

पेटेंट कार्यालय
शासकीय जर्नल

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DATE: 28/11/2025

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202541108669 A

(19) INDIA

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(43) Publication Date : 28/11/2025

(54) Title of the invention : A SYSTEM AND METHOD FOR A SMART TORQUE WRENCH WITH DIGITAL CALIBRATION INTERFACE

(51) International classification	:G01L 25/00, H04W 28/18, H04L 69/24, H04W 92/00, H04L 51/58	(71)Name of Applicant : 1)Vels Institute of Science, Technology & Advanced Studies (VISTAS) Address of Applicant :Pallavaram, Chennai, Tamil Nadu -600117 Tamil Nadu India (72)Name of Inventor : 1)Dr. S. Venugopal 2)Dr. V. Muthuraman 3)Dr. Vinod kumar T 4)Dr. S. Arunkumar 5)Dr. Ajith Arul Daniel 6)Dr. S. Varunraj
(31) Priority Document No	:NA	
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Filing Date	:NA	
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Filing Date	:NA	

(57) Abstract :

[041] The invention discloses a system and method for a Smart Torque Wrench with a Digital Calibration Interface, incorporating torque sensing components, a microcontroller processing unit, a digital display, and wireless communication capabilities for precise torque measurement and calibration traceability. The system automatically synchronizes calibration profiles through a digital calibration docking station or cloud-based calibration server, ensuring accurate, validated torque delivery during operation. Real-time torque values are displayed to the operator, and multimodal feedback is provided to indicate correct torque attainment. Additionally, the system logs torque events with timestamps and operator identifiers, enabling secure data storage, audit compliance, and integration with Industry 4.0 monitoring platforms. Accompanied Drawing [FIGS. 1-2]

No. of Pages : 18 No. of Claims : 10

“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	
Vels Institute of Science, Technology & Advanced Studies (VISTAS)		Indian	India	Pallavaram, Chennai, Tamil Nadu - 600117	
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]					
Natural Person ()		Other than Natural Person			
		Educational Institutions ((✓))	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	
1. Dr. S. Venugopal		Indian	India	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117	

2. Dr. V. Muthuraman	Indian	India	Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
3. Dr. Vinod kumar T	Indian	India	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
4. Dr. S. Arunkumar	Indian	India	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
5. Dr. Ajith Arul Daniel	Indian	India	Assistant Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
6. Dr. S. Varunraj	Indian	India	Assistant Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 60011

5. TITLE OF THE INVENTION

“A SYSTEM AND METHOD FOR A SMART TORQUE WRENCH WITH DIGITAL CALIBRATION INTERFACE”

6. AUTHORISED REGISTERED PATENT AGENT(S)

IN/PA No.

Name

Mobile No.

7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA

Name

Dr. S. Venugopal

Postal Address

Associate Professor,
Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117

Telephone No.

Mobile No.

8072375039

Fax No.

E-mail ID

abiresearchacademy@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)
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)					
<p>(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).</p> <p>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.</p>					
(a) Date 09/11/2025					
(b) Name			(c) Signature		
1. Dr. S. Venugopal 2. Dr. V. Muthuraman 3. Dr. Vinod kumar T 4. Dr. S. Arunkumar 5. Dr. Ajith Arul Daniel 6. Dr. S. Varunraj					
(ii) Declaration by the applicant(s) in the convention country					
<p>(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</p>					

~~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: -

- 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(s) 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.~~

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
Complete/ Provisional specification) #	No. of pages:13		
No. of Claim(s)	No. of claims:10 No. of pages: 02		

Abstract	No. of pages: 01		
No. of Drawing(s)	No. of drawings: 02 No. of pages: 02		

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 3
- (h) Declaration of Inventorship on Form 5
- (i) Power of Authority
- (j) **Total fee ₹.....in Cash/ Banker's Cheque /Bank Draft bearing No.....
Date on 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 09th day of November 2025

Applicant: Vels Institute of Science, Technology & Advanced Studies (VISTAS)

To,
The Controller of Patents
The Patent Office, at 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”;

FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See section 10 and rule 13)

TITLE OF THE INVENTION

“A SYSTEM AND METHOD FOR A SMART TORQUE WRENCH WITH DIGITAL
CALIBRATION INTERFACE”

Applicant:

Vels Institute of Science, Technology & Advanced Studies (VISTAS),

Pallavaram, Chennai, Tamil Nadu -600117.

