

Wireless Spying Robot for Supervision

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Abstract: Robot is the most important invention in many walks of life. Robots are invented to reduce human efforts. These Robots are extensively used in defence areas, industries, medical and home applications. It reduces human efforts and time by carrying out many risky jobs that are not possible by humans. This paper presents a Wireless Spying Robot for Supervision which is basically used for defence purpose. The robot is powered by battery. It is operated using wireless signee technology. The controlling device of the whole system is a microcontroller. This robot has metal sensors for detecting mines or bombs along with diffusion facility, fire sensor with pump motor to extinguish fire, gas sensor with buzzer to detect gas, IR sensors for path finding and obstacle avoidance. The system provides continuous visual monitoring through the wireless camera attached to the robot and sends continuous data to the control unit.

Keywords: Zigbee transmitter and receiver, camera, robot, GUI, supervision.

1. Introduction

The embedded systems are designed to do some specific task, rather than be a general purpose computer for multiple tasks. It has also have real time performance constraints that must be met, for reason such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs. The Wireless communication has become an important feature for commercial products and a popular research topic within the last ten years. There are now more mobile phone subscriptions than wired-line subscriptions. Lately, one area of commercial interest has been low-cost, low power, and short-distance wireless communication used for personal wireless networks. Technology advancements are providing smaller and more cost

effective devices for integrating computational processing, wireless communication, and a host of other functionalities
Wireless spy camera Robot

projects main functionality is deal with tough situations where human beings cannot handle situations like bomb disposal, narrow and small places...etc. This system works using a computer controlled system through which is done using electronic programming. Using camera attached to robot we can view location where the robot is using this video we can wireless control and know location details.

The implementation of this project is to resolve the problem of replacing a human army with wireless controlled Omni directional monitoring robot with video support that completely controlled with wireless network. The project is to detect an object that is located at some distance within the range of RF transmitter with wireless camera. This vehicle is equipped with a metal detector can detect any land mine

on its way, and wireless camera which will transmit the live pictures and videos remotely. This robot is also having a metal detector sensor, which will sense the presence of any mine in the survey area. It has also having a robotic arm, which will be used to pick and place the bombs and mines. It will provide the facility to remove the obstacles in the way. It is equipped with some other sensors like fire fighting, which will detect the fire on the way and it has a pump motor which starts sprinkling water to extinguish fire. This unit is helpful and useful for surveillance of an area in defence grounds for enemy, spying purpose where the human reach is not recommended or avoided. The unit is small handy portable and can reach places easily.[i]

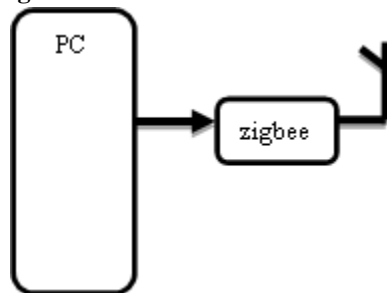
2. Basic components and Control Principal:

In the manual mode, the user is provided with a GUI (Graphical User Interface) in order to control the robot and its movements, and is connected via wireless technology which is, Zigbee. The automatic mode yields a solution for all the problems that the manual mode creates. In the manual mode operation the system is initially programmed with software's which are implemented in embedded systems. The mechanical structure of the proposed system is mainly designed on wheeled type, which is the most common structure used among detection and rescue robots. The wheeled robot is comparatively of lower costs, which help in massive production of such robots. This system, compared with the later ones has some advantages. Primarily, the system constructed works in dual mode, which means that, control of the robot can be done either manually or automatically, as per the user's choice diversion in its path. The automatic mode, since it is programmed,

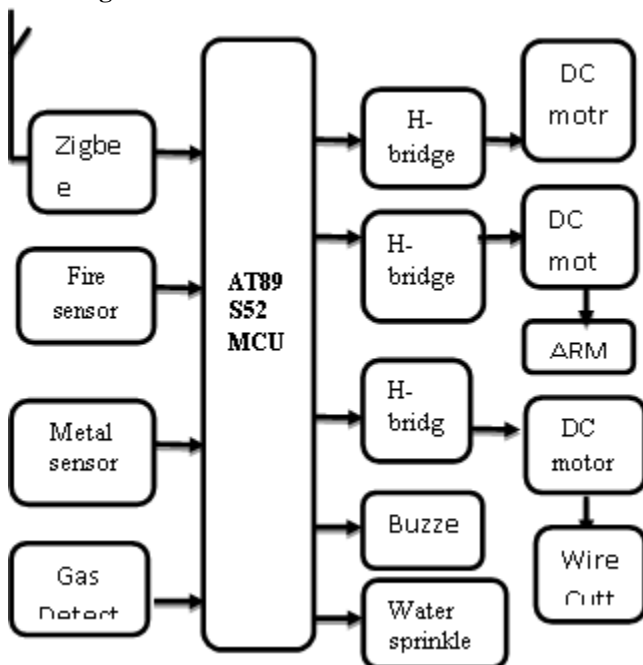
allows the user to make the robot to travel within the specified range.[ii]

BLOCK DIAGRAM

Transmitting unit:



Receiving unit:



I. HARDWARE DISCRPTION:

- II. The AT89S52 have low power idle and power down mode. It is a type of 8051 family of microcontroller and are high performance computing devices. It has 8K bytes of in-system programmable flash memory. It executes most of complex instructions in a single clock cycle since it works at crystal frequency ranging from 0Hz to 33MHz. AT89S52 is a powerful microntroller used to interface various modules like RF modules GSM and sensors.

