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SYSTEM OF CONTROL AND IDENTIFICATION RFID APPLIED IN THE UNIT OF EMERGENCY MOTORIZED "THE HAWKS" OF THE PNP

SYSTEM OF CONTROL AND IDENTIFICATION RFID APPLIED IN THE UNIT OF EMERGENCY MOTORIZED "THE HAWKS" OF THE PNP

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Summary— The present investigation thesis is based on the integration of a system with technology RFID for the identification and control of the motorcycles of the unit of emergency motorized "The Hawks" of the PNP, specially to reduce the time of waiting for every official of the emergency division and to generate an electronic database for the management of the division, for the purpose of improving the services that the police unit realises.

The project is framed in the type of technological research, based at comprehensive level with a design of mixed source (documentary and field) with the employment of skills and instrument of a compilation of information, specially the analysis of sources documented like the survey, direct observation and not structured interview.

For the integration of the automatic system and the fulfillment of the raised targets, it was used as he guides a mixed operative structure that allows the development of the application using a proper element of the technology RFID.

This way one concludes that with the integration of the automatic system with technology RFID it generates a better management of the motorcycles of the unit.

Index of terms— "System RFID"," System of Control and Access", "Third Badge RFID", "National Police of Peru.

I. INTRODUCTION

The systems RFID (Radio Frequency Identification) it is a technology that has integrated to the identification systems for radio frequency; it allows storage and data recovery of the devices named you to label, cards, transponders or tags RFID. (RFID, 2015)

At present due to its advance, under cost, increase of its capacities and advantages opposite to other identification technologies; it has generated reception and interest on the part of the public and private sector.

In the present thesis project on System of Control and Identification RFID Applied in the Unit of Emergency Motorized "The Hawks" of the PNP, it is based on elements like: readership, tags, antennas and a base of information integrated an automatic system that allows the identification by means of waves of radio of the tags (third badge) installed in the motorcycles. And it is detailed and analyzes each of the chapters in its different stages of the following way:

In Chapter I, there is described our main problem and targets for the achievement of a system automated with technology RFID, likewise scope and limitations.

In Chapter II, the related theory develops identifiers, tags (third badge), antennas, etc. That will be much utility for the development of the thesis.

In Chapter III, there is described in detailed form the function and importance of the police division. Development of all the raised problems of the thesis.

First: There will be realized a detailed study of the current situation of the motorized ones, with surveys and interviews that allow gathering information.

Second: to develop the integration with all the teams and elements necessary for the project.

In Chapter IV, the analysis of the costs and benefits that it would present to the unit with the integration of the system RFID.

II. THEORETICAL FRAME

The technology RFID

It is an identification system for radio frequencies

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that allows the automatic information apprehension, identifying objects using the wave use of radio frequency. Composed principally for:

Figure 1: Components of an RFID system.
Source: Courtesy of GS1 /Peru.

- ***RFID reader.*** **-** Using its antennas they send digital information codified in waves of radio frequency to be able to obtain the information stored in the tags that are inside its reading status. All the readership has the reading capacity and to register
- ***RFID antennas***. There is the most sensitive component. Mostly they are lodged in enclosures that are easy to mount and occur rarely turn like racks protected.

- ***RFID tang and third plate.*** **-** It is a passive verifiable device that allows the reading with a technology of radio frequency of a serial the only grab-able in the chip.

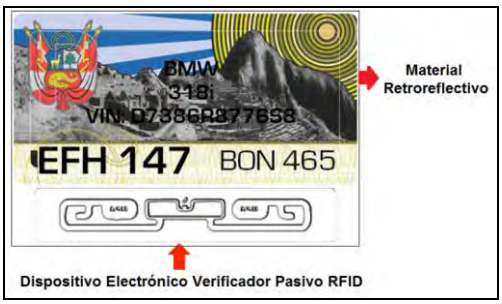

Figure 2: Third plate-Peru.
Source: Made by myself

- ***Electronic product code (EPC).*** - It is a standard for the implementation RFID that allows the automatic identification and the trazabilidad of the objects in real-time. Its target is to create a global standard for the identification of individual objects as well as the information exchange

III. DEVELOPMENT OF THE SYSTEM RFID

Analysis of the current situation of the unit of motorized emergency the "Hawks" of the PNP.