The following specification particularly describes the nature of the invention and the manner in which it is performed:

FIELD OF THE INVENTION

[001] The present invention relates to torque-controlled fastening tools, particularly to a **smart torque wrench** incorporating digital sensing and calibration capabilities. The invention specifically addresses systems and methods for precise torque measurement, automated calibration synchronization, digital torque verification, and wireless communication for data logging and quality assurance in industrial assembly, maintenance, automotive, aerospace, construction, and mechanical engineering environments.

BACKGROUND OF THE INVENTION

[002] Torque wrenches are widely used in industries to tighten fasteners to a predetermined torque value, ensuring the structural integrity and mechanical reliability of assemblies. Manual torque wrenches typically rely on mechanical indicators or preset mechanical detents, which may lose accuracy over repeated use and time due to mechanical wear and environmental impacts.

[003] With advancements in precision engineering, digital torque wrenches have emerged, offering electronic measurement and display features. However, these solutions still depend heavily on periodic manual calibration and verification, which often require multiple external tools, specialist interventions, and off-site calibration facilities. This dependency increases maintenance downtime and operational cost.

[004] In high-risk industries such as aerospace, automotive manufacturing, and medical device assembly, incorrect torque application can lead to severe mechanical failure, safety hazards, or product non-compliance with global

standards. Therefore, ensuring accurate torque delivery with verifiable calibration integrity is essential for maintaining product quality and operator safety.

[005] Existing digital torque wrenches typically store torque values and measurement units but lack integrated calibration traceability. They do not provide automated synchronization with calibration databases, nor do they verify calibration validity during active usage. This creates blind spots in torque compliance audit trails.

[006] Furthermore, traditional calibration systems usually rely on manual documentation, handwritten logs, or standalone spreadsheets. Such methods are prone to human error, data loss, forged compliance records, or difficulties during safety audits and certification reviews, especially in regulated manufacturing environments.

[007] There is also a growing requirement for intelligent tools that seamlessly integrate with Industry 4.0 platforms, enabling real-time data capture, quality control analytics, automated maintenance scheduling, and remote monitoring. Conventional torque wrenches lack the capability to communicate wirelessly with IoT-enabled dashboards, factory management systems, or cloud-based calibration servers.

[008] Another challenge lies in providing user guidance and feedback accuracy. Many torque tools rely solely on visual indicators, which may be insufficient in fast-paced assembly environments with varying lighting and noise conditions.

Enhanced multimode feedback such as vibration alerts, audio cues, or LED indicators can significantly improve operational accuracy and ergonomics.

[009] Therefore, there is an evident need for a smart torque wrench system and method that integrates real-time torque sensing, automated digital calibration, wireless data logging, and intelligent user assistance. Such a system would reduce calibration downtime, prevent torque errors, support compliance documentation, and ensure long-term measurement traceability.

[010] The present invention addresses the above-mentioned limitations by providing a **Smart Torque Wrench with a Digital Calibration Interface**, enabling seamless calibration synchronization, precise torque measurement, wireless communication, and secure audit-ready data storage to support modern industrial and maintenance applications.

SUMMARY OF THE INVENTION

[011] The present invention provides a **System and Method for a Smart Torque Wrench with Digital Calibration Interface**, designed to deliver accurate torque measurement, real-time calibration validation, data logging, and wireless communication for enhanced operational reliability. The invention integrates electronic torque sensing components, embedded computing hardware, and a digital user interface to ensure controlled and verifiable torque application in industrial environments.

[012] In one aspect, the system comprises a torque wrench equipped with strain gauge or piezoelectric torque sensors, a microcontroller-based processing unit, a digital display module, and a wireless communication

interface. These elements collectively enable the continuous measurement of applied torque, dynamic computation of torque values, and live feedback to the operator during tightening operations.

[013] In another aspect, the invention includes a **digital calibration interface** that automates the synchronization of calibration data. The wrench communicates with a calibration docking station, external computing device, or cloud server to retrieve, validate, and store calibration records. This ensures that the wrench always operates under an up-to-date calibration profile and eliminates human error in calibration tracking.

[014] The system further features a data logging mechanism that records each torque event, including the applied torque, timestamp, operator identity, and part or component identifier. These records can be wirelessly transmitted to a supervisory database or manufacturing execution system for compliance verification, audit traceability, preventive maintenance scheduling, and production quality control.

[015] The invention also supports multimodal feedback, such as visual display cues, vibration pulses, or audible indicators, which notify the operator when the target torque range has been reached. This enhances usability, reduces user fatigue, and minimizes the probability of over-tightening or under-tightening fasteners.

