

# A Domestic Robot for Security Systems by Video Surveillance Using Zigbee Technology

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*Abstract-In this implementation of Defense security systems .When a person or motor vehicle enters a monitored area, PIR motion detectors are commonly used in conjunction with different parts of the war field. When someone enters secured places, immediately it will send an indication to the control room section through wireless communication and is indicated to the control room through alarm [1]. The concerned people can understand that an eventuality has happened in the host section. At the same time web camera connected to the microcontroller keeps on capturing what is going on there at the host place and saves it into the computer. When the security people in supervisory room, get an indication to the host section by alarm, they log into the host section computer through wireless LAN, and view all information of the war field section images by PC and can operate the weapons if the entered people were opponent person. Sectors based on PIR detectors, ultrasonic sensors and also communicate to the Control room through wireless communication by means of encrypted data and then from the control room they can able to monitor what's happening in the war field and supervise from the control room itself when signal is sent on detection of human by pir sensors a alarm is buzzed in control room thus reducing work load.*

**Keywords :** LAN, PIR, PIR

## INTRODUCTION

In this system consists of two sections Warfield section and the control room section, in the former section consists of Passive IR motion detectors are usually designed to provide an indication to an alarm panel in response to detecting IR that is indicative of motion of the object. When a person PIR motion detectors are commonly used in tagged with different parts of the war field. Someone enters secured places, immediately it will send an indication to the control room section through wireless communication and indicated to the control room through alarm. The people can understood something happens in host section [4]. At the same time camera keep on capturing images at the host place and saved into the

computer. When the security people in supervisory room, they got an indication to the host section by alarm, they log into the host section computer through wireless LAN, they can view all information of the war field section images by PC and they operate the weapons if the entered people were opponent persons.

The communication between the war field and the control room Zigbee communication it's more secure and safety and only the encrypted data will be

transforming and no one can access this information. By placing this battle field section in different places so we gained high security

A motion detector of an alarm system has a microwave sensor and a passiveinfrared sensor, and includes signal processing logic for initiating an antimasking evaluation upon detection of certain conditions [10]. The detector then samples the sensor signals and compares the signals to a series of possible outcomes. Some of the possible outcomes represent the masking conditions, while others represent normal conditions. A match with masking conditions results in an alarm signal being generated. With the rapid development of microelectronics and wireless communication technologies, mobile robots are being widely used in industrial automation, home automation, hospitals, entertainment, space exploration, military, etc. In

Recent years, as the size and the cost of mobile robots have decreased significantly, they are finding increasing uses in home environments. More and more mobile robots are now working around us and they will help us a lot in our daily lives. Various home robots have been proposed to do housework such as cooking, cleaning, house plant watering, pet feeding and taking care of children. Home security is one of the typical applications of home robots. In traditional home security systems, monitoring devices are usually mounted on fixed locations such as doors, windows and walls [7]. A home surveillance system based on an

embedded system with multiple ultrasonic sensor modules has been presented in. If any intruder passes through the ultrasonic sensing area, the ultrasonic transmission will be blocked by the human body. The authors use a Majority Voting Mechanism (MVM) to process the output signals from The robot can return to the docking station for recharging operations when the on-board battery is too low it from a remote location Surveillance systems provide the capability of collecting authentic and purposeful information Forming appropriate decisions to enhance safety Sensors the inclination has been to utilize more intelligence The most recent generation is decomposed into multi sensor environments Awareness of time is particularly important for tele operation of conversational robots. Findings have shown that people engaged in high-workload Tasks tend to underestimate the passage of time.

Although most of the current home security systems can work normally, it is inconvenient to deploy and maintain a lot of sensors and accessories everywhere in the rooms. Due to irregular room structures and various physical limitations of sensors, there often exist some regions that cannot be covered by the sensors. In view of these drawbacks, a more flexible and more efficient solution for home security is to deploy a mobile robot equipped with surveillance devices such as infrared sensors..

### 1.1 EXISTING SYSTEM:

The size and the cost of mobile robots have decreased significantly; they are finding increasing uses in home environments. More and more mobile robots are now working around us and they will help us a lot in our daily lives. The alert system at the server side is also not proper and most importantly it requires 24hr monitoring of the video even no human at the vicinity which is a high workload for the human so monitoring is done manually and cctv cameras are wired which is high cost.

There is much advancement in the field of engineering, robotics in particular. Many robotic systems have been developed for various purposes. There are certain systems which are used for automatic motion of vehicles in road and wheel chairs which can help disabled. There are also robotic systems which can be used for defense purposes. In addition to these advancements there are no such wireless robots which can transmit in a wireless manner automatic docking and

recharging capabilities for home security .The proposed system is composed of a surveillance robot.

### 1.2 Proposed System:

In the proposed system the robot can transmit video in a wireless fashion reducing the cost of wires, implementation of advanced technology so which is proposed to be a high security alert. The robot can return to the docking station recharging operations when the on-board battery is too low hence an high security system which is high alert for people and hence on the whole Monitoring easy through Computer and storing of the video Detecting persons through PIR sensors and thus alert in the server side only when there is detection of human and use of multiple use of sensors like ultrasonic sensors and so on for High Protection.

