



INTRUSION DETECTION SYSTEM USING REGULATED PATROLLING ROBOTS FOR APARTMENTS

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Abstract : This project deals with the development an intelligent robot for real-time monitoring and control for intrusion detection. The robot can be remotely controlled using the HC-05 Bluetooth module and a microcontroller, smart camera interface embedded on the robot. The robot consists of a video camera with wifi link. The camera on the robot is used to capture and record real time video from the robot. The robot can be controlled based on visual feedback from the same smart phone. The four wheeled dc motors help to navigate the robot, PIR sensor used to detect the human motion detection and ultrasonic sensor to avoid obstacles. A control switch is used to operate the vehicle in two different modes i.e., automatic mode and manual mode. The camera mounted on the robot should be able to move to different locations, which can better capture the images of any field. The Prompt Patrol Robot allows performing intelligent video surveillance at medium distances while in motion. The Prompt is designed to patrol continuously, and this permits efficiently keeping control over premises of any size.

Index Terms - wireless network, Arduino Uno Board, HC-05 Module and video surveillance.

I.INTRODUCTION:

An Embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Personal digital assistants (PDAs) or handheld computers are generally considered embedded devices because of the nature of their hardware design, even though they are more expandable in software terms. With the introduction of the OQO Model 2 with the Windows XP operating system and ports such as a USB port both features usually belong to "general purpose computers". Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. In terms of complexity embedded systems can range from very simple with a single microcontroller chip ,to very complex with multiple units, peripherals and networks mounted inside a large chassis or enclosure Avionics, such as inertial guidance systems, flight control hardware/software and other integrated systems in aircraft and missiles.

- Cellular telephones and telephone switches.
- Engine controllers and anti lock brake controllers for automobiles
- Handheld computers
- Personal digital assistant
- Video game consoles
- Computer peripherals such as routers and printers.
- Industrial controllers for remote machine operation.

II.EXISTING SYSTEM:

A robot which performs image processing using the camera on an Android smartphone has also been implemented. However, this method is limited by the processing power of the phone, a problem that we have addressed by remotely performing all imaging processing operations on a different computer, after transmitting the camera's feed.

Some existing projects use short range wireless camera. Some existing robots can only be controlled with a manual mode which needs human supervision throughout the whole patrolling process.

III.PROPOSED METHOD:

Patrolling is the major thing when we are going to secure anything as it is the most tedious job. Because of this, it will become risky to the human beings to observe all things continuously. So, a robot is implemented which can continuously observe the things and perform many functions based on the conditions. Using this robot, the work burden will be reduced and the performance will be more accurate.

4.1.2: HC-05 BLUETOOTH MODULE:

- It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications. It has range up to <math><100\text{m}</math> which depends upon transmitter and receiver, atmosphere, geographic & urban conditions. It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART). HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

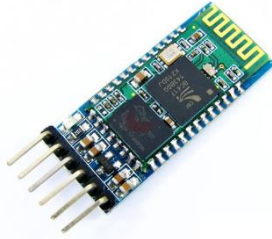


Fig:4.1.2:HC-05 Bluetooth Module

4.1.3: NIGHT VISION CAMERA:

Security cameras are an essential component of any effective home or business security system. Night vision security cameras are able to monitor low-lit to completely dark environments (without compromising image quality). If we need night vision patrolling technology to protect our property, consider the benefits of night vision security cameras or night vision patrolling cameras with an IR illuminator, which allow us to see clearly what is going on outside our doors and windows.

Today's night vision security cameras are highly functional and cost-effective when it comes to home security. We do not have to worry about low-quality, unidentifiable images in nighttime settings. With day / night cameras, we can observe the perimeter of our property even when it is pitch-black outside.



Fig:4.1.3:Night Vision Camera

4.1.4: ULTRASONIC SENSOR:

The ultrasonic sensor (or transducer) works on the same principles as a radar system. An ultrasonic sensor can convert electrical energy into acoustic waves and vice versa. The acoustic wave signal is an ultrasonic wave traveling at a frequency above 18kHz. The famous HC SR04 ultrasonic sensor generates ultrasonic waves at 40kHz frequency.



Fig 4.1.4: Ultrasonic Sensor

4.1.5: PIR SENSOR:

PIR sensors are everywhere because it is almost impossible to visualize without them every day in modern life. These sensors are less costly, very simple to utilize, and consistent, so applicable in door openings, security alarms, vending machines, automatic lighting switches, lift lobbies, and many more. Since these sensors are designed with many benefits they have been used in different electronic projects related to Raspberry Pi & Arduino.

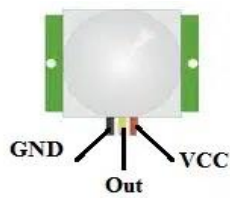


Fig4.1.5:PIR Sensor

4.1.6: DC MOTOR:

A DC motor is any of a class of rotary electrical machines that converts electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of dc motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in the part of the motor.