[016] By offering real-time sensing accuracy, automated calibration management, wireless connectivity, and intelligent feedback, the invention overcomes the drawbacks of traditional torque wrenches. The system ensures

reliable torque compliance, improves workflow efficiency, supports regulatory documentation, and aligns with Industry 4.0 smart manufacturing integration requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[017] The accompanying figures included herein, and which form parts of the present invention, illustrate embodiments of the present invention, and work together with the present invention to illustrate the principles of the invention
Figures:

[018] Figure 1, illustrates the structural configuration of the Smart Torque Wrench, showing the torque sensor assembly embedded within the wrench body, the microcontroller processing unit, the digital display module, the battery compartment, and the wireless communication interface.

[019] Figure 2, illustrates the Digital Calibration Interface system architecture, demonstrating the communication link between the smart torque wrench, a calibration docking station, and an external computing device or cloud-based calibration management server.

DETAILED DESCRIPTION OF THE INVENTION

[020] The present invention relates to a **System and Method for a Smart Torque Wrench with Digital Calibration Interface**, incorporating torque sensing hardware, embedded processing, wireless communication, and automated calibration synchronization. The following detailed description explains the structural components, operational workflow, data communication, and functional integration of the system.

A. Smart Torque Wrench Hardware Structure

[021] The smart torque wrench consists of a mechanically rigid wrench body designed to withstand repetitive torque loads. Within the wrench body, a **torque sensor assembly** is positioned, preferably using strain gauges or piezoelectric sensors, configured to generate electrical signals proportional to the applied torque force.

[022] A **microcontroller processing unit** is integrated within the handle section and electrically connected to the torque sensor assembly. The microcontroller performs analog-to-digital conversion of sensor signals, applies calibration coefficients, and computes real-time torque values.

[023] A **digital display module** is mounted on the handle to present torque readings, calibration status, user notifications, battery level, operational mode, and error alerts. The display may be an LCD, OLED, or electronic paper display to maximize readability in varied lighting conditions.

[024] The wrench is equipped with a **rechargeable battery** or replaceable power cell enclosed in a protected compartment. The power management system regulates voltage supply, monitors battery health, and optionally supports wireless or dock-based charging.

[025] A **wireless communication module**, such as Bluetooth, Wi-Fi, NFC, or LoRa, enables connectivity between the wrench and external devices, including calibration stations, smartphones, industrial workstations, and cloud platforms.

B. Digital Calibration Interface and Synchronization

[026] The invention features a **digital calibration interface** designed to automate the calibration process and ensure traceable accuracy control. The torque wrench can be placed in a **calibration docking station** equipped with a reference torque mechanism and data communication interface.

[027] During calibration, the docking station applies controlled torque loads to the wrench while capturing sensor output data. The docking station calculates updated calibration parameters and transmits them directly to the wrench's memory through wired or wireless communication.

[028] The calibration data may also be uploaded to a **cloud-based calibration server**, enabling digital storage of calibration history, compliance certification documents, operator credentials, and version-controlled calibration profiles. This ensures traceability for industrial audit requirements.

[029] The wrench periodically verifies calibration validity and alerts the operator if calibration is due, expired, or inconsistent with the stored profile. This prevents usage of uncalibrated tools in regulated industrial environments.

C. Real-Time Torque Measurement and User Feedback

[030] During operation, the microcontroller continuously calculates torque values and compares them to predefined torque targets. The wrench may store multiple torque preset profiles selectable by the operator for different tasks or components.

[031] The invention includes **multimodal feedback mechanisms** to notify the operator when the desired torque threshold is achieved. This may include visual

display indicators, vibration feedback through haptic motors, or audio signals from an integrated buzzer.

[032] The feedback ensures accurate tightening even in noisy, obstructed, or visually restrictive environments, reducing the risk of over-tightening or under-tightening.

D. Data Logging and Wireless Data Exchange

[033] The smart torque wrench records each torque event, including measured torque value, timestamp, operator identifier, fastener or part identifier, and optional GPS location for field service scenarios.

[034] The recorded data is stored locally in onboard memory and can be transmitted wirelessly to enterprise systems such as **Manufacturing Execution Systems (MES)**, **Quality Management Systems (QMS)**, or cloud monitoring dashboards.

[035] The system supports data encryption and secure authentication to ensure that torque compliance records remain tamper-proof and audit-ready for regulatory and certification purposes.