Here in our existing system there are only remote monitoring for robots are available Here in our system we are going to control the robot from remote location in addition to remote monitoring (i.e. User Mode) [3]. Our system also signal to the remote computer alarm My robot is High security system since world load is less human effort is reduced Highly alert for people since alarm is used in the secured room Remote monitoring and control when harm to the robot Detecting persons through PIR sensors no signaling in case of animal Wireless communication. With the rapid development of microelectronics and wireless communication technologies, mobile robots are being widely used in industrial automation, home automation, hospitals, entertainment, space exploration, military, etc. In recent years, as the size and the cost of mobile robots have decreased significantly, they are finding increasing uses in home environments [6]. More and more mobile robots are now working around us and they will help us a lot in our daily lives Various home robots have been proposed to do housework such as cooking, cleaning, house plant watering, pet feeding and taking care of children Home security is one of the typical applications of home robots. In traditional home security systems, monitoring devices are usually mounted on fixed locations such as doors, windows and walls. A home surveillance system based on an embedded system with multiple ultrasonic sensor modules has been presented in. If any intruder passes through the ultrasonic sensing area, the ultrasonic transmission will be blocked by the human body. The authors use a Majority Voting Mechanism (MVM) to process the output signals from The robot can return to the docking station for recharging

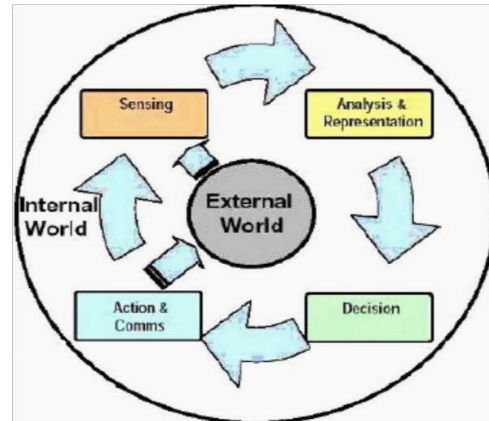
operations when the on-board battery is too low it from a remote location Surveillance systems provide the capability of collecting authentic and purposeful information Forming appropriate decisions to enhance safety Sensors the inclination has been to utilize more intelligence The most recent generation is decomposed into multi sensor environments Awareness of time is particularly important for tele operation of conversational robots. Findings have shown that people engaged in high-workload Tasks tend to underestimate the passage of time.

Although most of the current home security systems can work normally, it is inconvenient to deploy and maintain a lot of sensors and accessories everywhere in the rooms. Due to irregular room structures and various physical limitations of sensors, there often exist some regions that cannot be covered by the sensors. In view of these drawbacks, a more flexible and more efficient solution for home security is to deploy a mobile robot equipped with surveillance devices such as infrared sensors and cameras. Many researchers worldwide are now engaged in designing various mobile surveillance robots for home security applications.



The development of a patrol robot system for home security with some interaction functionalities has been presented in the system integrates a variety of sensors to gather environmental information and detect abnormal events such as fire alarm, intruder alert and gas leakage. The authors want to implement some dedicated human- robot interactions that will help create pleasant

experiences when the robot gets along with people in the home environment. A home security system composed of a mobile robot and an ultrasonic sensor network is proposed in .The deployed sensor nodes provide the robot with location information for path planning. The design and implementation of an intelligent home.



## Embedded Systems

security robot based on off-the-shelf components has been presented in .The authors aim to implement a low cost and small home security robot that is suitable for patrolling tasks in narrow indoor It Includes an intelligent security robot and multiple remote interfaces has been presented in, the user can get access to the host computer to get security information of the house.

- e.g.: modems, cellular phones
- Home Appliances
- e. g.: CD player, VCR, microwave
- Control Systems
- e. g.: Automobile anti-lock braking systems, robotics, and satellite control and so on.

### 2.1 Overview of embedded systems

An embedded system is a special purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose omputer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific

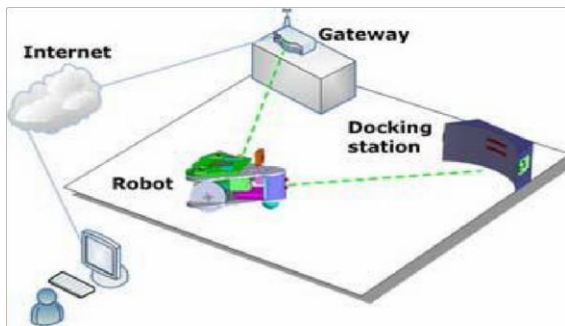
tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

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. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected.

Embedded systems provide several functions

- Monitor the environment; embedded systems read data from input sensors. This data is then processed and the results displayed in some format to a user or users
- Control the environment; embedded systems generate and transmit commands for actuators.