Infrastructure. -The unit is provided with a 10 000 square meters area approximately, with encirclement perimétrico of a 4 meters height, front orange color with walls color cremates, relies on with a metallic door (large door) black color of two sheets, 5 meters long and 3metros with 70 centimeters high for the one that they deposit and there go out the effective police ones, the (patrol) vehicles and the motorcycles of the unit "The Hawks". Also, in its interior of the installation, it is provided with bedrooms, snack bar, main courtyard and spaces destined for the motorized vehicles.

Motorcycles and the third plaque.- Are CBX 250 Twister Motorcycles from Honda acquired by the government.

Figure 3: Motorcycles motorized emergency unit "Los Halcones" PNP.
Source: Made by myself.

Situation of the manual record.-At present for the purpose of taking an administration, the administration and logistics of the unit of emergency motorized "the Hawks" of the PNP designates five effective ones as minimum, so-called service" prevention guard" the same ones that are divided into two named groups prime and ninth, in schedules of 06:00 to 13:00 (cousin), of 13:00 to 20:00 hours the ninth one and of equal way it happens in the night, in such a way that the service remains covered 24 hours of the day. One of the effective ones of shift supports in the rush hours 06:40 and 13. 00 schedules in which the personnel movement and motorized it goes out to cover the different services, and they enter to consume its

food and its personal cleaning.

The shift service to use a roll of printed services and a notebook of control that is an opening do sign and legalized by the organs of control and the chief of unit in this notebook the motorized personnel moves to towards the access door with the motorcycle, then it has to extinguish the motorbike and go down to register in the notebook filling its name, hour and date, badge of motorcycle, place of service and signature and impression of its right index that is corroborated by the shift manager or in its defect as the confidence grade realizes the note the manager; then the motorized one lights its motorcycle and goes out.

Figure 4: Manual entry Notebook.
Source: Made by myself.

Generated tails.- This form of manual record becomes very tedious, stressful and harmful to the personnel since at the time of exit tails are generated and waiting times, for what the personnel has to come with an hour of anticipation to its center of works, for the purpose of going out to the service.

Figura 5: Cola y espera de los Halcones PNP.
Source: Made by myself.

Development of survey. **-** For a better analysis of the current situation of the existing problem, a police officer of the unit formulated a survey with ten questions of a closed answer, with a population sample of twenty interrogated persons, considering like analysis.

Conclusions of the current situation. **-** The analysis conducted on the current situation we conclude that:

To date May 14, 2015, there is no automatic control system for motorcycles, and these are recorded manually, causing queues, loss of time very important for this unit and mainly great economic losses to the Peruvian state:

Selection of equipment needed for the RFID system.

- ***Motorola FX7400 RFID Reader.*** **-** It is an advanced data capture at fixed points, small environments and user and installation.

Figure 6: Motorola FX7400 RFID Reader.
Source: Courtesy of Motorola.

- ***Two antennas Motorola AN700 RFID.-*** plastic coated aluminum with a weight of 1.13 kg offering all the functionality required for outdoor environments and limited. It is the ideal place to integrate with Motorola FX7400 RFID reader add, besides being extremely compact highly resistant to rain, snow spaces and extreme temperatures.
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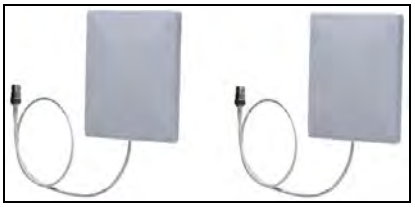

Figure 7: Motorola AN700 RFID antenna.
Source: Courtesy of Motorola.

- ***Network Hub - Motorola RFS7000.-*** This device is characterized by unparalleled performance, security, stability, scalability

and manageability. With a dimension of 44.45 x 440mm x 390 mm, 8 mm, 6.12 kg, and four Ethernet interfaces 10/100/1000 copper / SFP, a 10 / OOB, one CF card slot, 2 USB ports and a port RJ45.

