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## TECHNOPRENEURSHIP | ENTECH 30

PROFESSOR: Engr. Mark Macawile, MSc, CSM, PMP

A.Y. 2020-2021 Third Term

ECEP03

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### Learning Team 6

Basmayor, Aaron

Detablan, Khenneth

Diona, Joseph Allen

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Ignacio, Robin

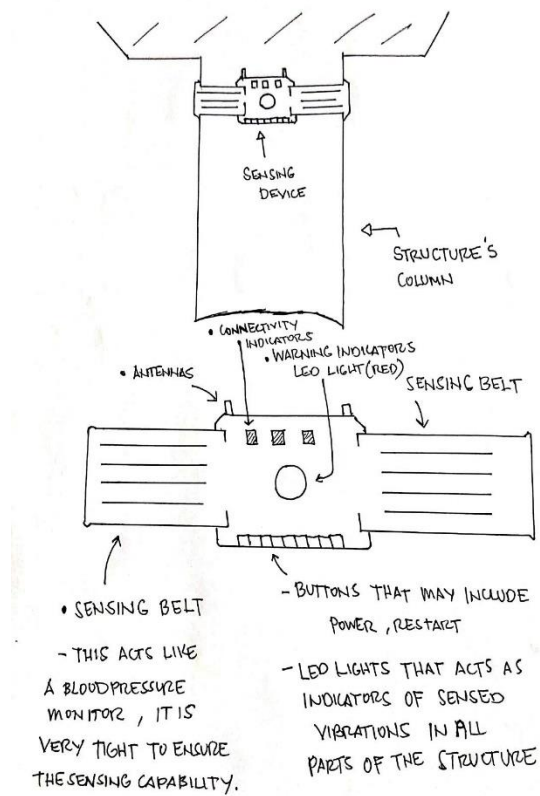
Lucas, Kenneth John

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### Prior Art

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STRUCTUREX:





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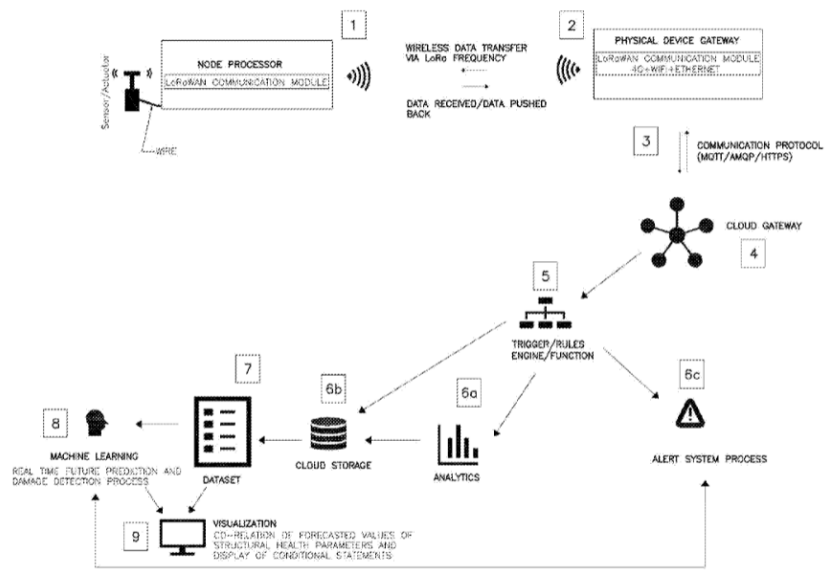
Lucas, Kenneth John

School: National Univesity

### PRELIMINARY SEARCH REPORT

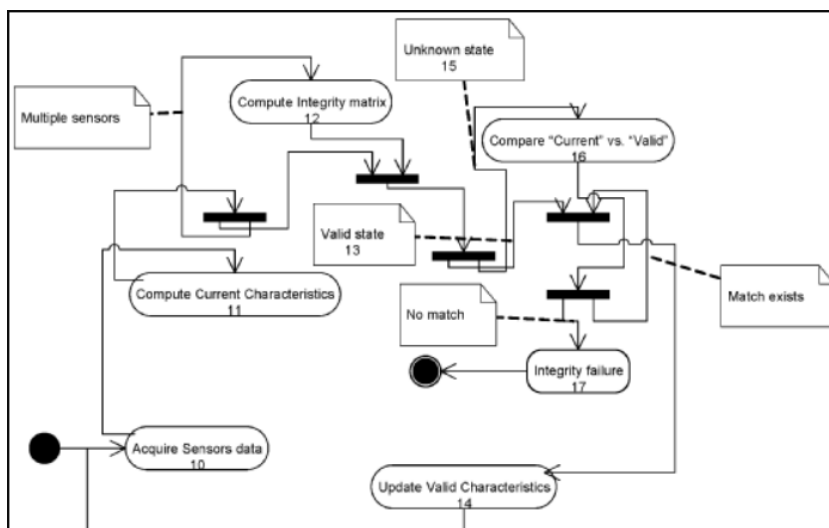
Title: StructureX: Structural Integrity Monitoring Systems		
Date: May 28, 2021		
Abstract:  Structurex is a realtime Structural Health Monitoring System developed by young Engineers from NUSTRUX tech It is composed of an Advance Sensing device based on Internet of Things. This is accompanied by a Mobile Application called Strux for an easy interpreted feedback of a strcuture's condition.		
Patent classification: H01L41/1132 Sensors G01M5/00 Elasticity of structures		
Keywords: (sensors* OR systems* OR devices) (structural integrity) (monitoring) (automatic OR automated) (application OR software)		
database	search strings	no. of hints
Espacenet	(sensors* OR systems* OR devices) AND (structural integrity) AND (monitoring) AND (automatic OR automated) AND (application OR software)	32,725
uspto	sensors and systems for structural integrity monitoring	3781
Epo	sensors and systems for structural integrity monitoring	157

