Design Of Wireless Spy Robot For Rescue Operations Using Audio And Video Surveillance

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Abstract— The Main aim of this paper is to design a spy robot which allow the Rescue team to go through the harsh conditions or may in disasters where it is very difficult to reach and help the banned people. This paper discusses the computer operated wireless robot which contains Wireless camera, motion sensor and temperature sensor. This robot will be operated through computer interface. As we are going forward wireless camera guide us in the direction, but if suppose there is something moving in the back word, then that can be detected by motion sensor i.e PIR sensor. On detection of human body, then by measuring its temperature, it can decide whether the person needs urgent help or not.

Keywords—Mechatronics;RF;Robot;Spy;Sensors;GUI

1. INTRODUCTION

A Robot is a mechatronics' device. It also includes resourcefulness or autonomy. The device with autonomy means does its thing "on its own" without a human directly guiding it moment-by-moment. The Robotics can be described as the current pinnacle of technical development. Robotics is a confluence science using the continuing advancements of mechanical engineering, material science, sensor fabrication, manufacturing techniques, and advanced algorithms. The study and practice of robotics will expose a dabbler or professional to hundreds of different avenues of study. For some, the romanticism of robotics brings forth an almost magical curiosity of the world leading to creation of amazing machines. A journey of a lifetime waits in robotics.

In practice, Robot is usually an electro-mechanical machine which is guided by computer or laptop, also mobile or electronic programming, and thus it is able to do tasks on its own. The Wireless controlled robots use RF circuits which have drawbacks of limited working range, frequency range and limited control. The Spy robot can capture audio and video information from the surroundings and can be sending to a camera receiver through RF(Radio Frequency) signal. The control of robot involves three distinct phases: perception, processing and action. Here, the preceptors are sensors mounted on the robot, processing is done by the on-board microcontroller or processor, and the task is performed using motors or with the help of some other actuators. In this paper when the user controls by remote controller, the spy robot will move to desired destination and spy images around the robot . In this paper the robot is not quite huge one and designed to be easy transportation.

2. GENERAL DESCRIPTION

To achieve the goal, the following additional technical arrangements are implemented in the system. Here Multiple devices are controlled and processed by Microcontroller .

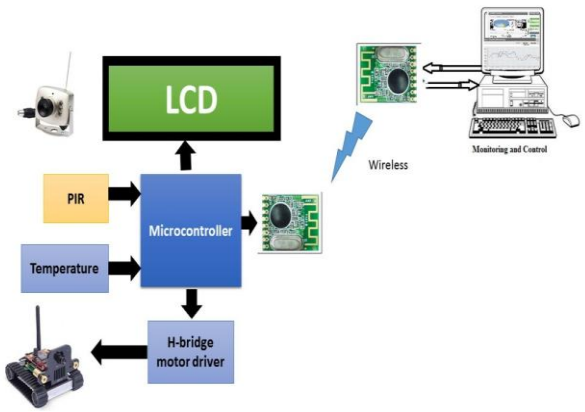

Figure 1. System Functional Diagram

A.Heart of System Microcontroller(AT89S52)

The AT89S52 is a low-power, high-performance 8-bit microcontroller which has 8K bytes of system programmable Flash memory. This device is manufactured using Atmel's high-density nonvolatile memory technology and this is compatible with the industry-standard 80C51 instruction set and pinout. The Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

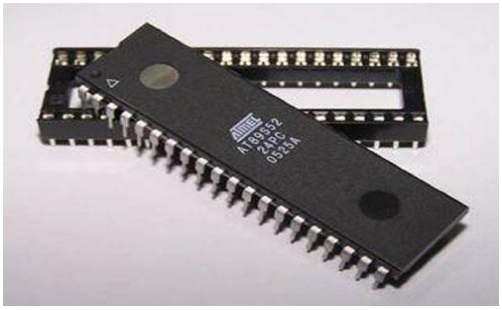

Figure 2. AT89S52 Microcontroller.

Speed Of AT89S52 Microcontroller

Total Machine Cycles = 12
Frequency=12MHz
to find out actual frequency(f)
f=?
f=12Mhz *1/12
f=1Mhz
we know the relation between time and frequency
T=1/f=1/10^6=10^-6
1 inst=1µsec
1 sec=1000000
i.e in 1 sec it execute 1000000 instructions.

B. Digital Temperature Sensor(LM75)

- LM75 temperature sensor includes a delta-sigma analog-to-digital converter, and a digital overtemperature detector.
- The host can query the LM75 through its I2C interface to read temperature at any time.
- The LM75 temperature sensor measures temperature and it converts the data into digital form by using a bandgap type temperature sensor and a 9-bit delta-sigma ADC. In Digital Temperature Sensor an I2C-compatible 2-wire serial interface allows access to conversion results.
- The LM75 temperature sensor accepts standard I2C commands to read the data, and set the overtemperature alarm (OS) trip thresholds, and configure other characteristics.
- While reading the Temperature register, any changes in temperature are ignored until the read is completed. In this the Temperature register is updated for the new temperature measurement upon completion of the read operation.

C. Motor Driver IC (L293D)

- In this project we are using L293 and L293D two motor drivers.

