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Design of an Intelligent Security Robot

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ABSTRACT : The purpose of the project is to implement a security system with robots for the detection of fire, bombs and obstacles and to provide an alert system when any of these are detected. Our intelligent robot which can overcome the obstacles coming in its way. We have made use of three infrared sensors to detect the obstacles via the IR communication technique. The IR transmitter sends out infrared radiation in a direction which consequently bounces back on coming across the surface of an object and thereafter is picked up by the IR receiver. Authors have applied a multi sensor integration technique to sense the obstacles using an LED based IR transmitter and receiver module integrated with the 8051 micro controller which permits collision free navigation of robots.

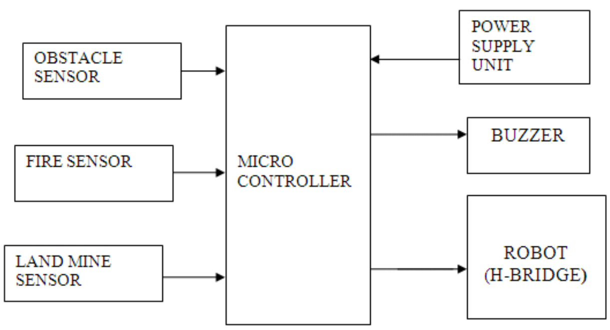
I. INTRODUCTION

Automated systems have less manual operations, flexibility, reliability and accurate. Due to this demand every field prefers automated control systems. Especially in the field of electronics automated systems are giving good performance. In the present scenario of war situations, unmanned systems plays very important role to minimize human losses. So this robot is very useful to do operations like detecting fire, obstacle, bombs and other things.

A robot is fitted with motors. A micro controller is used to control all operations. According to the motor operations the ROBOT will operate in specified directions. If any obstacle is observed by the robot it will change its direction or it will stop. In this system we have fire sensor. Whenever the sensors sense the smoke, buzzer will ON and also we have used another sensor for detecting the bomb or any dangerous materials or land mines. A self thinking robot which skillfully makes its way through obstacles approaching its way using programmed brain without any guidance from human beings. Intelligent security robots can play a significant role in reducing human efforts n saving a lot of time by smart sensing and navigation technique.
To accurately achieve a task in an intelligent environment, a robot has to be able to react dynamically to changes ion its surrounding

- Robots need sensors to perceive the environment
- Most robots use a set of different sensors
- Different sensors serve different purposes
- Information from sensors has to be integrated into the control of the robot

II. BLOCK DIAGRAM



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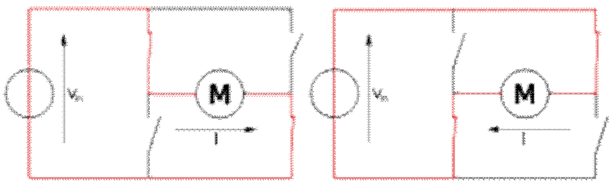
H-BRIDGE:

An H-bridge is an electronic circuit which enables a voltage to be applied across a load in either direction. These circuits are often used in robotics and other applications to allow DC motors to run forwards and backwards. H-bridges are available as integrated circuits, or can be built from discrete components.

III. GENERAL

The term "H-bridge" is derived from the typical graphical representation of such a circuit. An H-bridge is built with four switches (solid-state or mechanical). When the switches S1 and S4 (according to the first figure) are closed (and S2 and S3 are open) a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor.Using the nomenclature above, the switches S1 and S2 should never be closed at the same time, as this would cause a short circuit on the input voltage source. The same applies to the switches S3 and S4. This condition is known as shoot-through.

Operation



The two basic states of an H-bridge.

The H-Bridge arrangement is generally used to reverse the polarity of the motor, but can also be used to 'brake' the motor, where the motor comes to a sudden stop, as the motor's terminals are shorted, or to let the motor 'free run' to a stop, as the motor is effectively disconnected from the circuit. The following table summarizes operation.

Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or electronic. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as a mouse click or keystroke.

Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

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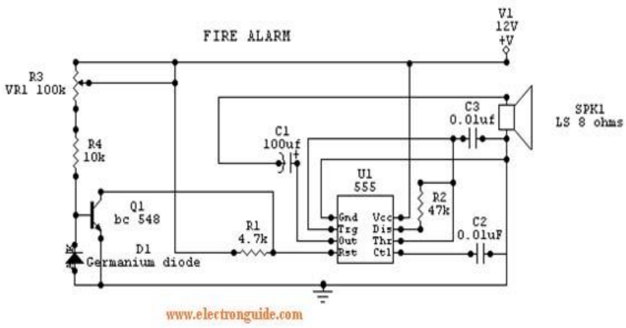
Piezoelectric disk beeper

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

Uses

- Annunciator panels
- Electronic metronomes
- Game shows
- Microwave ovens and other household appliances
- Sporting events such as basketball games

IV. FIRE ALARM



An reverse biased germanium diode is used here as a heat sensor at normal room temperature the reverse resistance of the diode is very high in the order of over 10 kilo ohms so it produce no effects on the transistor Q1 which conducts and keeps the reset pin 4 of ic 555 at its ground level, and so the alarm doesn't get activated.

When the temperature in the vicinity of the diode (the sensor) increases in case of fire, the reverse resistance of the germanium diode drops at about 70 degree its resistance drops to a value below 1 kilo ohms this stops Q1 conduction and the 555 ic pin 4 becomes positive through the resistor R1 which activates the alarm.