Figure 8: Hub Motorola RFS7000.
Source: Courtesy of Motorola.

- ***In addition to others like*:** desktop computer, coaxial cable, Ethernet cable, ups, and gutters.

Block diagram proposed.-In the block diagram allows us to see the sequences and relevant aspects of the processes, the RFID system proposed.

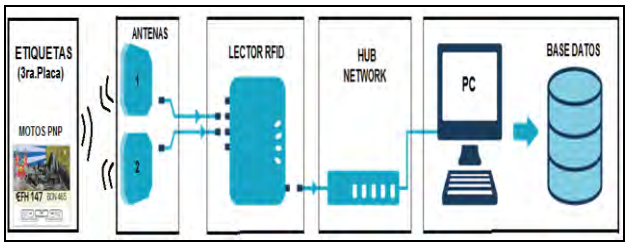

Figure 9: Block diagram of the proposed RFID system.
Source: Made by myself.

RFID tag (Third Plate): This label is affixed to the side of the motorcycle, which means the power supply receiving antennas, sends a signal in the form of radio waves to the antennas of the RFID system.

***Antennas 1and 2*:** Responsible for issuing radio signals that serve to feed the passive tag turn recension signals emitted by the labels, which are carried by coaxial cable to the RFID reader for processing.

RFID reader: Obtains information as a single electronic EPC code.

Hub Network: Serve with network hub that will allow the network integrates and concentrate from the reader and send the signal through RJ45 Category 5 UTP cable.

***PC and database*:** It is responsible for addressing a database by electronic unique identifying code EPC motorcycle, recording output or income, and stores the date and time information.

Determination reading field.

The reading field named also reading area is perhaps one of the important points for our system RFID proposed in the unit of emergency motorized "The Hawks" of the PNP, since thanks to the reading area we will be able to determine the distance to which the system will be activated and the functioning of all the processes involved, that is to say, the motorcycles must be in the field of radio frequency so that they could realize the suitable communication.

For it, we will use the Friis equation, in the free space described in the previous chapter defined of the following way: (equation 1)

$$r = \frac{\lambda}{4\pi}\sqrt{\frac{P_t G_t G_r \tau}{P_{CI}}}$$

where:

r is the maximum operating distance.

P_t G_t=PIRE; P_t it is power and G_(t) the antenna gain of the reader.

λ it is the wevelengths.

G_r It is the antenna gain of the RFID tag.

P_CI It is needed to power the integrated circuit of the RFID tag or sensitive data that is (12□W) ATMEL 5590 model power.

τ is the energy transfer coefficient ranging from 0 to 1.

The we find the length λ

$$\lambda = \frac{c}{f}$$

Considering that c = speed of light ($3x\ 10^8 m/s$) and a $f = 915MHz$.

$$\lambda = \frac{3\ x\ 10^8 m/s}{915MHz\frac{1}{s}} = \frac{3\ x\ 10^8 m}{915\ x\ 10^6} = \frac{10^2 m}{305} = 0.3228m$$

Manufacturer data.

This data can be obtained, from an extraordinary consultation upon consultation of the acquisition of any RFID tag, to give negotiations and solutions according to the standards and requirements of the customer and / or end-user.

915 MHz bandwidth. To 10dB

Z_s=6.7+j197

Z_a=84+j5 Ω

And finally we replace the values obtained in the obtaining Friis equation we have:

$$r = \frac{0.3228m}{4\pi}\sqrt{\frac{10_v 3_{dbi} 1_{dbi}}{12\mu W}}$$

$$r = 8.8\ metros.$$

Ie the radio reading would be given according to the angle of installation of the antennas as the chart.

