

## REUSABLE PASSIVE RFID SENSOR FOR STRUCTURAL HEALTH MONITORING

IITM Technology Available for Licensing

### Problem Statement

- Current methods for checking structural health are **complex** and often involve **expensive wired systems**. They require **labor-intensive work**, and many sensors are for **one-time use** or **need frequent adjustments**.
- Therefore, there's a need for a **cost-effective** and **adaptable RFID-based system** that is **wireless**, **sensitive to small changes in deformation**, and **easy to install**. The instant patent discloses a reusable **RFID sensor** that attaches to components and wirelessly transmits data to a reader.

### Technology Category/ Market

**Electronics & Circuits | Medical & Surgical Devices**

**Industry:** Structural Health Monitoring (SHM) Systems, Wireless Structural Health Monitoring Technology, Civil Engineering and Infrastructure

**Applications:** Infrastructure, Manufacturing, Materials Testing, Aerospace, Energy Industry, Automotive, Non-Destructive Testing (NDT), Safety & Maintenance

**Market:** The global data center RFID market size is projected to reach **\$5.53B by 2024**, it is expected to reach **\$14.69B by 2026** growing at a **CAGR of 9.3%**.

### Intellectual Property

IITM IDF No: 1602; IN IP Grant No.: 449495

### TRL (Technology Readiness Level)

TRL - 4, Experimentally validated in lab.

### Research Lab

**Prof. Velmurugan R**  
Department of Aerospace Engineering

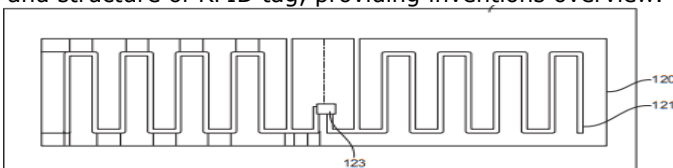
**Prof. Kavitha Arunachalam**  
Dept. of Engineering Design

### Technology

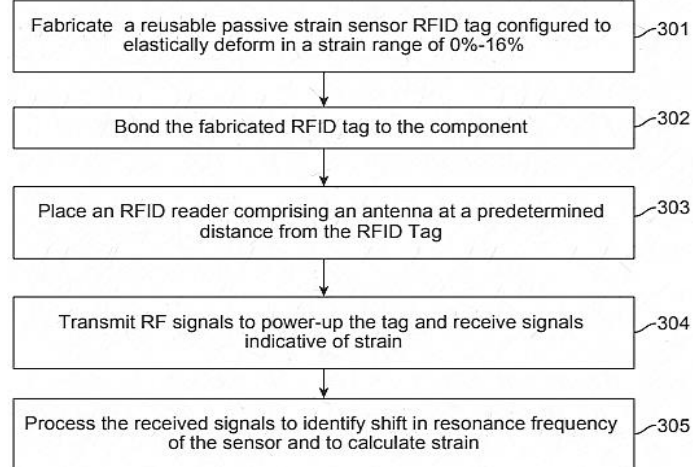
The present patent discloses a **Reusable Passive RFID Sensor System** for Monitoring Structural Health.

It describes RFID tags with **meander dipole antennas** and **adhesive bonding** for **detecting deformation** in components, providing cost-effective, real-time monitoring solutions across various industries.

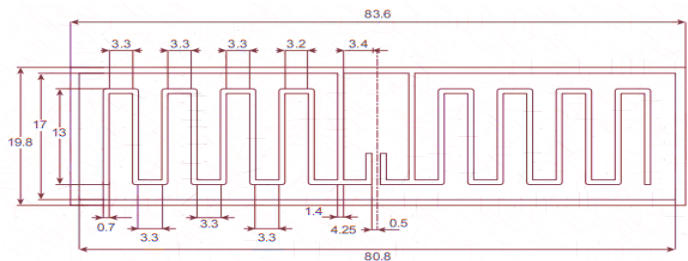
**FIG.1** illustrates **RFID Tag Device**: the key components and structure of RFID tag, providing inventions overview.



### Method of Wireless Structural Health Monitoring



**FIG. 2** shows the **fabricated RFID tag** & its dimensions.



### Key Features / Value Proposition

#### ❖ **User Perspective:**

- Cost-Efficiency:** Saves money with reusable sensors and eliminates expensive wired systems.
- Real-Time Monitoring:** Provides immediate data for proactive maintenance and safety.
- Versatility:** Reusable sensors can monitor multiple components.

#### ❖ **Industrial Perspective:**

- Wireless Convenience:** Simplifies installation and reduces disruption.
- Adaptability:** Fits various industries, informing data-driven decisions.
- Data-Driven Decisions:** Informs decisions for reliability and cost savings.

#### ❖ **Technology Perspective:**

- RFID Technology:** Enables wireless data exchange efficiently.
- Precision:** Accurately measures strain and deformation using resonance frequency.
- Material Versatility:** Adapts to different materials and monitoring needs with various conductive materials.

