Unmanned Video/Audio Transmission Robot with Motion Sensor Using 8051 Microcontroller

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***Abstract*--**This paper is to design and develop an intelligence robot to detect dangerous Gas/Smoke by using an 8 bit microcontroller. In this paper the robot is designed to move automatically. The robot acts according to the command given by the program. It will move in all the directions like forward, backward, right and left. The Smoke sensing unit is available in robot mechanism. If particular Smoke is detected, robot will switch ON the Alarm Unit. The video and audio are monitored at the control unit. For transmitting audio and video, RF camera has been used. [1].

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I. INTRODUCTION:

Technology is the word used for the practical application of scientific knowledge in the industry. The advancement in technology cannot be justified unless it is used for leveraging the user's purpose. Technology, is today, imbibed for accomplishment of several tasks of varied complexity, in almost all walks of life.

The society as a whole is exquisitely dependent on science and technology. Technology has played a very significant role in improving the quality of life. One way through which this is done is by automating several tasks using complex logic to simplify the work.

A robot is an "apparently human automation, intelligent and obedient but impersonal machine" [3]. Basically, a robot is a machine designed to do a human job (excluding research robots) that is tedious, slow or hazardous. It is only relatively recently that robots have started to employ a degree of Artificial Intelligence (AI) in their work many robots required human operators, or precise guidance throughout their missions. Slowly, robots are becoming more and more autonomous [2].

The aim of this paper is to design and develop an intelligence robot to detect dangerous Gas/Smoke by using an 8 bit microcontroller. In this the robot is designed to move automatically [3]. The robot acts according to the command given by the program [1]. It will move all the direction like forward, reverse, right and left. The Smoke sensing unit is available in robot mechanism [5]. If particular Smoke is detected, robot will switch ON the Alarm Unit. The video and audio are monitored at the control unit. For transmitting the information zigbee has been used.

SMOKE DETECTOR:

A **smoke detector** is a device that detects smoke and gives an alarm. Smoke detectors alert people within hearing range; few interface with a security system or notify emergency services.[4] Smoke detectors have come a long way since George Darby first invented in 1902. Before scientists knew how to capture ionizing molecules in a small enclosed space, they actually used an open/close electrical system along with a wedge of butter to detect fires and heat. This system's setup included two plates or electrical circuits, not unlike today's Ionization alarms, with a wedge of butter between them[5]. When the heat of the room became overwhelming and dangerous, the butter would melt, causing the two circuits to collapse onto one another initiating the alarm. Since then, technology has found a way to capture light and molecules in a cheaper, more efficient, and safer way to save millions of lives each year [4].

TWO COMMON TYPES:

There are two types of smoke detectors common to today's normal household:

1. Ionization Smoke Detector and
2. Photoelectric Smoke Detector.[4]

These smoke detectors are both used to detect fire, but not the same type of fire. Photoelectric Smoke Detectors are faster in detecting smoldering fires, while Ionization Smoke Detectors are better at detecting flaming fires due to their ability to detect smaller particles [4].

IONIZATION SMOKE DETECTOR

An Ionization Smoke Detector has two key parts: the ionization chamber, and a source of radiation. This source of radiation consists of a very minute concentration of Americium-241, which produce alpha particles. The Ionization Chamber contains two plates: one plate is negatively charged, and the other is positively charged.[4]

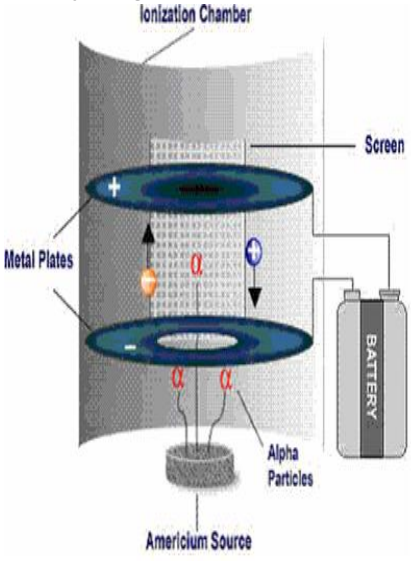

Fig 1

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PHOTOELECTRIC SMOKE DETECTOR

Is a less common and more expensive than the Ionization Smoke Detector. It consists of a chamber in the shape of a capital letter "T." The horizontal portion of this chamber consists of a light source called a Light Emitting Code. This beam of light travels across this horizontal bar, but never sends light vertically. At the base of the "T," is a photocell, which senses light from darkness. When smoke enters this "T" chamber, light from the beam is broken up and is scattered away from its straight beam. When a certain level of light reaches the photocell, which is usually in darkness, the alarm is initiated.

