Microcontroller Based Tracking System for the Detection of Human Presence in Critical Areas

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***Abstract* - In this paper a robust system for enabling robots to detect and identify humans in domestic environments is proposed. Here presented a sample model on a live human detection and tracking system based on a microcontroller. In recent days the high speed wireless technologies are improving day by day in the field of automation applications. Using these advanced technologies a fast, accurate, new robotic controlling device based on advanced control algorithms are developed .The critical part of the system is the microcontroller unit interfaced to the robotic circuitry; the mechanical movements are monitored and controlled by the micro controller in control circuitry. To detect the live person we are using PIR sensor called as passive infrared sensor which is used to detect the persons whether they are alive or not. The remote uses certain range of Radio frequencies which is used to transfer the commands from the remote to the robot. By using this we can change the directions of the robot. The CPU of the robot is a microcontroller (AT89C52). The power is derived from a set of three 9V batteries. Locomotion is with the help of two geared motors attached to the chassis.**

I. INTRODUCTION

There is increasing interest in domestic service robots in the robotics community. A domestic service robot is a subclass of mobile service robots designed to interact with humans in a home environment, and to provide different kinds of services (cleaning, cooking, entertainment, companionship, and surveillance, to name just a few).The home environment is defined as 'any place where people live their daily lives', which can include, for example, a kitchen, a bedroom, or a garden. Although some special-purpose domestic robots are already popular. The advent of new high-speed technology and the growing computer capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drives and advanced control algorithms.

In live personal detection robot is based on 8 bit Microcontroller. This Robot follows which is drawn over the surface. Using PIR sensor for detection of human. It is mainly used in the debris for Earth quake rescue.

Internally it consists of IR sensors. The infrared sensors are used to sense the live persons. All the above systems are controlled by the Microcontroller.

The 8 bit Microcontroller is used to control the motors. It gets the signals from the PIR sensors and it drives the motors according to the sensor inputs. Two DC Gage motors are used to drive the robot.

II. BLOCK DIAGRAM

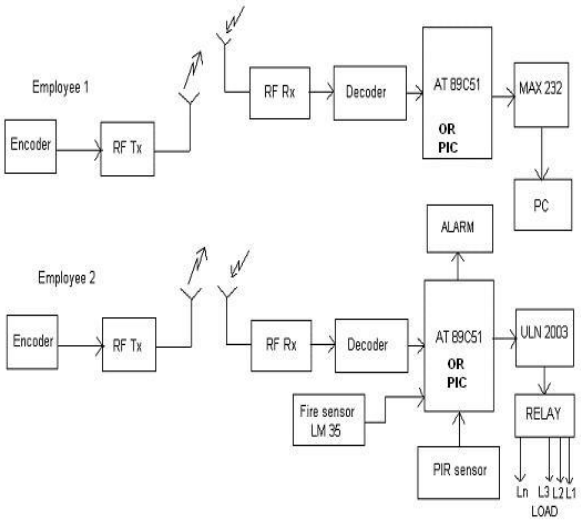

Fig 1: Human Detection System

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with

Flash on a monolithic chip, theAtmel AT89C51 is microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89C51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, two 16-bit timer/counters, five vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power savingmodes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The Power-down Mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware.

III. WORKING

This robot is developed by using AT89C51 micro controller to it RF receiver is connected and driver IC and DC motors are used. The robot movement is controlled by using RF remote control. This remote consists of RF transmitter through this remote robot movement is controlled by sending commands to robot through RF transmitter which receives data through RF receiver connected to controller and then based on commands received by controller for changing direction of robot.

To change the position of robot RF transmitter is used which is used to change to particular direction. Consider movement of robot in forward direction then particular command is send to controller through RF remote this remote internally contains RF encoder, The RF encoder to transmit the position change wirelessly to robot. HT12E is RF encoder which receives the parallel data from the controller and converts this parallel data into serial data and to transmit the serial data to RF transmitter through "Dout" pin in RF encoder TE pin should always be kept high to transmit it to data pin of RF transmitter. Then serial data is received by the data pin of transmitter and is send out wirelessly by the antenna to RF receiver present at robot.