### CONTACT US

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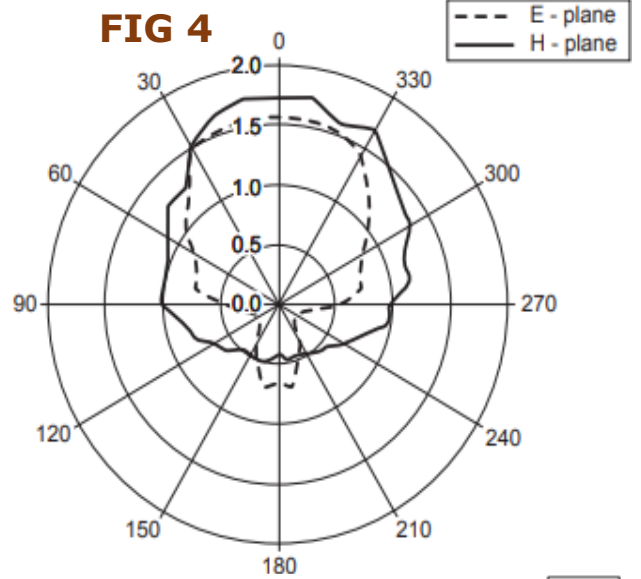
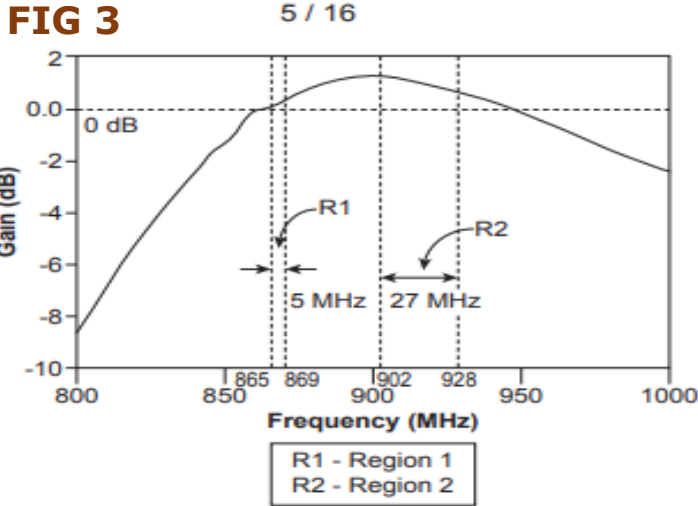
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**FIG. 3** shows the simulated Gain Vs. frequency characteristics of RFID tag.

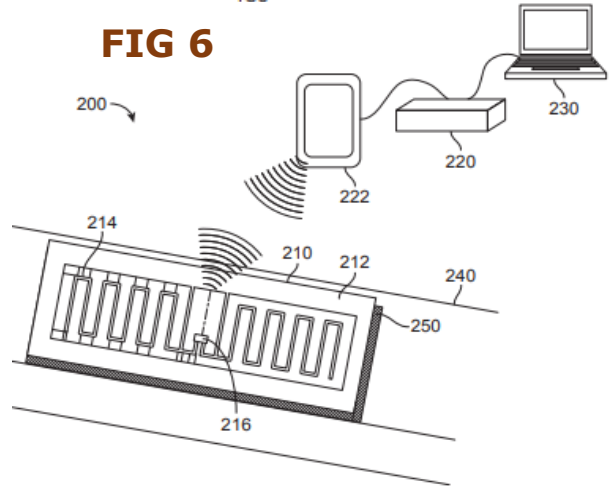
**FIG. 4** shows the actual radiation pattern in E and H planes at 915 MHz.

**FIG. 5** shows the stress strain curves obtained from load cell and correlated from RFID tag's frequency shift for tensile specimen.

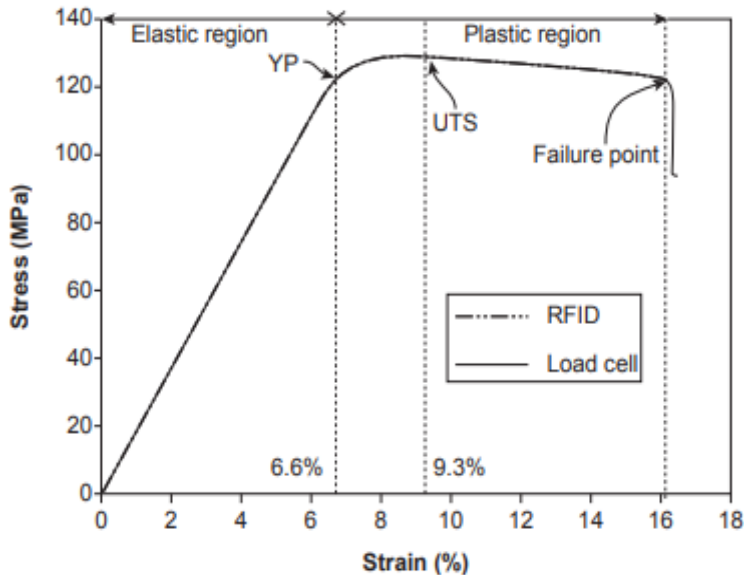
**FIG. 6** illustrates a system for measuring strain

**FIG. 7** illustrates the mechanical clamping of substrate and RFID tag to component;

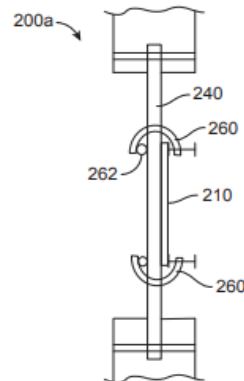
**FIG 6**



**FIG 5**



**FIG 7**



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