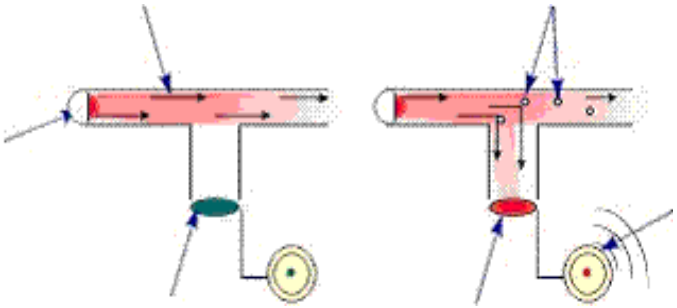

Fig 2

DC MOTOR:

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homo polar motor (which is uncommon), and the ball bearin motor, which is (so far) a novelty[6]. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source -- so they are not purely DC machines in a strict sense[6].

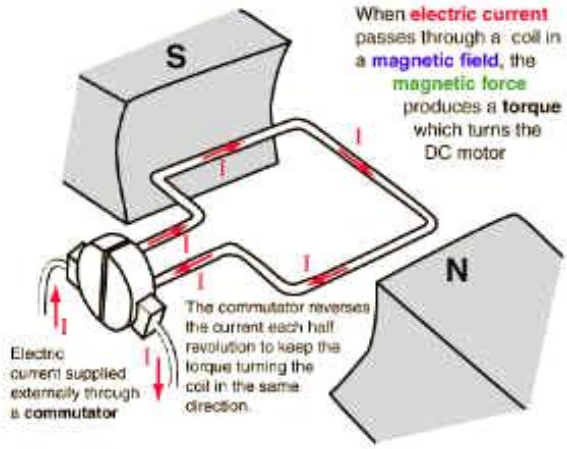

Fig 3

TYPES OF DC MOTORS:

1. Brushed DC Motors
2. Brushless DC Motors
3. Coreless DC Motors [7]

Brushed DC motors:

The classic DC motor design generates an oscillating current in a wound rotor with a split ring commutator, and either a wound or permanent magnet stator. A rotor consists of a coil wound around a rotor which is then powered by any type of battery.

Brushless DC motors:

Some of the problems of the brushed DC motor are eliminated in the brushless design. In this motor, the mechanical "rotating switch" or commutator/brushgear assembly is replaced by an external electronic switch synchronised to the rotor's position. Brushless motors are typically 85-90% efficient, whereas DC motors with brushgear are typically 75-80% efficient. [7]

Coreless DC motors:

Nothing in the design of any of the motors described above requires that the iron (steel) portions of the rotor actually rotate; torque is exerted only on the windings of the electromagnets. Taking advantage of this fact is the coreless DC motor, a specialized form of a brush or brushless DC motor. Optimized for rapid acceleration, these motors have a rotor that is constructed without any iron core. The rotor can take the form of a winding-filled cylinder inside the stator magnets, a basket surrounding the stator magnets, or a flat pancake (possibly formed on a printed wiring board) running between upper and lower stator magnets. The windings are typically stabilized by being impregnated with Electrical epoxy potting systems. Filled epoxies that have moderate mixed viscosity and a long gel time. These systems are highlighted by low shrinkage and low exotherm. Typically UL 1446 recognized as a potting compound for use up to 180C (Class H) UL File No. E 210549.

METHODOLOGY:

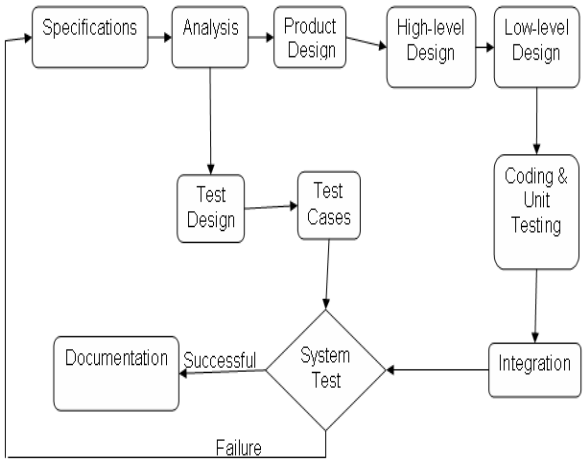

Fig 4

FIG gives the pictorial representation of the procedure followed in the development.

In the specifications stage, the requirements of the model were identified. In order to identify the requirements, literature survey was carried out [8].

The identified requirements and the specifications of the model were then analyzed to identify whether or not they were viable. If any of the specifications seemed impracticable, the specifications were reviewed.

Once the viable specifications were identified, the design of the product was developed. A set of all possible test cases was also prepared simultaneously [8].