E. System Integration and Industrial Application

[036] The invention is compatible with Industry 4.0 smart factory platforms, enabling automated workflow management, predictive tool maintenance scheduling, operator performance analytics, and real-time quality assurance monitoring.

[037] The smart torque wrench may be used in automotive assembly lines, aerospace manufacturing, heavy equipment maintenance, medical device fabrication, and precision engineering workshops where torque accuracy is critical.

[038] The present invention significantly enhances torque application accuracy, calibration reliability, and industrial traceability by integrating real-time sensing, wireless communication, and automated calibration management within a smart torque wrench system. The solution reduces operational downtime, minimizes human error, ensures compliance with international torque standards, and supports continuous quality assurance across diverse manufacturing and maintenance environments.

[039] In future implementations, the system may incorporate advanced machine learning algorithms to predict tool wear, recommend calibration intervals based on usage trends, and suggest optimal torque profiles for specific materials or fastener types. Integration with augmented reality (AR) headsets or smart glasses may further assist operators through visual step-by-step torque workflows in complex assembly settings. The invention may also be adapted for robotic or autonomous tool systems, expanding its applicability in next-generation smart factories and automated assembly lines.

[040] Overall, the invention provides a reliable, intelligent, and digitally traceable torque application system, overcoming the limitations of conventional torque wrenches by enabling real-time accuracy verification, calibration synchronization, ergonomic operator guidance, and secure data logging.

We Claim:

1. A smart torque wrench system comprising a torque sensor assembly, a microcontroller unit, a digital display module, a power supply, and a wireless communication module configured to measure and display real-time torque values.
2. The smart torque wrench system of claim 1, wherein the torque sensor assembly comprises one or more strain gauge or piezoelectric sensors calibrated to generate electrical signals proportional to applied torque.
3. The smart torque wrench system of claim 1, wherein the microcontroller unit is configured to convert sensor signals into torque readings and apply calibration coefficients stored in memory.
4. The smart torque wrench system of claim 1, wherein the wireless communication module enables data exchange between the torque wrench and an external calibration station, computing device, or cloud server.
5. A digital calibration interface configured to automatically update calibration parameters of the smart torque wrench system through wired or wireless data communication.
6. The system of claim 5, wherein calibration data is transmitted to and stored on a cloud-based calibration server for maintaining calibration history and audit traceability.
7. A method of torque application comprising measuring torque using the torque sensor assembly, computing torque values via the microcontroller unit, and displaying the torque readings on the digital display module during operation.

8. The method of claim 7, further comprising comparing real-time torque values with predefined torque thresholds and generating multimodal feedback to indicate correct torque attainment.
9. The method of claim 7, further comprising logging torque values, timestamps, and operator identifiers into onboard storage and transmitting the recorded data to an external monitoring system.
10. The smart torque wrench system as claimed in any preceding claim, wherein the system is configured for integration with Industry 4.0 platforms for predictive maintenance, audit compliance, and workflow automation.

Dated this 09th day of November 2025

Applicant

Vels Institute of Science, Technology
& Advanced Studies (VISTAS)

ABSTRACT

A SYSTEM AND METHOD FOR A SMART TORQUE WRENCH WITH DIGITAL CALIBRATION INTERFACE

[041] The invention discloses a system and method for a Smart Torque Wrench with a Digital Calibration Interface, incorporating torque sensing components, a microcontroller processing unit, a digital display, and wireless communication capabilities for precise torque measurement and calibration traceability. The system automatically synchronizes calibration profiles through a digital calibration docking station or cloud-based calibration server, ensuring accurate, validated torque delivery during operation. Real-time torque values are displayed to the operator, and multimodal feedback is provided to indicate correct torque attainment. Additionally, the system logs torque events with timestamps and operator identifiers, enabling secure data storage, audit compliance, and integration with Industry 4.0 monitoring platforms.

