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Smart dispensers to optimize restocking process

Kenneth M. Schow

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## Smart dispensers to optimize restocking process

ABSTRACT

Many businesses need to efficiently restock paper towels in company bathroom facilities. This disclosure describes a smart paper towel dispenser which includes a built-in scale to detect the weight of the paper towel roll and a WiFi/GPS enabled microcontroller. The rate at which paper towels are dispensed and the device location is obtained to assess the number of towels remaining, the number of towels dispensed, and to determine when the paper towel stock is low and needs to be replaced. An alert is provided to the responsible personnel to replace the paper towels. The data can also be used to build forecasts, e.g., using a regression machine learning model such as a KNN algorithm with supervised data, to identify times of the day when paper towels need to be replaced.

KEYWORDS

- Paper towel dispenser
- Facilities management
- Bathroom supplies
- Restocking

BACKGROUND

Large businesses, e.g., that own or lease office facilities to house a large number of employees run facilities operations. The facilities operations need to restock supplies in various locations in the facilities, e.g., bathroom supplies, which often run out quickly. Research shows that drying off one's hands is critical to preventing the spread of germs. Without the provision of drying towels, employees face a greater risk of sickness. This can lead to losses for employers in terms of lost employee productivity.

DESCRIPTION
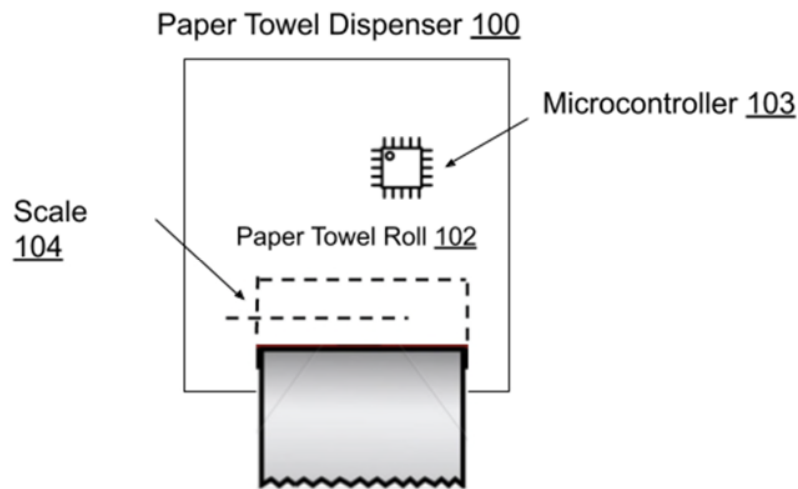
Fig. 1: Smart Paper Towel Dispenser

This disclosure describes a smart paper towel dispenser device (100) that includes a built-in scale (104) to measure the weight of a paper towel roll (102); and a WiFi/GPS enabled microcontroller (103). The firmware of the microcontroller is remotely upgradable over WiFi. The rate of dispensation of paper towels is determined, e.g., by running regression analyses on the microcontroller, or on a remote server.

The device location is provided by a GPS signal, if available. Alternatively, WiFi triangulation techniques can be utilized to determine the device location.

The device is configured to obtain different types of data: the microcontroller can precisely measure the quantity of towels remaining on the roll, the number of towels dispensed, timestamps for each individual paper towel dispensation, etc. The paper towel roll scale can detect when the paper towel stock is low, e.g., based on weight measurements. The weight measurements can be cross-referenced with the count of towels dispenses, as measured by the microcontroller, and either or both measures can be used to determine whether the end of the paper towel roll has been reached.

The obtained data can be analyzed and used for various purposes. For example, the data can be used to alert facilities personnel to replace paper towels at specific locations, based on detected low stock. The data can also be sent to a centralized service that dispatches facilities personnel. For example, a mobile application can be provided that prioritizes the replacement by providing an alert to an appropriate person from the facilities team, e.g., close to the device location, to replace the paper towel stock and can also provide navigation guidance to the device location. The data can be analyzed, e.g., using regression techniques, to build forecasts to determine the times during the day the paper towels should be replaced. For example, a regression machine learning model such as a KNN algorithm with supervised data can be used. The machine learning algorithm can adapt to changes in the consumption patterns over time.

The described techniques can thus improve the efficiency of paper towel restocking process. The techniques can also be used to optimize supplies of other types of consumables in office buildings or other facilities, e.g., kitchens, safety stations, other open areas, etc.

CONCLUSION

Many businesses need to efficiently restock paper towels in company bathroom facilities. This disclosure describes a smart paper towel dispenser which includes a built-in scale to detect the weight of the paper towel roll and a WiFi/GPS enabled microcontroller. The rate at which paper towels are dispensed and the device location is obtained to assess the number of towels remaining, the number of towels dispensed, and to determine when the paper towel stock is low and needs to be replaced. An alert is provided to the responsible personnel to replace the paper towels. The data can also be used to build forecasts, e.g., using a regression machine learning model such as a KNN algorithm with supervised data, to identify times of the day when paper towels need to be replaced.

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