Artemis: Railroad Crack Detection Robot
IITM Technology Available for Licensing

PROBLEM STATEMENT

- The conventional maintenance of the railway tracks, it become **highly difficult and unreasonably costly** to manually go and check for cracks in railway tracks.
- Further if it left undetected, which may lead to derailments.
- **Derailments** are a **serious challenge** for railways and cause great **loss of life .**
- Hence, it is needed to address the issues.
- Present invention addresses above challenges & provide solutions efficiently.

INTELLECTUAL PROPERTY

IITM IDF Ref. 1643; IN Patent No: 460037

TECHNOLOGY CATEGORY/ MARKET

Technology: Railroad Crack Detection Robot;
Industry: Railway Industry,
Application: Railway Industry;
Market: The global rail flaw detection robot market is projected to grow at a **CAGR** of **7.10%** during **2024-2030.**

TECHNOLOGY

- The present invention describes a **non-destructive, non-interrupting rail road continuously operable inspection system** for **detecting defects in a rail track**.
- Said non-destructive, non-interrupting continuously operable inspection **method** for detecting defects in a rail track.

The Robot travel along a track, & using ultrasound technology, infrared technology, & eddy current based sensors, it would detect crack.

During operation, Robot reaches the earmarked station, and share data which helps to know exactly where the cracks located for corrective measures.

- The robot can move on the **inner portions** of the **railway tracks** in such a way that **railway locomotives** can move from above on the same track.
- For achieving this feat, the **axes** of the wheels are **aligned vertically**.
- To move above the fish plates, the use of custom made spring suspension system are incorporated., Further, for the stability of the robot, there are six wheels used along with six suspensions incorporated.(3 wheels on either side) (Refer Fig 1A)

Fig. 1A

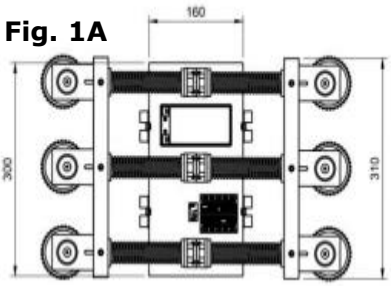

Fig. 1B

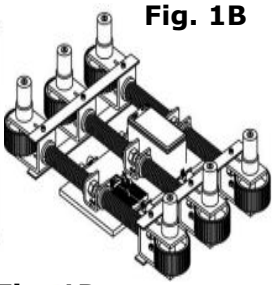

Fig. 1C

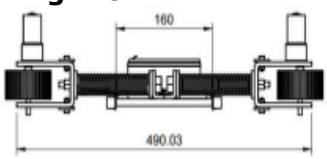

Fig. 1D

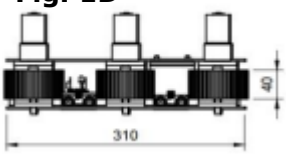

Fig.1A, 1B, 1C, & 1D:Illustrate the proposed robot fixed in the Railway Track for detecting defects in a rail track;;

TRL (TECHNOLOGY READINESS LEVEL)

TRL-4, Proof of concept Tested & validated;

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KEY FEATURES / VALUE PROPOSITION

❖ *Technical Perspective:*

- **Uniqueness** in the **Robot Design, therefore** the robot can be **integrated** with the existing railway infrastructure easily**.**
- Said **Robot** can **move** on the **inner portions** of the railway tracks in such a way that railway **locomotives** can move **from above** on the **same track**.
- The system comprises of a **carriage base means adapted** for being **self propelled** within a **two-rail track.**
- **A plurality of sensors** & the most preferred is an array of **ultrasonic, infrared sensors, eddy current based sensors & transducers** in between its tires which roll along a **rail web** adapted for **transmission & reception of ultrasonic beams** into and from the at least **one rail** for detection of defects within the rail.
- The system also includes a **data acquisition means** in communication with the **plurality of sensor means.**
- The **Methods** used by the railways for **accident deterrence cause disruptions** in the regular working of the Indian Railways, **causing losses**.
- Provide real time solution in terms of **real time transmission** whenever a **crack is detected**.
- The **transmitted message** includes **location of the crack & the time of detection**.
- Facilitate **GSM sim module** which works on cellular network, alternatively,

-as a **failsafe**(in case of network errors) measure the location of the cracks in a **SD card** using a **microcontroller SD card shield.**

- **Eliminates** visual inspection & manual inspection, & **save time, secure process, avoid the risk of human lives**.

❖ *Industrial Perspective:*

- The **robot design** facilitates the **addition & usage of equipment** for the main purpose (**crack detection**) as well as for secondary purposes like **surveillance**.
- This **cost-effective design** is also **completely modular** for **easy maintenance** of the robot.

IMAGE

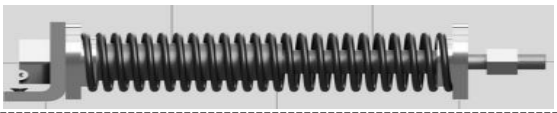

FIG. 2A: Illustrates suspension section

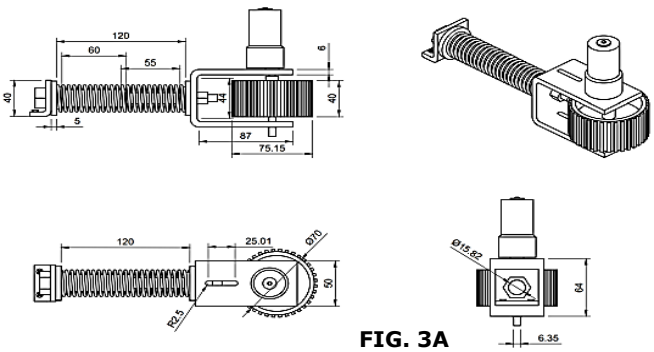

FIG. 3A

FIG. 3B

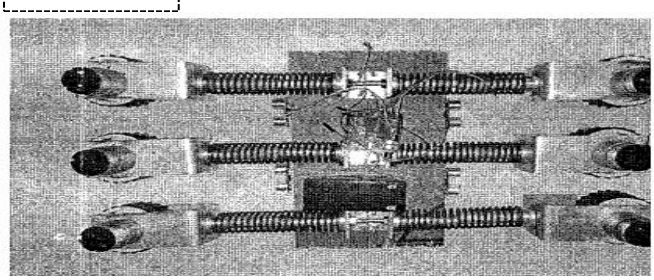

FIG. 3A&3B: Illustrates web arrangement

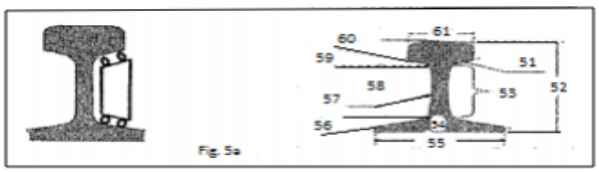

FIG. 4: Illustrates web arrangement

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