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作品編號 100022
參展科別 工程學
作品名稱 Multi-Alarm Teleoperated
得獎獎項 四等獎

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Abstract

This article talks about the design, construction and operation of multi-alarm teleoperated. The work contains the different stages of construction that were performed for both hardware and software, as well as the way in which the entire process is developed. The prototype is autonomous. It can detect the things that happen in the house and send a sms to the cell phone. With the cell phone you can drive a robot in the house.

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1.- Introduction

1.1 Problem statement

Advances in technology allow us to develop new systems, those systems contribute solutions to the nowadays problems. Those systems impact in different areas. This project impacts in the social area.

One of the most serious problems in our society is the insecurity. The thefts in houses, offices and business are very common and we don't combat this problem with methods very effective. A good method for the combat of this problem is put alarms but it's very hard to know what happen in our house when we aren't in it.

1.2 Theoretical framework

We find a alarm system with sensors. The sensors are in the house and when the sensors detect a danger the speakers are on, but we don't know which sensor detects the danger. We don't know with security what happen in our house.

This prototype is going to communicate what happen in our house in real time and we will see what happen and chek if the alarm is true or is a false alarm.

1.3 Objective

General:

Put in practice an innovator and technology idea for reduce the loss of material goods a cause of thefts or fires.

Specific:

Create a device, this device will read what happen in the house and send this information to the cell phone and we can drive a robot with it. With the robot we can see what happen in our house because it has a camera and the video will be in our cell phone.

1.4 Justification

Looking for the best method for the security problem, we put in action an innovative and technological idea. With this idea it will be easier to drive information about our house when we aren't in it.

1.5 Hypothesis

It's possible to help in the solution of the security problem with sensors in the house and those sensors will detect if the windows or the doors are open but you can add a lot of types of sensors depending on the characteristics of the house. This with the use of new technology.

2.- Method

We did the objective of using a mechatronic device for the protection of the house in three phases.

1) Study phase

First we did an investigation about the backgrounds of the problem and the possible solutions, with this information we can know the objectives of the project, what we wanted to do, what we had and what we needed.

With this information we could do a list of the requirements for choosing the correct components that we could use for our necessities

For the electronic system we studied the different alternatives for the drive of the sensors for example the sensor that detects if the windows are open, the different types of arduinos, the communication of them and the wireless signals.

2) Pretesting phase.

When the study phase finished, we started with the pretesting phase, in this we check the components and the correct operation of them. We applied arduino commands for the activation of inputs and outputs and the wireless signals. We were certain that we can receive the message in our cell phone. With the servomotors we needed ports with PWM and the arduino has this type of ports.

3) Implementation phase

In this phase we could integrate the different subsystems of the project. (Annex 1). And we defined the operator of this way

The process starts when the sensor detects a danger and sends the information to its node and this sends to the main node. The main node sends the information to the cell phone and drives the robot with the cell phone. (Annex 2)

3.1 Hardware description

3.1.1 Ultrasonic sensor.

It measures the distance of the signals that rebound to the object in this case the window and when the window is open the distance will be larger and the sensor will send the signal.

3.1.2 SHARP sensor.

This sensor detects the distance with the object too. When the door is open the distance changes and the sensor will send the signal.

3.1.3 Arduino uno (main node)

It read the signals in the Arduino Pro Mini and when receives the signal of the sensors, it send the signal to the cell phone and we can drive the robot.

3.1.4 GSM SHIELD

It's a dispositive, its function is send the text message to the cell phone when the main node send the signal.

3.1.5 Arduino Uno (in the robot)

It receives the signals of the X-Bee and with them it moves the robot with the servomotors.

3.1.6 X-Bee

It connects wirelessly the principal node with the robot.

3.1.7 Servomotores

They are the motors programmable. They receive the signal of the Arduino Uno and move the robot.

3.1.8 Keypad

With this device we drive the robot with its buttons. It's temporary we will drive the robot to the cell phone.

3.1.9 Robot structure

It's of acrylic and a crazy wheel for their balance. (Annex 3)

3.1.9.1 Arduino Pro Mini

It reads the sensors and communicates its state for I²C to the main node.