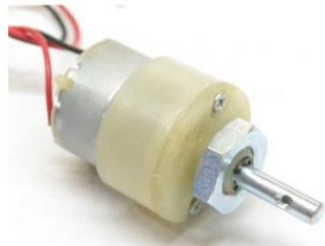


Fig:4.1.6:DC Motor

4.1.7: MOTOR DRIVER:

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. One of the easiest and inexpensive way to control DC motors is to interface L293D Motor Driver with Arduino. It can control both speed and spinning direction of two DC motors. And as a bonus, it can even control a bipolar stepper motor like NEMA 17.

Motor drives are circuits used to run a motor. In other words, they are commonly used for motor interfacing. These drive circuits can be easily interfaced with the motor and their selection depends upon the type of motor being used and their ratings (current, voltage).



4.1.7:Motor Driver

4.1.8: SWITCH:

Switches connect two open terminals in a circuit. This example turns on the LED on pin 2 when we press the pushbutton switch connected to pin 8. Pull-down resistors are used in electronic logic circuits to ensure that inputs to Arduino settle at expected logic levels if external devices are disconnected or are at high-impedance. As nothing is connected to an input pin, it does not mean that it is a logical zero. Pull down resistors are connected between the ground and the appropriate pin on the device.



Fig:4.1.8:Switch

4.2: SOFTWARE REQUIRED:

4.2.1: ARDUINO IDE SOFTWARE:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It originated from the IDE for the languages *Processing* and *Wiring*. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple *one-click* mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus. The source code for the IDE is released under the GNU General Public License, version.

4.2.2: EMBEDDED C:

EMBEDDED C Programming is the sole of the processor functioning inside each and every embedded system we come across in our daily life, such as mobile phone, washing machine and digital camera. Each processor is associated with embedded software. The first and foremost thing is the embedded software that decides the functioning of the embedded system.

RESULT AND DISCUSSION:

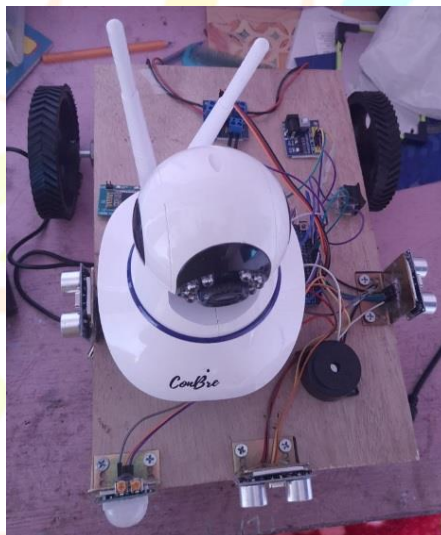


Fig: Working model of proposed patrolling robots for apartments



Fig:Proposed patrolling robotic vehicle,when intrusion detected

CONCLUSION:

The patrolling robot for real-time monitoring and intrusion detection with the help the real time condition of any area without any human source. This robot has the ability to substitute a human at the buildings or factories and this robot works both as autonomous and manually controlled. This robot is interfaced with various sensors which produce the output based on which desired operation can be performed. Since these robots are small in size, they can enter tunnels, mines and small holes in buildings

at the war area and can withstand harsh conditions and can be able to work for longer time when compared to human beings. The operating cost for this robot is also lesser than the cost of human beings. This robot can be made more efficient and accurate by fixing a camera on the robot. The camera mounted on the robot should be able to move to different locations, which can better capture the images of surrounding areas. It makes the user to take better decisions to move the robot in manual mode.

. Future work will be devoted to extend these basic attack scenarios to develop more complex scenarios, as well as consider more sophisticated defense mechanisms, such as the implementation of ML algorithms to detect patterns of agent interactions and attacks.

REFERENCES:

- [1] M. Lezzi, M. Lazoi, and A. Corallo, "Cyber security for industry 4.0 in the current literature: A reference framework," *Computers in Industry*, vol. 103, pp. 97–110, 2018.
- [2] T. Poppensieker, W. Richter, R. Riemenschnitter, and G. Scherf, "A new posture for cyberrisk in a networked world," in *Leading in a disruptive world*. McKinsey&Company, 2018, ch. 3.
- [3] Cisco, 2018 Annual Cybersecurity Report, 2018.
- [4] ECSO, <https://ecs-org.eu/cppp>, accessed: 2019-07-26.
- [5] D. Emm and V. Chebyshev, "Kaspersky security bulletin 2018. top security stories," <https://securelist.com/kaspersky-security-bulletin-2018-top-security-stories/89118/>, 2018.
- [6] W. Stallings and L. Brown, *Computer Security: Principles and Practice*. Pearson, 2015.