Documents Considered to be relevant:

Category	citation of documents
System	<p><b>a. SYSTEM AND METHOD FOR STRUCTURAL HEALTH MONITORING USING INTERNET OF THINGS AND MACHINE LEARNING</b></p> <p><b>Abstract</b></p> <p>The present invention discloses a system and method for structural health monitoring to identify structural anomaly and to predict structural integrity of civil structures on real time basis by evaluating feasibility of wireless structural health monitoring (SHM) of civil structures encompassing internet-of-things (IOT) and machine learning models (8). The system comprises of sensor (S) connected to node processor (1, 1a, 1b, 1c, ...1n), physical device gateway (2), cloud gateway (4), trigger function software client (5), graphic user interface or dashboard (9) and communication module (C). The system evaluates incoming real-time engineering data on the cloud gateway (4) and allows a trigger function to route said engineering data to cloud storage (6b) and cloud analytics (6a) and alert system (6c). The system gives a single conditional statement in real-time by correlating predictions of multiple structural integrity parameters of the civil and mechanical engineering structures. The system of the present invention is an automated, cost-effective, user friendly and industrially scalable system.</p>  <p>Publication Number WO/2020/188585</p>



	<p>Publication Date24.09.2020</p> <p>International Application No.PCT/IN2019/050722</p> <p>International Filing Date30.09.2019</p> <p>IPC</p> <p><u>H04L 12/66</u> 2006.01</p> <p><u>G06F 21/30</u> 2013.01</p> <p><u>G05B 23/00</u> 2006.01</p> <p>CPC</p> <p><u>G05B 23/024</u></p> <p>Applicants</p> <ul style="list-style-type: none"><li>LIVEHOOAH TECHNOLOGIES PRIVATE LIMITED [IN]/[IN] C-1942, Sushant Lok Phase 1, Gurugram, Haryana Gurugram 122009, IN</li></ul> <p>Inventors</p> <ul style="list-style-type: none"><li>KULSHRESHTHA, Pradit</li></ul> <p>Agents</p> <ul style="list-style-type: none"><li>MITTAL, Swati</li></ul> <p>Priority Data</p> <p>201911010335      16.03.2019      IN</p> <p>Publication LanguageEnglish (EN)</p> <p>Filing LanguageEnglish (EN)</p> <p>Designated States</p> <p><i>Latest bibliographic data on file with the International Bureau</i></p>
System	<p><b>b. Structural Integrity Monitor</b></p> <p>Abstract</p> <p>Method      and      apparatus      of      completely      passive      and</p> <p>nondestructive monitoring of structural integrity of simple and complex objects.</p> <p>Apparatus is extremely compact, lightweight, inexpensive, and statistically precise and reliable.</p>



Office: United States of America

Application Number10710574

Application Date21.07.2004

Publication Number20050016269

Publication Date27.01.2005

Publication KindA1

IPC

G01N 7/00

InventorsTouzov Igor

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Priority Data60481123 22.07.2003 US

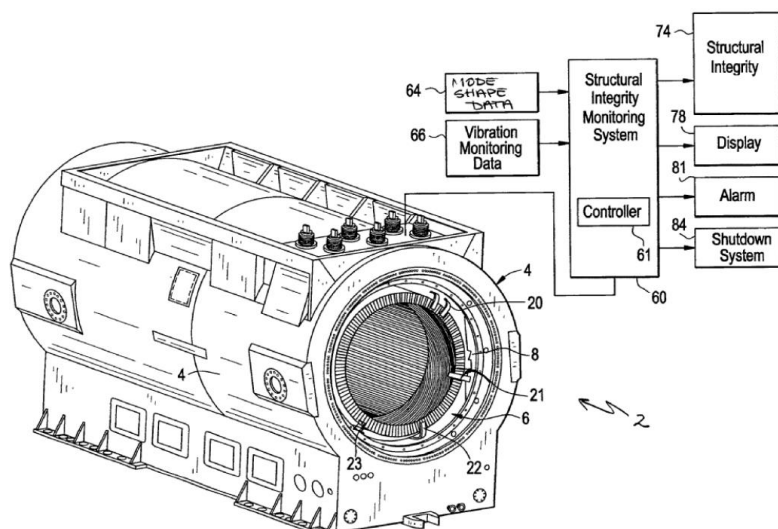
c. Structural integrity monitoring system