3.2 Software decription

All of programming is in the Arduino platform.

Each arduino has a different programming for the different type of work it does.

The arduino uno (main node) is communicate for I²C with the arduino pro mini because It needs know the state of the sensors. It has the program to send a text message to the cell phone and drive the robot (annex 4)

The arduino uno in the robot has a program with function to send outputs of ports and drive the robot.

3.- Results and discussion

We achieve integrate the control system of the arduino uno, arduino pro mini with sensors, the GSM, the Keypad and the robot.

The system can detects if the window or the door is open, send a message of the cell phone and drive the robot in the house by the keypad.

4.- Conclusions

4.1 Conclusions about the general objective.

This project impacts in the social area because it can reduce the material losses for the fire or theft. We will know what happen in our house.

4.2 Conclusions about the specific objects.

It's fact create a dispositive that sends information when our house is in danger when we aren't in it.

4.3 Final considerations

We will continue investigating a lot of types of sensors for the house and how we can send the video to the cell phone. We will work in the web site for the driving of the robot.

5.- Gracitudes

We thank to the CINVESTAB because they assigned an advisor and they allowed us work in their places. We thank to the CBTis 271 too because they approved the participation of the autor in this event. And the special form thank to the autor's parents for the support.

6.- Bibliography

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7.- Annexes

Annex 1

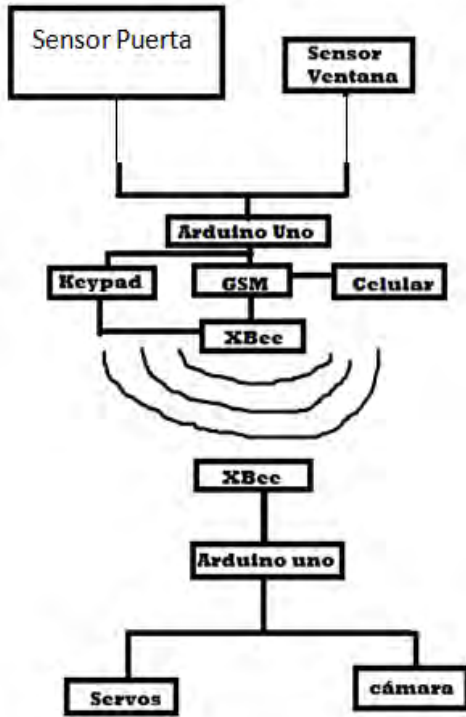
Photography by Omar López



System of arduinos, sensors, Xbee and servomotors.

Annex 2

Binnacle's diagram



Main diagram of the Project.

Annex 3

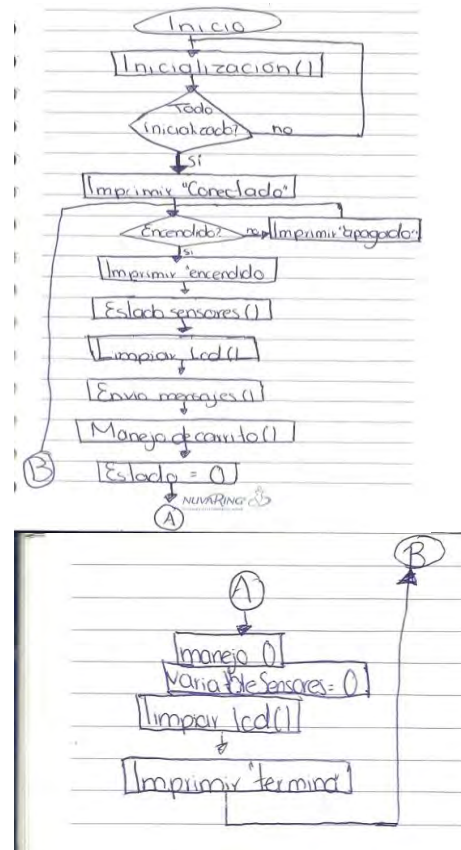
Photography by Itzel López



The robot.

Annex 4

Binnacle's picture.



Flowchart of the main code.

【評語】 100022

1. The implementation of teleoperated multi-alarm is very encouraging.
2. The reliability of the system is suggested to be further considered.