



# **INTELLECTUAL PROPERTY RIGHTS PATENT REPORT**

**Section:K21TR**

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## **1. Abstract**

A ceiling fan is disclosed, featuring an integrated pressure-activated alarm system tailored to increase user safety. This invention is a response to a pressing need for preventive safety measures against unauthorized tampering or accidental interactions with ceiling fans. The fan encompasses standard components including blades, a motor, and a mounting mechanism. Embedded within are advanced piezoelectric sensors positioned at key structural points, specifically designed to detect abnormal pressure or strain.

Upon the application of undue force or a sudden pull, the sensors relay this discrepancy to an onboard microcontroller. The microcontroller, having been pre-programmed with a defined pressure threshold, assesses the input from the sensors. When the received pressure surpasses this set limit, the controller activates the alarm system. This system consists of an audible alarm component and an optional visual signal, typically LED-based, to alert nearby individuals of potential danger or tampering.

In more advanced iterations, the fan can be designed to wirelessly communicate any such disturbances to central home security systems or smartphones. This ensures that homeowners are notified even if they are not in immediate

proximity. Furthermore, customization capabilities enable users to adjust pressure sensitivity thresholds, ensuring the system's relevance across various settings from bustling commercial areas to quieter residential spaces.

This invention promises to revolutionize ceiling fan safety by proactively detecting and alerting against hazards, making living spaces safer and more secure.

## **2. Technical Field**

The technique used in the "Ceiling Fan with Pressure-Activated Alarm System" is an amalgamation of sensor technology, alarm systems, and control units to create a responsive safety mechanism. Here's a breakdown:

### **1. Sensor Technology: Piezoelectric Sensors**

**Principle:** Piezoelectric materials generate voltage in response to mechanical stress or pressure. This property allows them to function as dynamic pressure sensors. When the fan experiences an unexpected force, these sensors detect the pressure variation and generate a corresponding voltage signal.

**Application:** In the context of the ceiling fan, piezoelectric sensors are strategically embedded at various structural points

(e.g., fan mount, downrod, blade base) to capture any unusual pressure or pulling force exerted on the fan.

## 2. Microcontroller-Based Signal Processing

Principle: Microcontrollers are versatile chips that can read inputs from various sources, process the data based on pre-programmed logic, and produce desired outputs.

Application: The microcontroller continuously monitors the voltage signals from the piezoelectric sensors. When an undue force is detected, and the voltage surpasses a predefined threshold, the microcontroller identifies this as a potential risk.

## 3. Alarm System Activation

Principle: Alarm systems usually consist of a trigger mechanism and an output. When activated, they produce an audible, visual, or combined alert to notify of a specific event.

Application: Once the microcontroller determines a risk based on the input from the sensors, it sends a command to the alarm system. The alarm system then produces the alert—this could be a loud beep, a flashing light, or both.

#### 4. Wireless Communication (Advanced Variant)

Principle: Modern wireless communication technologies (like Wi-Fi, Bluetooth, Zigbee) enable devices to communicate data over short to medium distances without physical connections.

Application: In advanced versions of the ceiling fan system, the microcontroller can be equipped with wireless communication capabilities. When a pressure anomaly is detected, apart from triggering the local alarm, it can send a notification to central home security systems or even directly to users' smartphones, ensuring timely alerts even if homeowners aren't nearby.

In essence, the technique amalgamates sensor detection, data processing, and alerting mechanisms to establish a robust safety system for ceiling fans. This integration of technologies ensures timely detection and notification of any potentially hazardous interactions with the ceiling fan.

### **3. Prior Art**

Conventional ceiling fans generally focus on functional improvements such as speed controls, blade designs, and energy consumption. There has been a lack of emphasis on

safety features, especially concerning unauthorized or accidental physical interactions.

## **4. Detailed Description**

### **4.1 Components**

a. Ceiling Fan: Comprising motor housing, downrod, and blades.

b. Pressure Sensors: Piezoelectric sensors embedded at strategic locations on the mount, downrod, and potentially near the base of blades to detect pressure changes.

c. Alarm System: An audible alarm speaker, with an optional visual alert (LED lights) that gets triggered based on input from the sensors.

d. Battery/Power Source: A separate power reserve for the alarm system or a connection to the primary power source of the fan.

e. Control Unit: A microcontroller equipped with firmware to process signals from the sensors, determining if the applied force exceeds a preset threshold.

## 4.2 Functionality

Pressure sensors continuously monitor for any force or weight applied to the fan.