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4.3 Land mine sensor:

Landmines would be ineffective weapons if they were easy to detect or if their presence was clearly marked. Therefore they often lie undetected and forgotten in the soil, years after a conflict has ceased, until they are usually tragically disturbed by civilians often children.

Additional complexity is caused by the variety of landmines which have been produced and planted in various conflicts. Some, of almost all plastic construction defeat metal detection, some are buried higher or lower in the soil while others feature varieties of detonation method or fusing which can foil mechanical destruction techniques.

The main problem with plastic landmines is that many contain very little metal, making it necessary to use extremely sensitive metal detectors, which then also detect all manner of scrap metallic objects and battlefield debris. The aim of multi-sensor systems is largely to reduce this false alarm rate and make detection and clearance faster and safer.

Despite various worthy conventions on their continuing use, landmines have been laid in conflicts around the world to such an extent that they continue to deny civilian populations access to their land, continue to cripple and kill innocent children and their clearance remains a slow, predominantly manual and costly operation around the world.

Sensatech is working on a project funded by QinetiQ to try to detect and possibly identify landmines within a soil without contacting or transmitting any pressure to the soil and without causing any type of landmine to be detonated.

Sensatech are approaching this task using arrays of capacitive sensors and non-contact 3d tomography techniques to try to map the soil under a sensor and detect objects embedded within the soil under the surface.

Assuming that sufficient definition and resolution could be obtained to the required depth within the soil, embedded objects could be compared to a database of known landmine types and a fit made if objects found in the soil match a known landmine type.

Additionally, it may be possible using capacitive and electric field techniques to try to identify the chemical composition of various elements at a range. This could allow the detection of materials within landmines such as various plastics or explosives

V. SOFTWARE DEVELOPMENT

KEIL SOFTWARE

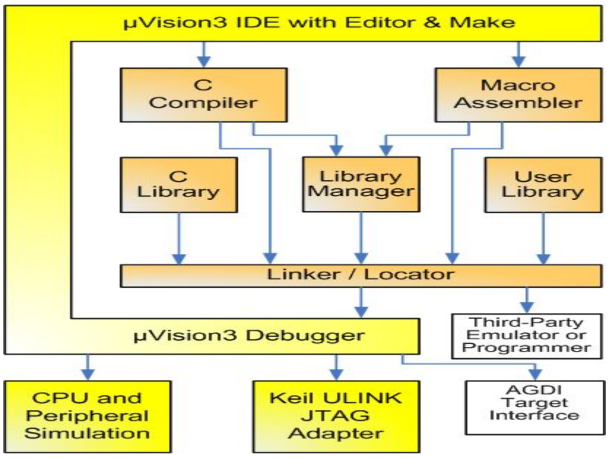

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Figure. Keil Software- internal stages

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications

C51 Compiler & A51 Macro Assembler:

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.

µVISION

What's New in µVision3?

µVision3 adds many new features to the Editor like Text Templates, Quick Function Navigation, and Syntax Coloring with brace high lighting Configuration Wizard for dialog based startup and debugger setup. µVision3 is fully compatible to µVision2 and can be used in parallel with µVision2.

What is µVision3?

µVision3 is an IDE (Integrated Development Environment) that helps you write, compile, and debug embedded programs. It encapsulates the following components:

- A project manager.
- A make facility.
- Tool configuration.
- Editor.
- A powerful debugger.

To help you get started, several example programs (located in the \C51\Examples, \C251\Examples, \C166\Examples, and \ARM\...\Examples) are provided.

HELLO is a simple program that prints the string "Hello World" using the Serial Interface.

MEASURE is a data acquisition system for analog and digital systems.

TRAFFIC is a traffic light controller with the RTX Tiny operating system.
SIEVE is the SIEVE Benchmark.
DHRY is the Dhrystone Benchmark.

WHETS is the Single-Precision Whetstone Benchmark. Additional example programs not listed here are provided for each device architecture.

BUILDING AN APPLICATION IN µVISION

To build (compile, assemble, and link) an application in µVision2, you must:
Select Project - forexample,166\EXAMPLES\ HELLO\HELLO.UV2).

Select Project - Rebuild all target files or Build target. µVision2 compiles, assembles, and links the files in your project.

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Start Debugging

You start the debug mode of µVision2 with the Debug – Start/Stop Debug Session command. Depending on the Options for Target – Debug Configuration, µVision2 will load the application program and run the startup code µVision2 saves the editor screen layout and restores the screen layout of the last debug session. If the program execution stops, µVision2 opens an editor window with the source text or shows CPU instructions in the disassembly window. The next executable statement is marked with a yellow arrow. During debugging, most editor features are still available.

For example, you can use the find command or correct program errors. Program source text of your application is shown in the same windows. The µVision2 debug mode differs from the edit mode in the following aspects:

The "Debug Menu and Debug Commands" described below are available. The additional debug windows are discussed in the following.

The project structure or tool parameters cannot be modified. All build Commands are disabled.
Disassembly Window

The Disassembly window shows your target program as mixed source and assembly program or just assembly code. A trace history of previously executed instructions may be displayed with Debug – View Trace Records. To enable the trace history, set Debug – Enable/Disable Trace Recording.

If you select the Disassembly Window as the active window all program step commands work on CPU instruction level rather than program source lines. You can select a text line and set or modify code breakpoints using toolbar buttons or the context menu commands.

VI. CONCLUSIONS

Robots are an important component in Intelligent Environments Automate devices and Provide physical services. Robot Systems in these environments need particular capabilities are Autonomous control systems, Simple and natural human-robot interface, Adaptive and learning capabilities and Robots have to maintain safety during operation

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