

Market Management and Security System

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Abstract

Selling nowadays is highly depending on large markets or what is called Malls. These Malls include a high number of properties that are added and sold at the same time. Most Malls are facing problems in managing these properties and security as well. In this study a Market Management and Security System (MMSS) is proposed. This system allows the digital friendly interactive monitoring of the available properties. The system consist of electronic trays accompanied with digital strain gauge, that gives a continuous instantaneous digital signal to the monitoring system which record the state of the tray, it shows how many parts are missing from the try. Whenever the property passes the payment disc it record selling and neutralise again. This system allows for security control, it gives signal if the tray looses more than the expected selling rate at a time, it can give the selling rate of each property, time that this property is most required, the total balance of the market properties and many others.

Keywords: Market Management, Market Security, Market Monitoring, Market Control.

1. INTRODUCTION

Malls are large retail complex containing a variety of stores and often restaurants and other business establishments housed in a series of connected or adjacent buildings or in a single large building. Shopping Malls provide revenue for their local economies, employment opportunities for nearby residents and common gathering places to catch up with neighbours and old friends. Because malls are usually large public places, security is required to keep customers safe [1]. Mall security also must deter the theft of property and merchandise [2]. Managing a large group of different businesses under the umbrella of one entity can be a challenge, particularly when you add to it an independent mall staff, issues with security and crowd management. Overcoming these obstacles requires careful planning and astute business acumen [3].

Strain measurements and signal conditioning, which is the principles of the low cost, wireless systems, are explained followed by a discussion on the data acquisition process [4].

In this study a Market Management and Security System (MMSS) is proposed to control, manage and secure the properties in the market. The system is essentially depends on a strain gauged tray that supply the weight of the try instantaneously to the management and security system.

2. SYSTEM PROPOSED

It is well known that markets are suffering from insufficient management and security issues. For better managing and security in markets a new system is proposed here.



Figure 1: Market Property layout, each property is placed in a special place, no mixing between properties.

Figure 1. Shows the properties layout in the supermarkets. It is obvious that each property is located in a place different than the other, as if each property is located in separate tray.

3. WIRELESS STRAIN GAUGED TRAY

The fundamental part in the proposed system is a wireless strain gauged tray shown in figure 2.

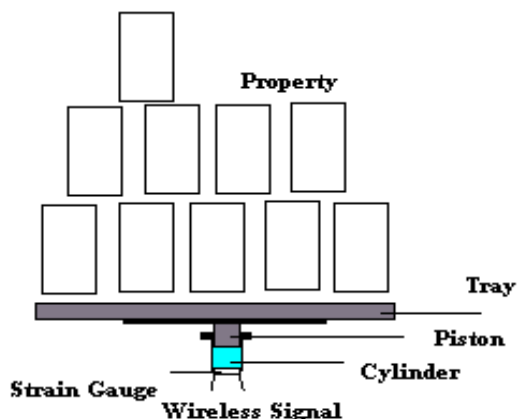


Figure 2: Schematic diagram of the new wireless strain gauged Tray.

3.1 STRAIN GAUGE

The strain gauge has been in use for many years and is the fundamental sensing element for many types of sensors, including pressure sensors, load cells, torque sensors, position sensors, etc. The majority of strain gauges are foil types, available in a wide choice of shapes and sizes to suit a variety of applications. They consist of a pattern of resistive foil which is mounted on a backing material. They operate on the principle that as the foil is subjected to stress, the resistance of the foil changes in a defined way.

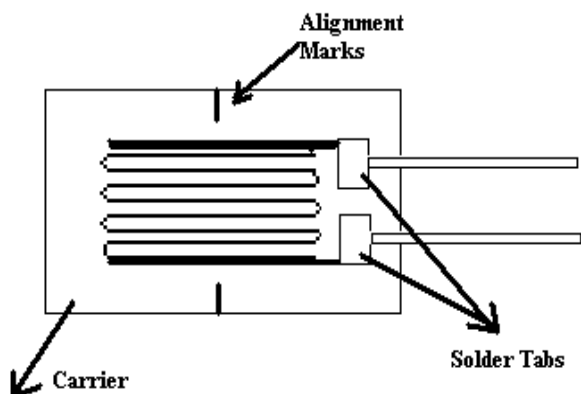


Figure 3: Schematic diagram of the strain gauge.

There are several methods to measure the weight of a property. The digital one uses strain gauges. As technology is improving rapidly wireless strain gauges are used. This device has its electrical resistance varying proportionally to the strain in the device [3]. A strain gauge consists of a very thin wire or, more commonly, a metallic foil arranged in a grid pattern. The grid pattern maximizes the length of metallic wire on a minimum surface. The cross sectional area of the grid is minimized

to reduce the effect of shear and Poisson Strain. The thin wire grid is mounted onto a foil or thin backing, which is called the carrier. The foil is attached to the surface of investigation. The strain of the surface is transferred directly to the wire of the strain gauge; indicating the weight of the tray.