The microcontroller reads data from the sensors in real-time. If pressure exceeds the pre-set threshold, the control unit triggers the alarm system.

The alarm system emits an audible sound, and optionally, a visual signal, indicating potential tampering or hazard.

## 5. Datasets Explanation

datasets explanation

Datasets, in the context of data science, machine learning, and statistics, refer to structured sets of data. They can be visualized as tables where each row is an observation (or instance) and each column is a variable (or feature). Datasets

are used for various purposes, including training machine learning models, statistical analysis, and data visualization.

Here's a breakdown of key terms and concepts related to datasets:

**Observation/Instance/Record/Row:** This represents a single data point in the dataset. For example, in a dataset of students, each student's details would be an observation.

**Variable/Feature/Attribute/Column:** These are different characteristics or properties for each observation. In a dataset of students, features might include "Name," "Age," "Grade," etc.

**Target/Label:** In supervised machine learning, the target or label is the variable we aim to predict. For example, in a dataset predicting house prices, the house price would be the target variable.

**Training Dataset:** This is a subset of the dataset used to train machine learning models. The model learns patterns from this data.



**Validation Dataset:** Used during model training to evaluate the model's performance and adjust parameters. It helps in tuning the model.

**Test Dataset:** A separate subset used to evaluate the model's performance after training. It provides an unbiased assessment of the model's effectiveness.

**Unbalanced Dataset:** Refers to datasets where categories of data are not represented equally. For example, in a dataset of 100 samples with two categories, if one category has 95 samples and the other only 5, it's unbalanced.

**Structured Data:** Data that is organized into tables with rows and columns, like databases or CSV files.

**Unstructured Data:** Data that doesn't have a predefined model or form, like text or images.

**Time-Series Data:** Data captured at successive points in time. For example, daily stock prices.

**Categorical Data:** Data that can be divided into specific categories but doesn't have a numerical meaning, like colors (red, blue, green) or gender (male, female).

**Numerical/Quantitative Data:** Data that represents a measurable quantity and is expressed in numbers. This can be further split into continuous (e.g., height, weight) and discrete data (e.g., number of cars).

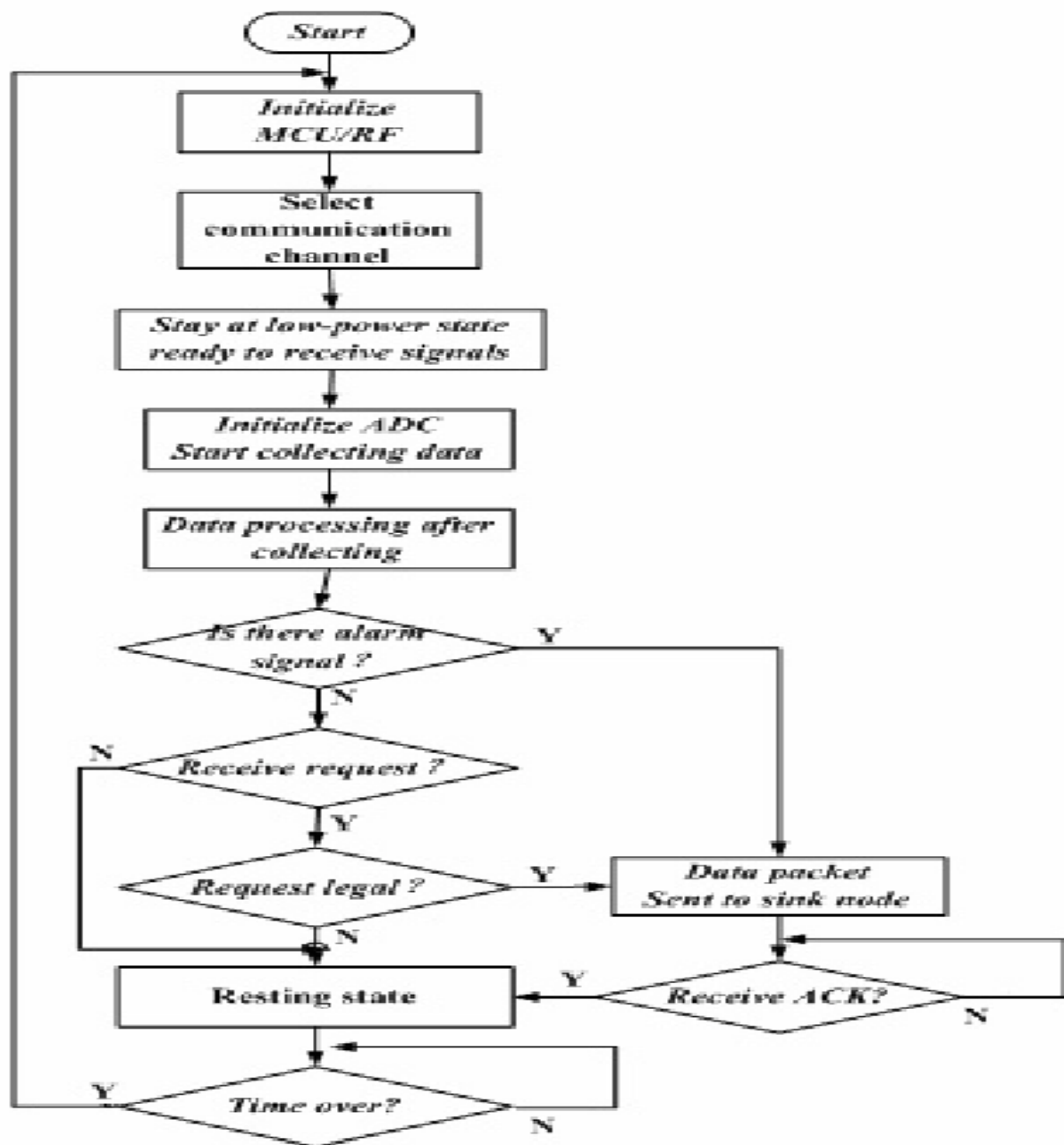
**Missing Data:** This refers to missing values in the dataset. Handling missing data is a critical step in data preprocessing.