The high level design document gives an overview of the design details. The low level design document contains the intricate details of the product design.

The paper was then divided into separate modules and each module was individually soldered, coded and tested.

All the tested modules were then integrated. The integrated module was then tested for the set of all possible test cases. In case the integrated module didn't work for a certain test case, the specifications were reviewed accordingly.

In general, after every stage in paper development, the specifications were reviewed.

After the integrated module satisfied all the test cases, different stages of the paper were documented [8].

II. DISCUSSION:

This paper brings together considerations of Smoke/gas leak behavior and Smoke detector design and use, with a view to improving the detection using Smoke Sensors. These scales are relevant to the detection of natural Smoke leaks from mains and services using hand-portable Smoke detectors. This was used for subsequent analysis with respect to the ability of Smoke leak detectors to confirm and locate a leak [4].

In this prototype paper we design in such a way that this robot can be moved any where and with the help of Smoke sensors connected to it we can get the information of that Smoke/smoke. This paper is very much useful in the places where a human cannot go in to the places like ground canals, Smoke oriented caves, etc., and this paper is very much useful in such situations [3].

III. BLOCK DIAGRAM

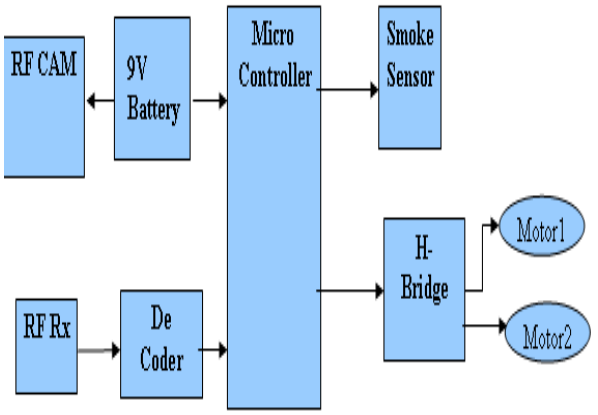

Fig 5

SMOKE DETECTION ROBOT

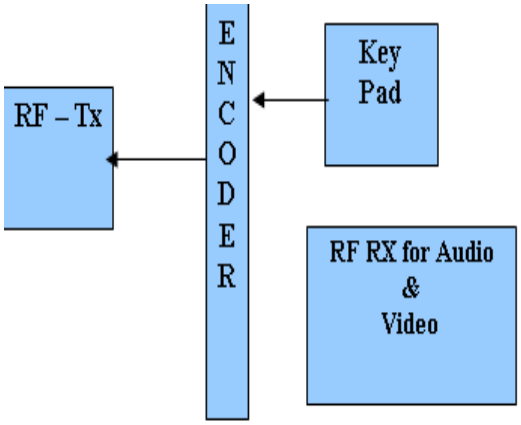

Fig 6

IV. DISCRIPTION OF 8051 MICROCONTROLLER

The 8051 is a low-power, high-performance CMOS 8-bit micro controller with 8Kbytes of in-system programmable Flash memory. [9]

The device is manufactured Using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 micro controller. [9]

The Atmel 8051 is a powerful micro controller, which provides a highly flexible and cost-effective solution to many embedded control applications.[9]

The 8051 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, full duplex serial port, on-chip oscillator, and clock circuitry. [9]

PIN CONFIGURATION

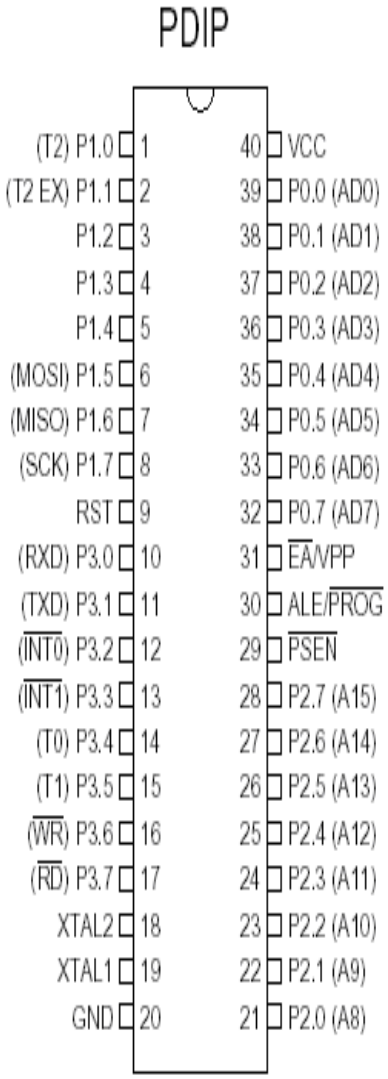

Fig 7

H-BRIDGE

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. 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. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.[10]