The signals from each tray are transferred to a regional data logger; that sends the data by its turn to a main data logger in the management and control room of the market.

3.2 THE SOFTWARE

When the data reaches the main data logger it enters the analyzer software where the serial number of the property, date, time and weight are recorded. The software then calculates many useful managing parameters, such as the number of the parts on the tray, the selling rate, maximum selling time, if there is a missing or confusing data for security, and if the tray requires refilling and many others as required. Whenever the customer reaches payment disc, the parts which are paid is omitted from the tray and the tray shows a green light on the monitoring bulletin board. If there is a confusing result such as changing properties tray or loss in the tray property, the monitoring system gives a direct alarm for security people to check the location.

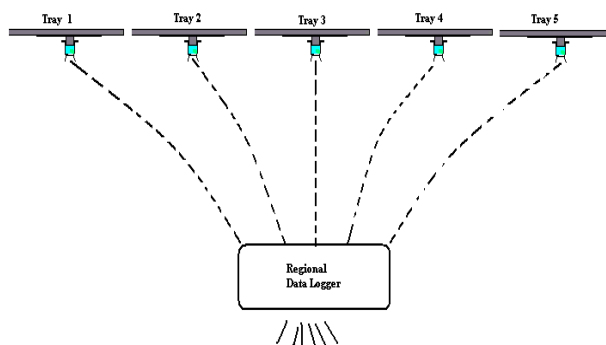


Figure 4: Wireless Data Collected to the Regional Data Logger.

Figure 4. shows how signals are transmitted from each tray in the different sub-regions to the regional data logger, which is in turn transmit these data to the main data logger in the managing and control room of the market.

	A	B	C	D	E	F	G	H
1	Serial Number	Date	Time	Weight	Number of Part change	Number Sold		Selling Rate
2								
3								
4								
5								
6								
7								
8								

Figure 5: Software for receiving data and analyses.

Figure 5. is a sample for the software analyzer, which records each movement of the properties, with date and time, then check within a suitable time if the property is passed through the payment disc. If the property is paid the light gets green again on the tray, otherwise the trays continue showing a red color.

This life interactive system gives the opportunity to do many managerial and control operations, such as

- 1- Desired time for the property: this tells the manager at what time the tray should be in its best condition, and when to make the refilling process.
- 2- Property selling rate: which gives the knowledge on how frequently you need to buy and at what quantities?
- 3- The emptying rate: helps to note if there is unusual emptying rate of the tray, it may be accidental or a thieving action.
- 4- The financial value of each property at any time, the overall available properties in the market...etc.
- 5- Confusing results on the tray may indicate the replacement of properties, or a property in the wrong location.
- 6- The collected data can help in reorganizing the market products according to the selling rates, which may help in reducing the shopping time in the market.

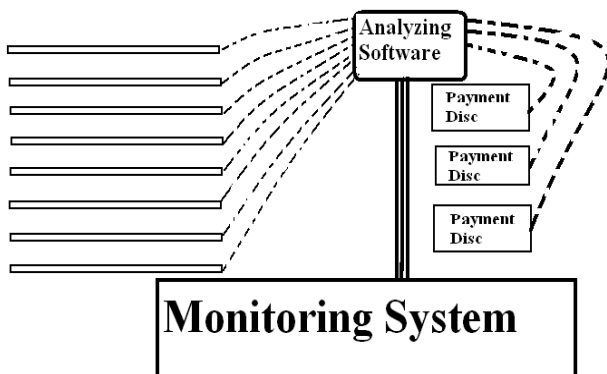


Figure 6: Schematic diagram of the proposed management and security system.

Figure 6. shows the general schematic diagram of the working principle of the MMSS, and how the regional data loggers is interacting with the main data logger in the managing and control room of the market, it shows also the signals sent from the payment discs to the system.

4. CONCLUSIONS

Technology is developing so fast. It is important to implement the new technologies in simplifying the human life. Management and security in large markets are main issues. It is very worthy to improve these issues. This paper proposes a new system that depends on the new technology of wireless strain gauges to record the weight

of each tray in the market, and then use these data in analyzing managing and security control of the market. The proposed system gave the opportunity to manage and control many parameters in the market. It is characterized by its life interactive ability that may be used to analyze and control many parameters that in the markets. The new system may be designed for the new markets or applied to already existing markets without difficulties.

ACKNOWLEDGEMENTS

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REFERENCES

- [1] http://www.ehow.com/list_6934614_challenges-mall-management.html#ixzz2wA4tSOZq.
- [2] http://www.ehow.com/list_7149238_mall-security-issues.html#ixzz2wA46h1pK.
- [3] P. Bielen, M.Lossie, D. Vandepitte." A low cost wireless multi-channel measurement system for strain gauges" PROCEEDINGS OF ISMA2002 - VOLUME II, pp 663-670, 2002.
- [4] Urs Berli, Michel Bönzli," Electronic Weighing Principles", METTLER-TOLEDO AG, Greifensee, May issue1991.