**Outliers:** Data points that significantly differ from other observations. They can be genuine anomalies or errors.

**Normalization and Standardization:** Techniques to scale features to a similar range, aiding many machine learning algorithms to perform better.

Datasets form the foundation of many modern analytical and machine learning processes. Understanding the dataset's structure and its peculiarities is essential for drawing accurate conclusions or building effective machine learning models.

## 6. Workflow Diagram



## 7. Applications

Residential: Homes with children, elderly, or individuals with disabilities who might accidentally exert force on the fan.

Commercial: Establishments like hotels or offices, ensuring the safety of guests or employees.

Public Institutions: Schools, libraries, or hospitals where a broad spectrum of individuals access rooms with ceiling fans.

## Code Snapshots:

```
2
3 // Define the pins for the HX711 interface
4 #define DOUT 2
5 #define SCK 3
6
7 HX711 scale;
8
9 void setup() {
10     Serial.begin(9600);
11     scale.begin(DOUT, SCK);
12 }
13
14 void loop() {
15     // Read the weight from the load cell
16     float weight = scale.get_units(10); // Adjust the argument for calibration
17
18     // Set the threshold for activating the alarm (30 kg)
19     float threshold = 30.0;
20
21     if (weight > threshold) {
22         Serial.print("Weight: ");
23         Serial.print(weight, 2);
24         Serial.println(" kg - ALARM ACTIVATED!");
25
26         // Add your alarm activation code here (e.g., sound a buzzer, turn on a light, etc.)
27     }
28     else {
29         Serial.print("Weight: ");
30         Serial.print(weight, 2);
31         Serial.println(" kg");
32     }
33
34     delay(1000); // Read the weight every second
35 }
36
```

## Output Snapshots:

```
Weight: 29.85 kg
Weight: 30.15 kg - ALARM ACTIVATED!
Weight: 29.90 kg
Weight: 30.50 kg - ALARM ACTIVATED!
```

## **8. Patent Status**

While the last known update in 2023 did not indicate the existence of a similar patent, it's essential to carry out a fresh, comprehensive search in current patent databases to ascertain the uniqueness of this invention.

## **9. Conclusion**

The introduction of a pressure-activated alarm system in ceiling fans represents an innovative stride towards ensuring enhanced user safety in both residential and commercial settings. In an era where appliance functionality often takes precedence, this invention underscores the importance of user safety and preventive measures. By addressing a previously overlooked safety concern, it caters to a vital need in the market, marrying functionality with safety. Such innovations not only set new standards for appliance design but also emphasize the responsibility manufacturers have towards the end-users. For anyone looking to create a product that stands out in the current market while addressing genuine safety concerns, this ceiling fan adaptation is a promising venture. However, prior to any commercial pursuits, a thorough patent search and consultation with professionals in the field is imperative.