils are subjected to three types of silane coupling agents namely γ -Aminopropyltriethoxysilane (KH550), 3-Glycid-oxypropyltri-ethoxysilane (KH560), and γ -Methacryloxy-propyltrimethoxy-silane (KH570) for one hour. Finally, the inflorescence fibrils are washed well with water to remove silane molecules present if any.

Result and Discussion

The effect of silane modification on the surface of inflorescence fibers subjected to three silane molecules can be inferred with the help of FTIR analyzer. The analysis was done as per KBr pellet technique for a wavelength ranging from 400 cm^{-1} to 4000 cm^{-1} at 32 scans each time for a wave length of 4 cm^{-1} . Finally, morphology of the inflorescence fibrils was examined by scanning electron microscope to perceive the effect of silane molecules on the surface of inflorescence fibrils.

FTIR Analysis

FTIR analysis is used to investigate the influence of silane modification on the chemical structure of inflorescence fibers. The wave numbers and their corresponding functional group assignment are represented in figure 4. The apex at 2970 cm^{-1} corresponds to C-H stretching vibration of alkanes. The apex at 1750 cm^{-1} correlate to C=O stretching vibration of esters. The

apex at 1100 cm^{-1} relates to C-O stretching vibration of alcohols. The apex at 750 cm^{-1} represents C=C aromatic stretching. In line with virgin fibers new apex were formed at 3750 cm^{-1} relating to OH stretching vibration, 3610 cm^{-1} correlates to N-H stretching vibration and 1500 cm^{-1} corresponds to stretching vibration of Si-O-C. The peaks confirm that inflorescence fibers and silane are subjected to condensation reaction [11].

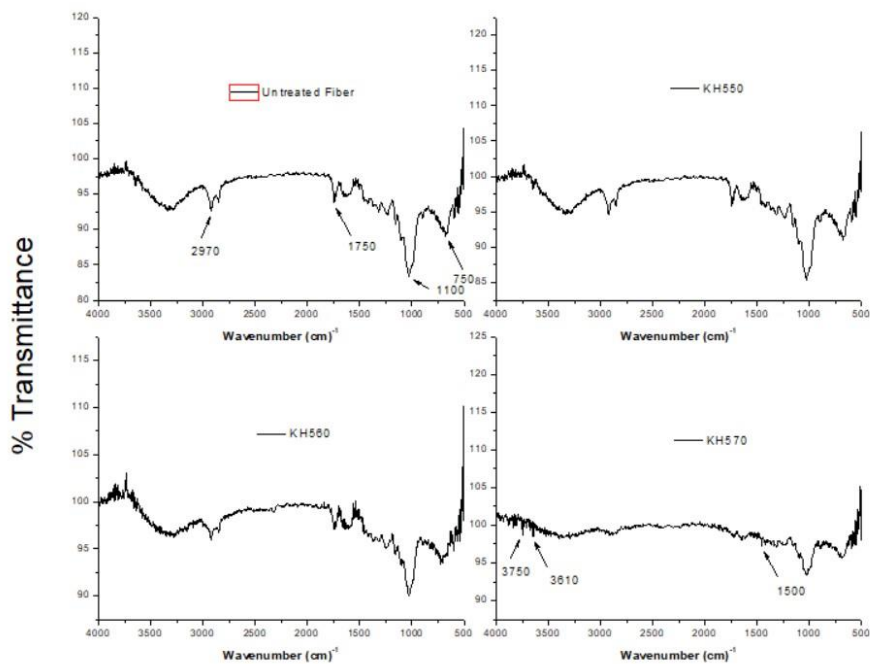


Figure 2 FTIR Spectrum Apex of Unmodified and Silane Modified Inflorescence Fibrils

The order of improvement between different silane modification is $\text{KH570} > \text{KH560} > \text{KH550} >$ unmodified inflorescence/glass fiber fortified hybrid epoxy composites.

Claim

1. The foresaid invention in which fiber extracted from Inflorescence of coconut tree.
2. The extracted inflorescence fiber as per claim 1 must be subjected to surface treatments through suitable agents available.
3. The extracted inflorescence fiber as per claim 1 may or may not be subjected to surface treatments if not required.
4. The extracted inflorescence fiber as per claim 1 must be subjected to silane coupling agents to enhance interfacial adhesion during reinforcement with polymer matrices.



सत्यमेव जयते

Office of the Controller General of Patents, Designs & Trade Marks
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Ministry of Commerce & Industry,
Government of India



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APPLICANT NAME	1 . VISHWAJEET ASHOK KADLAG 2 . DR.SHRIKANT BAHUSAHEB RANDHAVANE
TITLE OF INVENTION	WILD ANIMAL DETECTION SYSTEM
FIELD OF INVENTION	MECHANICAL ENGINEERING
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