

Remote tracking system for vending machines via WiFi to mobile device

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Abstract

The proposal was developed by a team of students from the Fidel Velázquez Technological University. We focus on designing a system that allows remote monitoring of the operation of vending machines, be they electronic or digital. We focus on this type of machines, since the market for these has increased significantly in the last 5 years, and it is becoming much more sophisticated every day. The fact that a machine stops its operation due to some technical failure, or, fill the so-called "purses", or exhaust your product, means an economic loss for the companies. This economic loss is multiplied if it is known beforehand that rents in shopping centers are very expensive. Therefore, a system that provides remote monitoring and offers information to the administrator or operator of said machines would be a significant competitive advantage.

Virtual Reality, Virtual World, Virtual Museum, Mexican Cinema, Stages of Cinema

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Introduction

The developments within the so-called Information Technologies (ICTs) have gained special importance due to their integrating characteristic for all types of industry, or, of services or within the trade. For some years now, the pure software development model was abandoned, whose purpose was to order only industrial or commercial operations and offer information about the status of operations and indicators.

It is no longer enough for a program to order operations and send information on behavioral indicators. It has become indispensable to integrate digital communication technologies as well as mobile devices so that a system is competitive in the market.

With the appearance of the first smart mobile devices or Smart phones, as well as the development of APPS, a career began that has not stopped designing applications of all kinds. However, until the recent appearance of the so-called Internet of Things, as well as the Internet of Everything, operations, indicators, strategies, logistics, maintenance, etc. will be converted into generic actions of the systems under development.

The cohesion of operations means to be more competitive in the market, much more efficient, and above all, much more flexible to enter new developments of its own, which in the case of Vending Machines is one of its characteristics sine qua non, or rather, the vending machine while having more innovative technological components, will be much more competitive in the market since its life time is very short and it does not exceed 3 years.

It is important to mention that the exponential growth that this type of machine is having is due to the liquidity of its operations, as well as to the profitability itself.

With our development, this profitability could be further improved by ensuring much better profits to entrepreneurs in this field.

In the same way, we can say that not all developments have been built on WiFi platforms, some of them took parallel routes as SMS. However, given that 90% of the mentioned machines, which is our target market, are located in commercial plazas, where it is easy to think that they have Wi Fi coverage, that is why it was decided to develop it on the Android platform, in response to the location of our market

Therefore, the proposal presented is based on a reliable technological infrastructure that allows us to prop up the improvement in profits, reducing costs and increasing sales times, while reducing the error ranges in the service of the same.

Due to the above, our multidisciplinary team, made up of students from the 5th and 6th semesters of the Fidel Velázquez Technological University, both from the Administration, Accounting and Systems career, has allowed us to detect some limitations in the Vending Machines market. both electronic and digital, even with very advanced technological components.

The problem to solve

According to studies carried out in the field in a random way in different commercial places of both CDMX and Edomex, we were able to determine the potential that vending machines have in the Mexican market. Some of them are services, others are entertainment, and some other consumer products.

All of them, as mentioned, electronic and digital machines, have problems of daily monitoring in their operation, that is, in the case of a strike, this is unknown until the operator visits the machine, or the Mall reports such stoppage, while the machine stops selling and rents continue to run. In the same way, this unemployment can be due to the filling of the purses or exhaustion of product, which can be reported with our system, as well as the daily advance of said machine.

Taking as a background we have divided our article into 5 sections

1. Our proposal
2. Hypothesis
3. The development
4. System Software
5. Conclusions

Our proposal

Currently in Mexico is not known of any device that allows the monitoring of Vending Machines in real time, although they are in the European market especially in Spain, as well as in Japan, which are world leaders in the design of vending machines all types. Therefore, we will try to develop a prototype that would be an independent system to the operation of the machine, that follows up on its operation, either in the entry of coins, in the inventory of the product in the case of having it, or of some technical stoppage, either by filling up purses, or, due to some mechanical or electronic difficulty, transmitted all this to a mobile device.

Initially the national market would be sought, or, if possible in the international or export.

Said device would be incorporated inside the machines, and this would communicate remotely with a mobile device, either an operator or an administrator.

Said technology would allow permanent monitoring of the operation of said machines, being able to observe their progress, some technical breakdown due to breakdown or failure by operation, as well as follow up the inventory within the machines, either of product or of coins.

The present development would allow the owner, administrator, or company to reduce downtime, increase sales for this reason, make maintenance routes more efficient, avoid unnecessary visits to machines, and give corrective maintenance more quickly.

All this would be done on an Android platform, remotely via Wi-Fi to a mobile device.

To make the prototype Arduino component will be used, as well as open software in order to avoid licensing costs that in this case would be unnecessary.

Hypotesis

Our hypothesis is based on the fact that the Schiller equivalent of a Digital Machine producing plastic articles, or mechanical metal, there can be a device that tracks the operation of a vending machine, for obvious reasons this has to be electronic or digital and not mechanical. This can be done through a network of sensors integrated in a device that reports progress, product inventory, currency inventory, as well as a technical stoppage. With this, the companies that operate or sell this type of machines, whether imported or domestic, will have a device that will help them reduce costs and organize maintenance logistics.

Development

The members of the working group explored some alternatives to evaluate which was the most feasible to incorporate it into the functionalities required by the proposed device. The platforms, software, licenses and components were weighed. Therefore, it was decided that it would have to be in Android Platform, to facilitate its incorporation to most mobile devices. Also, Arduino components were proposed, since their software is completely open and their licenses are free, and with that they will be subject to a reduced budget for our prototype. In the same way, the design of a Domi was initially proposed, in order to observe its functionality and how that technology would behave, this was developed with recycled material.

Once this was done, we proceeded to the acquisition of the components and the development of the functional prototype.

This device, according to what is consulted with experts, is feasible to design it, and it is up to the team to develop the alternatives to solve the proposed approaches for the device.

System Software

For the purpose of WiFi-GPS communication, the Java language was used, which due to its characteristics is a safe, object-oriented language, that is, it allows the reuse of software components, as in our case, of neutral architecture.

Java was chosen because it is a very flexible platform, easy to understand for young people, since it can inherit functionality, adding new features without altering the initial code. At the same time, it is multiplatform which allows us to incorporate the existing system without altering the codes of this.

Finally, the JAVA updates allow to expand the system if necessary or desired by the same team, or other students who wish to incorporate new functionalities.

Conclusions

The development is focused in the first instance to complement a technology whose primary objective is to provide products and services with great promptness, since many people seek quick consumption due to its great activity, or to satisfy a divertimento. In the same way, the proposed complementary development will improve the image that vending machines often "steal our coins", since the service will improve, will be much faster and the times of unemployment will be reduced.

It is for this reason that the first major objective of the development is to improve the efficiency in the market of the aforementioned machines, generate greater revenues for our customers, as well as provide a better service to the public user.

Reduce travel to verify the machines and thereby reduce the polluting gases emitted by long journeys.

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