The RF receiver connected to robot receives the data through antenna and sends to controller. The sent data by the RF transmitter is received by the RF receiver and send that data RF decoder which decodes the signal i.e., serial data into parallel by using HT12D. The signal is received by "DIN" pin and sends out using data pins and through data pins data is send to controller. Then controller sends received data to Driver IC which is used to change the direction of robot. The motors used here are DC motors. Motors cannot be interfaced directly to controllers since these do not support logic states. Since if sudden high state is applied to motor gets struck so the motor is interfaced to controller for smooth direction changing the name of that IC is L293D (line driver). To this single IC two DC motor can be connected. Totally four pins of controller is used to connect to this IC. By giving different logic values to these the motor directions can be changed.

Hence the direction of robot is changed by using RF remote. To detect the live person by using robot PIR sensor is used.

The PIR sensor is used for detecting live persons during earth quakes. This sensor does not emit any rays from it, it just absorb the radiations generated by the hot bodies since living body is composed of 96 degrees it absorbs the radiation once it detects it sends data to controller through to controller then controller automatically gives buzzer sound by activating the pin-2 as an indication that person is alive.

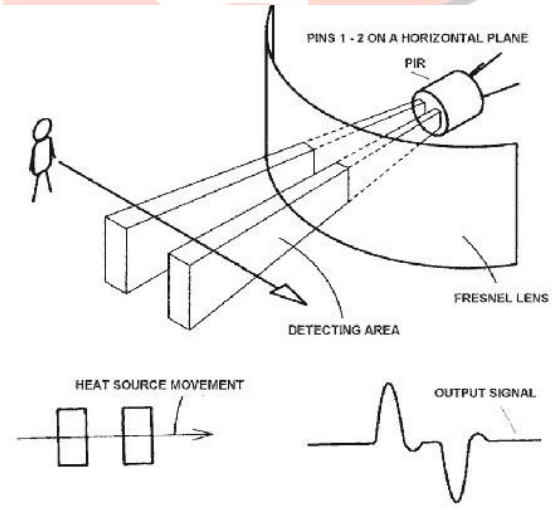

Fig 2: PIR Sensor Working

IV. CODING

Source files are created by the µVision IDE and are passed to the C51 Compiler or A51 Macro Assembler. The compiler and assembler process source files and create replaceable object files.

The Keil C51 Compiler is a full ANSI implementation of the C programming language that supports all standard features of the C language. In addition, numerous features for direct support of the 8051 architecture have been added

CIRCAD'98 is a powerful and easy-to-use PCB Design package. Included within one clean and simple program are ample tools for all aspects of circuit design and manufacturing. Utilizing the latest integrated and interactive PCB design software, we can produce artwork designs from schematic diagrams, net lists, or output from many circuit design packages.

V. FUTURE SCOPE

Alive Human Being Detector finds applications mainly in disaster management and crisis management. Some of its major applications are listed below.

1. In military applications to detect the presence of human being.
2. In Rescue operations where human reach is impossible.
3. This equipment can be used at mines, earthquake prone places

Visual basic has been used to create an on screen application to control the robot. Make the robot capable of carrying the victim to secure places. Include metal detectors and bomb sensors to detect the presence of bomb in Warfield and in rescue operations. Include proper lighting options for night time usage.

VI. CONCLUSION

The development of robots for domestic environments is a challenging task. One of the most basic problems is how to enable them to detect and identify humans robustly. Live human detection using PIR sensor has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the Unit. Secondly, using highly advanced IC's and with the help of growing technology the detection of human being is done for protecting them in earthquake prone areas.

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Biographies

SUBITHA M B received the B.TECH. degree in Electronics & Communication Engineering from the CUSAT University Cochin Kerala, in 2009, and the M.E. degree in Electronics & Communication Engineering from the ANNA University Chennai , Tamil Nadu, in 2013.Currently working as an assistant Professor of Electronics & Communication Engineering at Kannur University Kerala. Teaching and research areas include floating point unit, control systems, and embedded system design.