The standard features of AT89S52 are: full duplex UART serial channel, 256 bytes RAM, a watchdog timer, power on off flag, 32 I/O programmable lines and two 16 bit timer/counters.



FIG2.1:AT89S52 MICROCONTROLLER

Motor Driver:

L293D is a four channel driver. It is a monolithic integrated high voltage, high current driver which is designed to drive switching power transistors. It accepts TTL logic level and used for heat sinking. Motor driver has two H-bridge and hence can control two DC motors which are having two input and 2 output pins for each. It is gathered in a 16 lead plastic package having four centre pins connected together. By using separate battery supply the operation of the whole circuit is protected from high current.

DC Motor:

An electrical motor converts electrical energy into mechanical energy. It has high revolution per minute and low torque. In order to reduce the rpm and to increase the torque gearbox is used. The main principal of operation is electromagnetism which states that current carrying conductor generates magnetic field and when it is placed an external field, it experiences a force proportional to rthe current in the conductor. The speed of a DC motor is directly proportional to the supply voltage, the motor will run at half speed when we reduce the supply from 12 volts to 6 volt.

Pump Motor:

It extinguish the fire there is motor called as small pump motor is attached to the robot, which will extinguish fire by sprinkling the water on it.

Metal detector:

Metal detectors are useful for finding metal enclosure hidden within the object or metal object buried underground. Metal detector is used here as a bomb detector.

Robotic Arm:

A robotic arm of 3dof (degree of freedom) is used, which is basically used to remove the obstacles in the way and also to place the bombs etc.

Wireless camera:

A camera is device that records images, either as a still photograph or as moving images known as videos. This is

used in the robot to take the video surveillance of the area. And it is transmitted using a carrier signal. On the receiving end it is converted to video signal.

Buzzer unit:

Buzzer unit is used for the indication purpose, that is, it gives a sound alert when there is any variation of gases, temperature and if there is any obstacles are there in front of the robot. Through the alert we can easily understand the situation of the field.

Gas sensor:

Gas sensor is used for detecting the hazardous gas details of the environment

Fire sensor:

Fire sensor is used to detect fire and the system is also provided with fire extinguishing feature. In this water pump is attached with robot for extinguishing the fire.

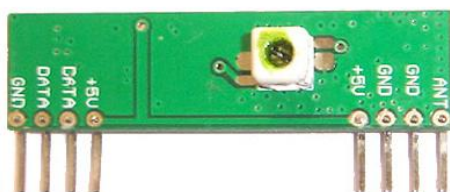
A. RF TRANSRECEIVER

a. RF TRANSMITTER STT- 433MHz TRANSMITTER

It is specially used for battery powered application. RF transmitter operates in the range 1.5-12 V supply. For a best range performance the transmitter employs a SAW stabilized oscillator which ensures accurate frequency control. STT-433 is suitable for high volume applications due to SIP friendly package and low cost.

RF RECEIVER STR-433 MHz RECEIVER:

It is of 8 pin and 433 MHz. The RF receiver converts transmitted RF signal received from antenna pin to digital data signal and make available on data pins. The range of RF receiver is 100 meters with no line of sight. There are two data pins available in the receiver module. This data can be used for further application.



III. SOFTWARE DESCRIPTION:

A. GRAPHICAL USER INTERFACE (GUI) :

The graphical user interface is used to interact with electronic devices through graphical icons. In this module we are creating Matlab code for generating GUI in the form of pushbuttons. When corresponding pushbuttons is pressed, this command is transmitted wirelessly through zigbee transmitter. Zigbee receiver will send this input datatype to the microcontroller serially which will drive the DC motor to move robot in corresponding direction.



WORKING PRINCIPLE:

The block diagram gives an idea of how the robot works. It shows how the system circuit works and how the current flow goes through it. The wireless communication used is zigbee which helps the robot to work within the specified range. In the proposed system, the system circuit can be implemented with the help of a block diagram which includes the sensors, zigbee, camera, buzzer unit and the power supply. These devices are interfaced with the help of 8051 and AT89S52 microcontrollers. All of these sensors are directly connected to the micro-controllers which have their own default program according to their use. The working energy of the robot is obtained from the battery which is attached to the microcontroller. A wireless camera, which helps in the live streaming of the nearby incidents, is included along with the other sensors. Buzzer unit act as an indicator, that is, it helps in identifying whether any obstacle is present in its way or not. If an obstacle is present, it gives an alert message to its operator. The PIR (Passive Infra-Red) sensor is used mainly for detecting the obstacles. The motor helps in moving the robot which implemented with the help of driver IC. The aim of the robot is monitoring and detecting the mines, fire, gas and obstacles. Not only detecting, tracing on to a screen can be easily done by wireless camera attached on the robot.[iii]

Results:

This project has developed a robot which is operated using the RF transmitter and receiver. Fire sensed by thermistor make the robot stop and pump motor sprinkles water until the fire got extinguished. Bombs and mines are detected by metal and magnetic sensors. Pick and place operation in the surveillance area is done by robotic arm. In order to avoid obstacles IR sensor are attached to find path. A microcontroller controls the working of various sensors and weapons through a software code embedded into it.

Conclusion:

War field wireless spying robot with live human detection and explosive has been successfully designed in the project.

The motor drivers are used to drive the motor accordingly robot changes movement when it faces an obstacle on the path when obstacles are detected by obstacle sensor. For this purpose, controller program was designed to enable the microcontroller to control robot, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.[i]

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