Accompanied Drawing **[FIGS. 1-2]**

Dated this 09th day of November 2025

Applicant

Vels Institute of Science, Technology
& Advanced Studies (VISTAS)

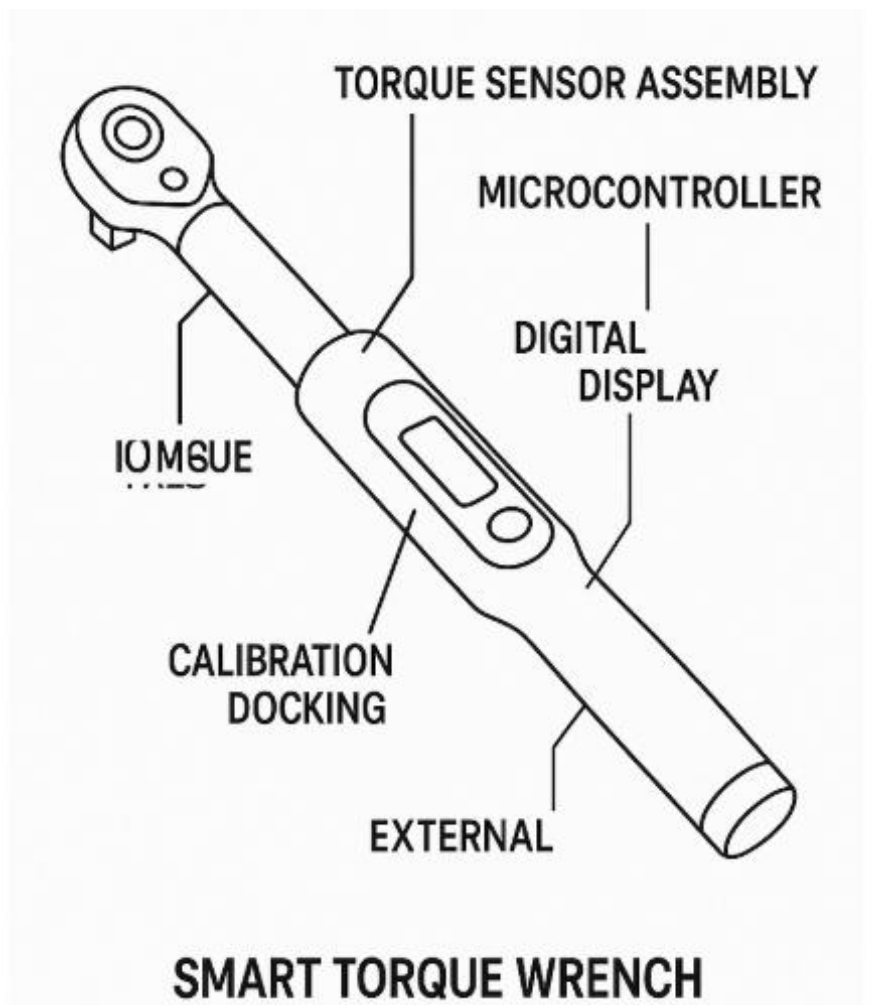


Fig. 1

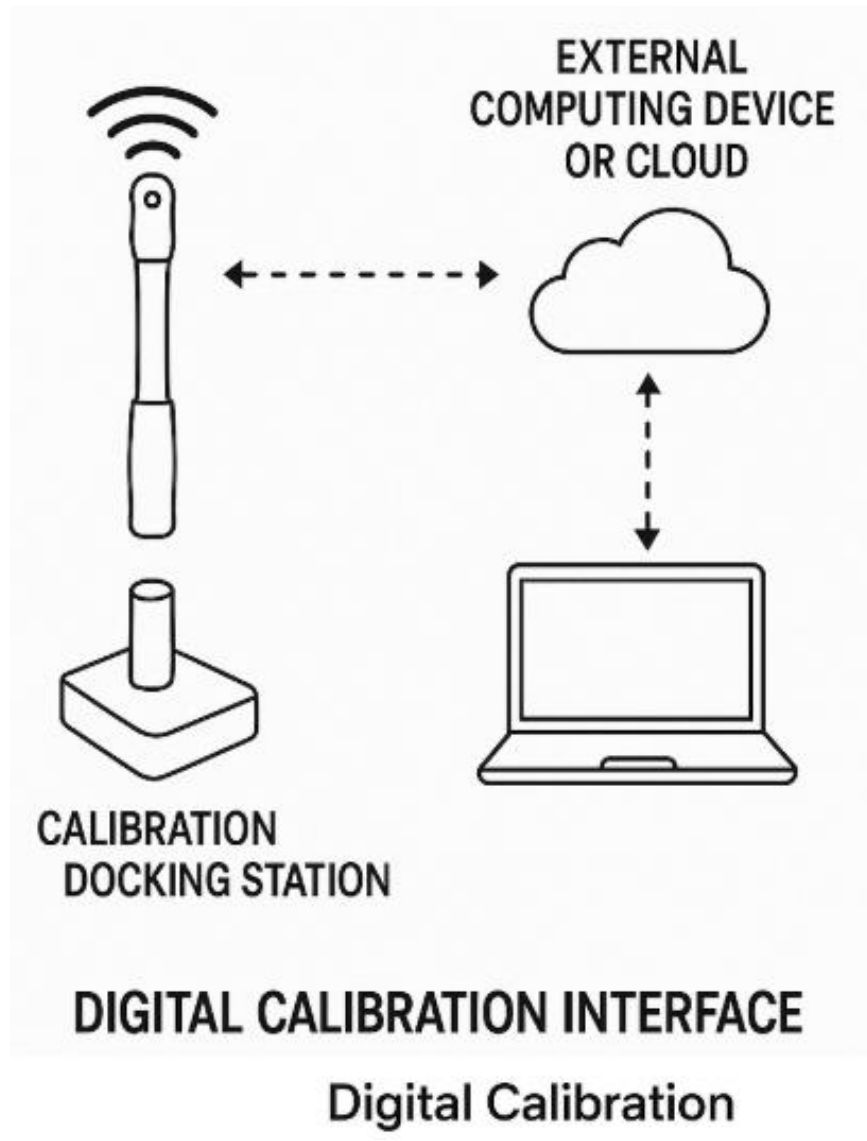


Fig. 2

Dated this 09th day of November 2025

FORM 3
THE PATENTS
ACT, 1970(39 of 1970)
and
THE PATENTS RULES, 2003
STATEMENT AND UNDERTAKING UNDER SECTION
8
(See section 8; Rule 12)

1. Name of the applicant(s).	We, Vels Institute of Science, Technology & Advanced Studies (VISTAS) having office at, Pallavaram, Chennai, Tamil Nadu -600117.
------------------------------	---

2. Name, address and nationality of the joint applicant.	<p>(i) That I/We have not made any application for the same/substantially the same invention outside India Or</p> <p>(ii) that I/We who have made this application No...dated alone/jointly with, made for the same/substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:</p>
--	---

Name of the Country	Date of Application	Application No.	Status of the Application	Date of Publication	Date of grant
-	-	-	-	-	-

3. Name and address of the assignee	<p>(iii) that the rights in the application(s) has/have been assigned to.....none.....</p> <p>.....</p> <p>..... that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.</p> <p>Dated this 09th day of November 2025</p>
-------------------------------------	---

4. To be signed by the applicant or his authorized registered patent agent.	
5. Name of the natural person who has signed.	Vels Institute of Science, Technology & Advanced Studies (VISTAS) Name of the Applicant
	To The Controller of Patents, The Patent Office, at Chennai
Note.-Strike out whichever is not applicable;	

FORM- 5
THE PATENTS ACT, 1970
(39 of 1970)
&
The Patents Rules, 2003
DECLARATION AS TO INVENTORSHIP