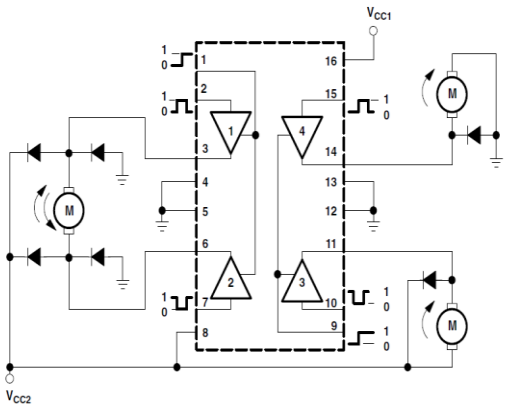

Figure 3. L293, L293D quadruple half-h drivers

- The L293 and L293D are quadruple high-current half-H drivers. The L293 motor driver is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V.
- The L293D motor driver is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. i.e Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

D. PIR Sensor

- The PIR sensors are used to sense motion, almost always allow you to detect whether a human has moved in or out of the sensors range.
- They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses.
- They are referred as PIR,"Passive Infrared", "Pyroelectric", or "IR motion" sensors.

E. RF CC2500(Wireless Module)

- CC2500 is a wireless module based on RF transceiver i.e CC2500 is a transceiver module.
- CC2500 is a small size and low power consumption module.
- It is a low-cost 2.4 GHz transceiver designed for very low power wireless applications.
- The circuit is intended for the 2400-2483.5 MHz ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band. The MAX RF output power can be set as high as +1dBm, with data rate as high as 500Kbps.
- The CC2500 module integrated many RF functions thus you can use it conveniently and reducing your development time.
- It provides hardware support for packet handling , data buffering and for burst transmissions.
- CC2500 module is suitable for transmitting and receiving data at multiple baud rates.

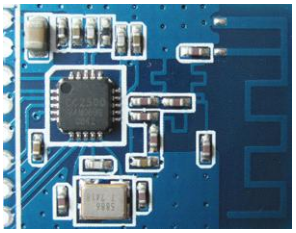

Figure 4. CC2500 Wireless Module.

2.1. Video Transmission: A program is created by focusing the
camera on a scene. The camera changes light from the scene into an electric signal, called the video signal, which varies
depending on the strength, or brightness, of light received from each part of the scene. In color television, the camera produces an electric signal that varies depending on the strength of each color of light. The video signals from the cameras are processed in a control room and audio signals from microphones placed in or near the scene also flow to the
control room, where they are amplified and combined. The
camera captures the video and audio signals and is then sent to
the receiver.

2.2. Camera Receiver:

Figure 5. Camera Receiver.

In this project,We are using a wireless camera, this type
of cameras are commonly available in the market. This camera works On 12volts DC supply. The camera has a receiver, which is Connected to the TV. Its output signals are in the form Of audio and video. These signals are directly connected to A television or a computer through a tuner card. This camera is connected to the robot. This camera captures the video and audio signals and sends those signals to the remote station and with the help of the camera receiver which is connected to the television or a computer through we can able to see the captured images.

3. WORKING

When we are pressing any key in controller the HT 12E generate 8 bit address and 4 bit data .The DIP switches are used for setting the address. Then the FSK transmitter sends the 8 bit address and 4 bit data to the receiver Then the FSK receiver receives the 8 bit address and 4 bit data and HT 12D decoder decodes the data, thus enabling the appropriate output. Thus the output signals that are generated controls the H-bridge which then rotates the motors i.e clockwise, anticlockwise, forward and backward. Video Transmission Section: In this paper we are using a wireless camera.
Now these types of cameras are commonly available in the
market. This camera works on 12VDC supply. These 12 Volt DC supply is taken from the battery placed in the robot. The camera has a receiver, which is placed in the remote station. Its output signals are in the form of audio and video. These signals are directly connected to a TV.

The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance basically the sensitivity of the sensor. When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a *positive differential* change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

The LM75 temperature sensor measures temperature and converts the data into digital form using a bandgap type temperature sensor and a 9-bit delta-sigma ADC. An I2C-compatible 2-wire serial interface allows access to conversion results. The LM75 accepts standard I2C commands to read the data, set the overtemperature alarm (OS) trip thresholds, and configure other characteristics. While reading the Temperature register, any changes in temperature are ignored until the read
is completed. The Temperature register is updated for the new temperature measurement upon completion of the read operation.

4. RESULT

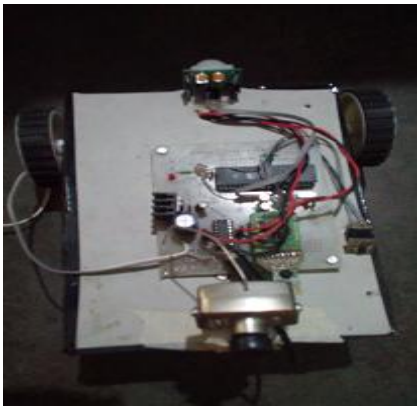

Figure 6. Camera Output with Designed circuit of Wireless Spy Robot.

During the project tests, our design works as expected. The primary aim for our paper would be

accuracy. This has been tested to the best of our ability. We have been able to view the things accurately that are happening. In our experience, our design has not caused any sort of disturbances. The robot will move based on the motor direction depending upon the input we give through the controller. With the help of the camera we are able to view the things that are happening in the surrounding area with the help of TV.

5. CONCLUSION

The idea of the paper evolved with a fantasy to see the places we wish to see at will. In this project the Robot can perform difficult and repetitive works for humans. It can have a very risky job and such dangerous job could be done by using small spy robot. But it is also useful to check and look out the places where dangerous poison gases have. Spy robot can also be used in searching people who are in building destroyed by the earthquake. Because of the wireless camera is installed in spy robots, it can be used remotely to enter and exit dangerous place that human cannot. If the user controls by remote controller, the spy robot will move to desired destination and spy images around the robot. The user can check and recommend from computer with the wireless remote controller. Similarly, Here we detected human bodies and temperature with the help of PIR sensor and temperature sensor.

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