V. PIN DIAGRAM

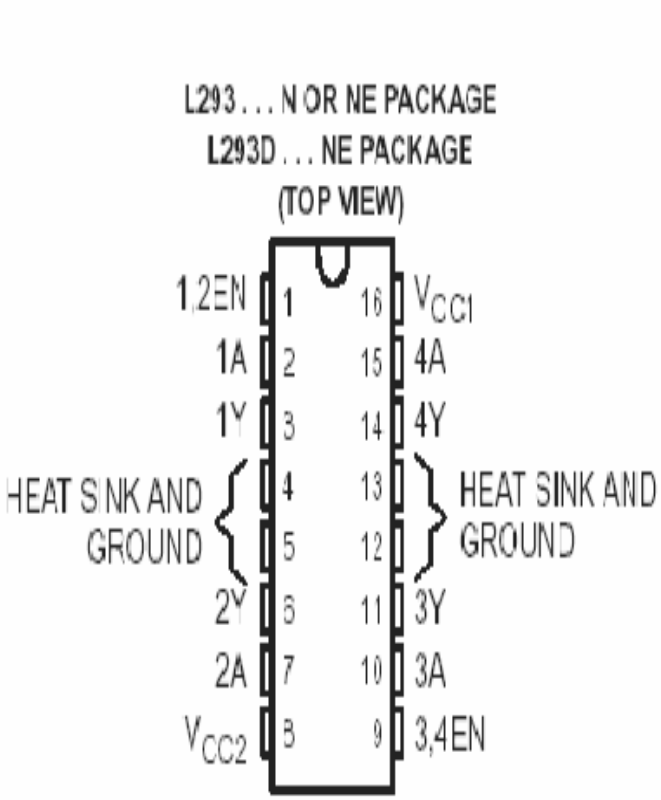

Fig 8

KEIL µvision3 OVERVIEW

The µVision3 IDE is a windows based software development platform that combines a robust editor, project manager, and integrated make facility. [11]

µVision3 integrates all tools including the C compiler, macro assembler, linker/locator

µVision3 helps for the development process of our embedded applications by providing the following:

Full-featured source code editor

Device database for configuring the development tool setting

Project manager for creating and maintaining our projects

Dialogs for all development tool settings

Links to development tools manuals, device datasheets and user's guides[11]

VI. SOFTWARE DEVELOPMENT LIFE CYCLE

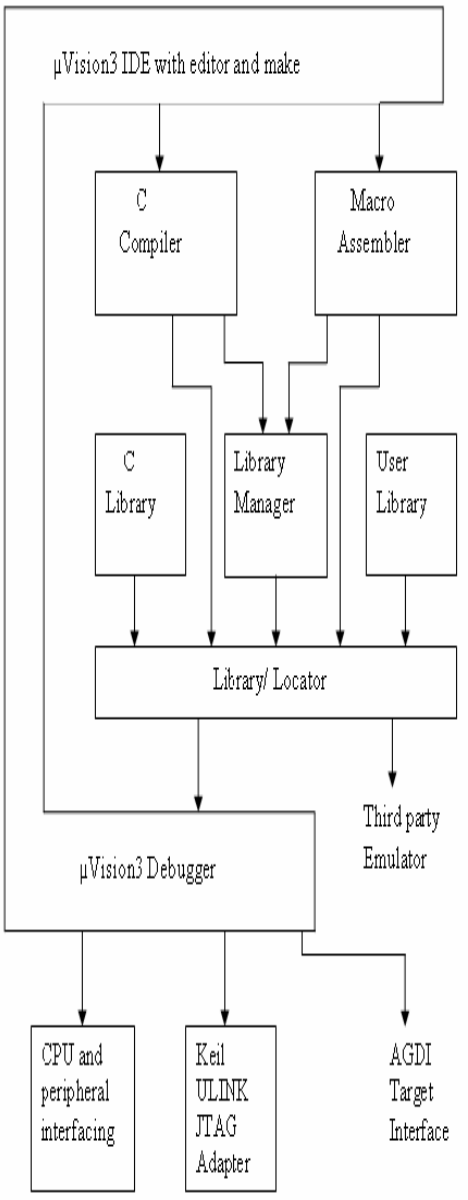

Fig 9

CONCLUSION:

This paper is to design and develop an intelligence robot to detect dangerous Gas/Smoke by using an 8 bit microcontroller.

In this paper the robot is designed to move automatically**.**

VII. FUTURE SCOPE:

With increased complexity, this device can be successfully used in any environment where automation is desired.

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