Abstract

Sensor

A structural integrity monitoring system includes a structure, at least two vibration monitoring devices mounted to the structure. Each of the at least two vibration monitoring devices outputs a vibration response signal. The structural integrity monitoring system also includes a controller operatively connected to each of the at least two vibration monitoring devices. The controller is configured to calculate a predicted vibration response based upon a vibration mode shape and the vibration response signal. The controller then compares the

predicted vibration response against a measured vibration response to detect changes in the structure



Also published as

EP2244081, JP2010256352, KR1020100117524

United States of America

Application Number 12429239

Application Date 24.04.2009

Publication Number 20100269592

Publication Date 28.10.2010

Grant Number 08186223

Grant Date 29.05.2012

Publication Kind B2

IPC

G01D 7/00

Applicants: General Electric Company

Inventors: Dawson Richard Nils, Barnes Gary Randall, DiLorenzo Peter Anthony

Agents Cantor Colburn LLP

Wipo	(sensors* OR systems* OR devices) AND (structural integrity) AND (monitoring) AND (automatic OR automated) AND (application OR software)	56
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References:

[https://search.uspto.gov/search?utf8=%E2%9C%93&affiliate=web-sdmg-uspto.gov&sort\\_by=&query=sensors+and+systems+for+structural+health+monitoring](https://search.uspto.gov/search?utf8=%E2%9C%93&affiliate=web-sdmg-uspto.gov&sort_by=&query=sensors+and+systems+for+structural+health+monitoring)



<https://www.epo.org/search.html?q=structural%20integrity%20monitoring%20sensors%20and%20systems&resultsPerPage=100&sortOrder=1>

<https://patentscope.wipo.int/search/en/result.jsf?vid=P11-KP8CEV-09429>

<https://worldwide.espacenet.com/patent/search?q=%28sensors%2A%20OR%20systems%2A%20OR%20devices%29%20AND%20%28structural%20integrity%29%20AND%20%28monitoring%29%20AND%20%28automatic%20OR%20automated%29%20AND%20%28application%20OR%20software%29>

## IMPROVING/INNOVATING THE PRIOR ART

### **how do you plan to do your product?**

- We will create a system with software that can be accessed over the internet for this project. Creating an application so the user may use to find out whether there is an issue in a given location, also by installing a real-time monitoring device that is connected to the internet and may provide data so that we may evaluate it for accuracy before submitting the data into our application.

### **VPC sentence:**

An IOT Based Real Time Structural Health Monitoring System Composed of A Sensing Technology and A User Friendly Mobile Application that lets you keep on track for the Structure's condition.

### **How do you plan to do your product?**

The primary step towards developing our product is to gather all the Key Resources. These are the component suppliers, funds, manpower, data analytics team, app developers, manufacturing facilities, machineries, customer service team, software for analytics, advertisers, and the branding of our product. After obtaining these resources we proceed by building the prototype, first is the sensing device which will be designed by the engineers and researchers that are part of the data analytics team.

As we evaluate a bunch of design proposals we are outsourcing app developers for our mobile application at the same time. These developers will be busy furnishing a user-friendly application ensuring a fast update for the user account. After we came up with final design of Structorex and upon the first launch of the first version of the mobile app



(which is still premature and still need to eliminate bugs and fixes), we will now test our system.

To ensure the efficiency of our sensing device, we may need to install it to some structures that encounters a massive number of live loads every day. For example, bridges, skyways, and train stations. We may also test it on earthquake simulations to record the data that is expected from extreme situations. Then after a series of testing and development of our device, we can now launch our first version of the device and make a trademark for our brand. After establishing the trademark, we can now advertise our product through our known marketing channels.

### **Product Cost:**

For the cost of our product, the customer will pay in two payment terms:

The first one is the onetime payment for the Device Installation, indicated below is the price for device installation:

**Installation fee** = PHP 500.00

**Device per quantity** = PHP 1,000.00

**Note:** Installation fee may increase depending on how many devices are need to be installed.

The second one is the monthly payment for the system specifically for the data analytics. Indicated below is the monthly payment for every device installed:

**Price per month** = 100 pesos per device installed

**Note:** The first month is free and serves as a promo. The customer may also get a discounted monthly payment if they installed 10 devices or more.

For example:

If they bought 10 devices, there will be 10 % discount of monthly payments.

Then it will become PHP 90.00 per device.

### **Maintenance fees and Warranty:**

The maintenance fees may vary depending on the device condition. There will be a given 6month Manufacturer's warranty for each device that may need replacement because of damage and faulty condition.