[See Section 10(6) and Rule 13(6)]

1. NAME OF THE APPLICANT(S)

We, **Vels Institute of Science, Technology & Advanced Studies (VISTAS)** having office at, Pallavaram, Chennai, Tamil Nadu -600117.

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of ~~my~~/ our application numbered _____ dated 09-11-2025~~is~~/are

2. INVENTOR(S)

(a) NAME	(b) NATIONALITY	(c) ADDRESS
1. Dr. S. Venugopal	Indian	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
2. Dr. V. Muthuraman	Indian	Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
3. Dr. Vinod kumar T	Indian	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
4. Dr. S. Arunkumar	Indian	Associate Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
5. Dr. Ajith Arul Daniel	Indian	Assistant Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu - 600117
6. Dr. S. Varunraj	Indian	Assistant Professor, Department of Mechanical Engineering, Vels Institute of Science, Technology &

		Advanced Studies, Chennai, Tamil Nadu - 60011
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~~3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:—~~

N.A.

~~We the applicant(s) in the convention country hereby declare that our right to apply for a patent in India is by way of assignment from the true and first inventor(s).~~

Dated this 09th day of November 2025

Vels Institute of Science, Technology &
Advanced Studies (VISTAS)

Applicant

To,
The Controller of Patents
The Patent Office, Chennai

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **Vels Institute of Science, Technology & Advanced Studies (VISTAS)** hereby request for early publication of my/our [Patent Application No.] TEMP/E-1/122043/2025-CHE

Dated **09/11/2025 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

This form is electronically generated.