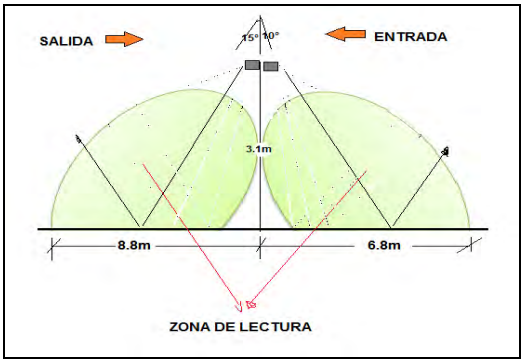

Figure 10: Reading Zone.
Source: Made by myself.

Sizing infrastructure design.- For the integration of RFID system on the drive, you must perform a basic infrastructure for the installation of the elements, especially antennas, according to the study location, angles, radiation and range of the antennas as it is shown.

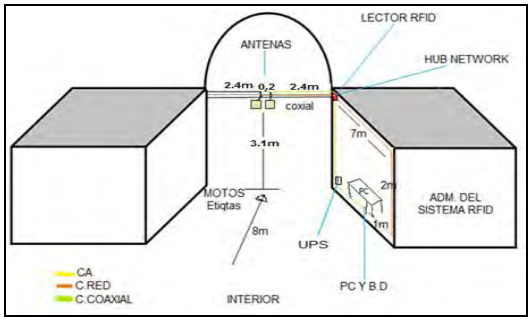

Figure 11: Location map of the element and the RFID system equipment.
Source: Made by myself.

System integration with database.- To store the information of the RFID reader, you need to have a database to make a correct storage of the information this database will be located on the computer disk C.

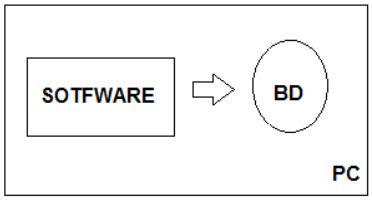

Figure 12: Integration of the database.
Source: Made by myself.

IV. COST BENEFIT ANALYSIS.

COSTS.

To implement the RFID system, it is considered the next table, where the cost summary is shown.

ítem	DESCRIPTION	TOTAL S/
01	Direct cost of human resources	1600.00
02	HR indirect cost	180.00
03	Cost of direct material resources	11815.09
04	Indirect cost of material resources	138.00
	TOTAL COST S /.	**13733.09**

Figure 13: Cost table.
Source: Made by myself.

BENEFITS

In the following chart, we can see cakes comparisons both contexts; that is a before and after.

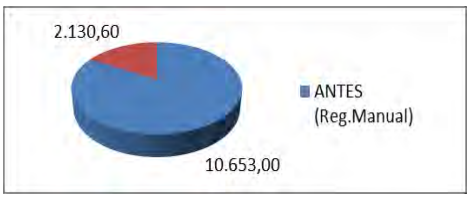

Figure 14: Comparison before and after the system.
Source: Made by myself.

RECOVERY TIME

How many days are needed to recover the investment?
As we know that the total investment is 13733.09 new soles.
As a day = 284.08 new soles.

13733.09 / 284.08 = 48.34 days.

The entire investment is recovered eight days in a month with 17 hours.

V. FEASIBILITY

Technically implementing the RFID system in the police station, it is feasible, viable, since it represents a low cost if compared with the current cost of human resources employed in the motor control.

VI. CONCLUSIONS

We conclude that RFID technology is technically feasible, versatile, economical, scalable and does not require direct physical contact; drastically reducing the waiting time of 1 hour and 15 minutes to ten minutes and let you have a record of the orderly, accessible and reliable motor.

With the integration of the center and RFID identification motorized emergency unit "the hawks" PNP would have an automatic system and would be at the forefront of technology in this genre, which would benefit all staff and the Peruvian state.

VII. RECOMMENDATIONS

- To realize more surveys and interviews to a major status of effective police.
- For its real implementation, the teams must be tried and verified. Before its buy and in normal work conditions.
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- On having finished the implementation of the system, one must qualify to all the effective police ones with the purpose of knowing the system and principally the protection of the tag third so-called RFID tackles.
- Training on the suitable use of the system RFID to avoid fears or negative reactions of the project that could generate a social cost for the state.

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