- Transform the information; embedded systems transform the data collected in some meaningful way, such as data compression/decompression. Although interaction with the external world via sensors and actuators is an important aspect of embedded systems, these systems also provide functionality specific to their applications. Embedded systems typically execute applications such as

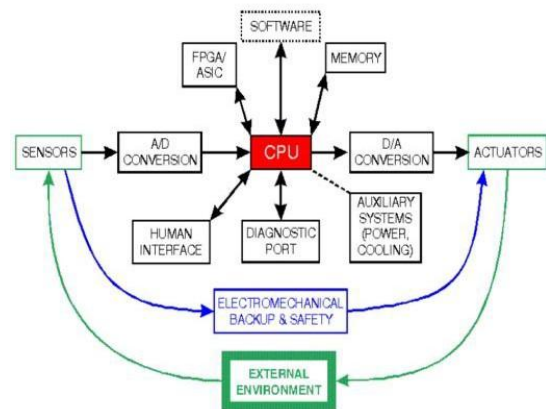
control laws, finite state machines, and signal processing algorithms. These systems must also detect and react to faults in both the internal computing environment as well as the surrounding electromechanical systems.

There are many categories of embedded systems, from communication devices to home appliances to control systems. Examples include;

- Communication devices

## 2.2block Diagram of An Embedded System:

An embedded system usually contains an embedded processor or a controller. Many appliances that have a digital interface -- microwaves, VCRs, cars -- utilize embedded systems. Some embedded systems include an operating system. Others are very specialized resulting in the entire logic being implemented as a single program. These systems are embedded into some device for some specific purpose other than to provide general purpose computing. An example of embedded system is shown in Fig 1.1



## 2.3Characteristics of Embedded Systems

Embedded systems are characterized by a unique set of characteristics. Each of these characteristics imposed a specific set of design constraints on embedded systems designers.

### Reactive Systems

As mentioned earlier, a typical embedded systems model responds to the environment via sensors and control the environment using actuators. This requires embedded systems to run at the speed of the environment. This characteristic of embedded system is called "reactive". Reactive computation means that the system (primarily the software component) executes in response to external events. External events can be either periodic or



aperiodic. Periodic events make it easier to schedule processing to guarantee performance. Aperiodic events are harder to schedule. The maximum event arrival rate must be estimated in order to accommodate worst case situations. Most embedded systems have a significant reactive component. One of the biggest challenges for embedded system designers is performing an accurate worst case design analysis on systems with statistical performance characteristics (e.g., cache memory on a DSP or other embedded processor). Real time system operation means that the correctness of a computation depends, in part, on the time at which it is delivered. Systems with this requirement must often design to worst case performance. But accurately predicting the worst case may be difficult on complicated architectures. This often leads to overly pessimistic estimates erring on the side of caution. Many embedded systems have a significant requirement for real time operation in order to meet external I/O and control stability requirements. Many real time systems are also reactive systems and a docking station. The palm-sized surveillance robot has a triangular shape with three wheel.

### 2.2.1 Hardware implemented

#### TV Tuner Card:

In order to receive the video transmitted from the distance I am using a tv tuner usb card .The card is connected to the pc and the camera captures the video when human detected by the pir sensor and transmitted to the pc with the help of the tv tuner card that is attached.



#### RS 232:

In telecommunications rs 232 serial binary data transmission since to connect to the pc a rs 232 cable is being used.

#### MICROCONTROLLER:

A Dallas microcontroller is being because a normal 8051 has only one USART were as a Dallas micro controller has two usart one to connect to the zig bee other usart to the pc .Other than that it

is similar to that of the 8051. which is as simple as microprocessor with memory unit.

#### PIR Sensor:

Passive infrared sensor is used in order to detect the human at the certain distance as human emits heat at a wavelength of 8 to 12 micro meters the sensor detects the human.



#### Ultrasonic Sensor:

This sensor has been used for the obstacle detection and movement it is been programmed in such a way that when it detects the obstacle it makes movement as been programmed.

#### 2.2.2 Software Implemented:

The programming is done in embedded c for the movement of the surveillance robot and for the movement of the camera .coding is written in such a way that when the sensor detects the human is would rotate in clock wise or anti clock wise direction and even transfer the control to the human who is monitoring the bot.

Sample:

```
#include<reg420.h>

#include<stdio.h> sbit PIR =
P0^7; sbit Relay1 = P0^0; sbit
Relay2 = P0^1; sbit Relay3 =
P0^2; sbit Relay4 = P0^3; sbit
alarm = P0^4;
//sbit rf1=P1^4; unsigned
char j;
void DelayMs(unsigned int); void
serial_init(void);
void Transmit_0(unsigned char); void
Transmit_1(unsigned char); unsigned char
i,RecDat;
```

## 2. Application

- It's a domestic purpose robot
- Can be used every field like banking and where ever security is required
- Military purpose
- Traffic monitoring
- Home security and so on

## 3. Conclusion

We have presented the design and implementation of a surveillance robot with automatic docking and recharging capabilities for home security. A docking method based on the self-localization of the robot and the infrared detectors of the docking station is proposed. The robot can navigate back to the docking station for recharging operations when the on-board battery is too low. The prototype robot achieved a success rate of 90% after 60 different docking attempts. Future work will focus on improving the current prototype robot to enable more functions. We plan to address several technical challenges such as visual navigation, adding more docking stations, and the automatic battery replacement mechanism.

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