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ROBOCAR WITH LIVE STREAMING FOR INACCESSIABLE AREA

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Certificate

Certified that the project work entitled ***"SAFETY CAR PARKING SYSTEM"*** carried out by MR.NAGARAJ A S-4BD11EC026, Mr.NAGARAJ A S-4BD11EC026, Mr.NAGARAJ A S-4BD11EC026, Mr.NAGARAJ A S-4BD11EC026 bonafide students of this institution in partial fulfillment for the award of degree of **Bachelor of Engineering in Electronics & Communication** by Visvesvaraya Technological University,Belgaum during the academic year **2015-16**.It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library.The project report has been approved as it satisfies the academic requirement in respect of project work prescribed for the said degree.

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Abstract

Disaster like earthquakes, bomb explosion and floods often cause loss of precious human lives. During such emergency situations and especially in urban disasters, in order to prevent loss of life and property, various essential services like policemen, fire fighters and medical assistances etc, are deployed. According to the field of urban search and rescue(USAR)the probability of saving a victim is high within the first 48 hours of the rescue operation, after that the probability becomes nearly zero. Generally rescue people cannot enter into some part of the earth quake affected areas. All this task are performed mostly by human and trained dogs often in very dangerous and risky situation the rescuer may become a victim who need to be rescued. Hence to make a rescue operation more safe and effective robot has been proposed which detect alive human beings and wirelessly communicate with the rescue team using bluetooth. This work aims to developed and economical robot which worked using 8051 Microcontroller, PIR Sensors etc. It can be used in areas where rescue is needed. The robot senses the human body temperature using PIR sensor and can also be viewed by using camera.

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Chapter 1

Introduction

The advent of new high speed technology and the growing computer capacity provided realistic opportunity for new robot controls and realisation of new methods of control theory.This technical improvement together with the need for a high performance robots created faster,more accurate and more intelligent robots using new robot controlled devices,new drivers and advanced control algorithm. The project deals with the live person detection robot which is based on microcontroller and uses PIR sensors,DC motors, RF tranceiver. This Project is mainly used in the earthquake rescue operation.

Internally it consists of IR sensors. The infrared sensors are used to sense the live persons. Once the people are located immediately gives audio alert, visual alert to the authorities so that help can reach the live person faster. All the above system are controlled by the microcontroller. The microcontroller is used to control the motors. It gets the signals from the PIR sensors. Two DC motors are used to drive the robot.

1.1 Problem statement

There is many different kind of catastrophe in natural and man-made disaster:earthquake, flooding, hurricane and they cause different disaster area like collapsed building, landslide or crater. During these emergency situations, and specially in urbandisaster, many different people are deployed (policeman, fire fighters and medical assistance).

In these situations, human rescuers must make quick decisions under stress, and try to get victims to safety often at their own risk. They must gather determine the location and status of victims and the stability of the structures as quickly as possible so that medics and fire fighters can enter the disaster area and save victims. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. This is why since some years, mobile robots have been proposed to help them and to perform tasks that neither humans dogs nor existing tools can do. For this project, we will focused only on robots which will work in a disaster environment of man-made structure, like collapsed buildings.

Chapter 2

Project Description

2.1 Block Diagram

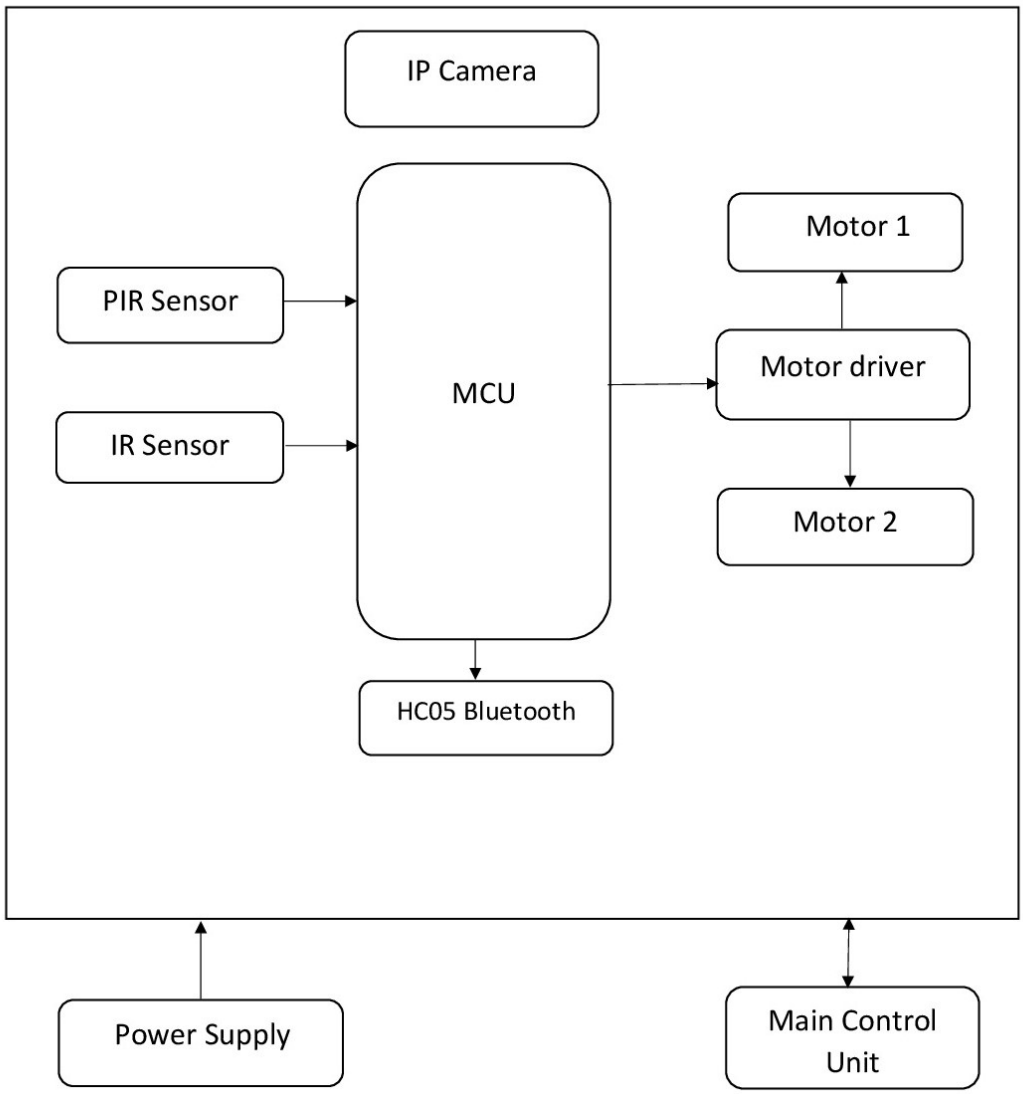

Figure 2.1: Block diagram

2.2 Flowchart

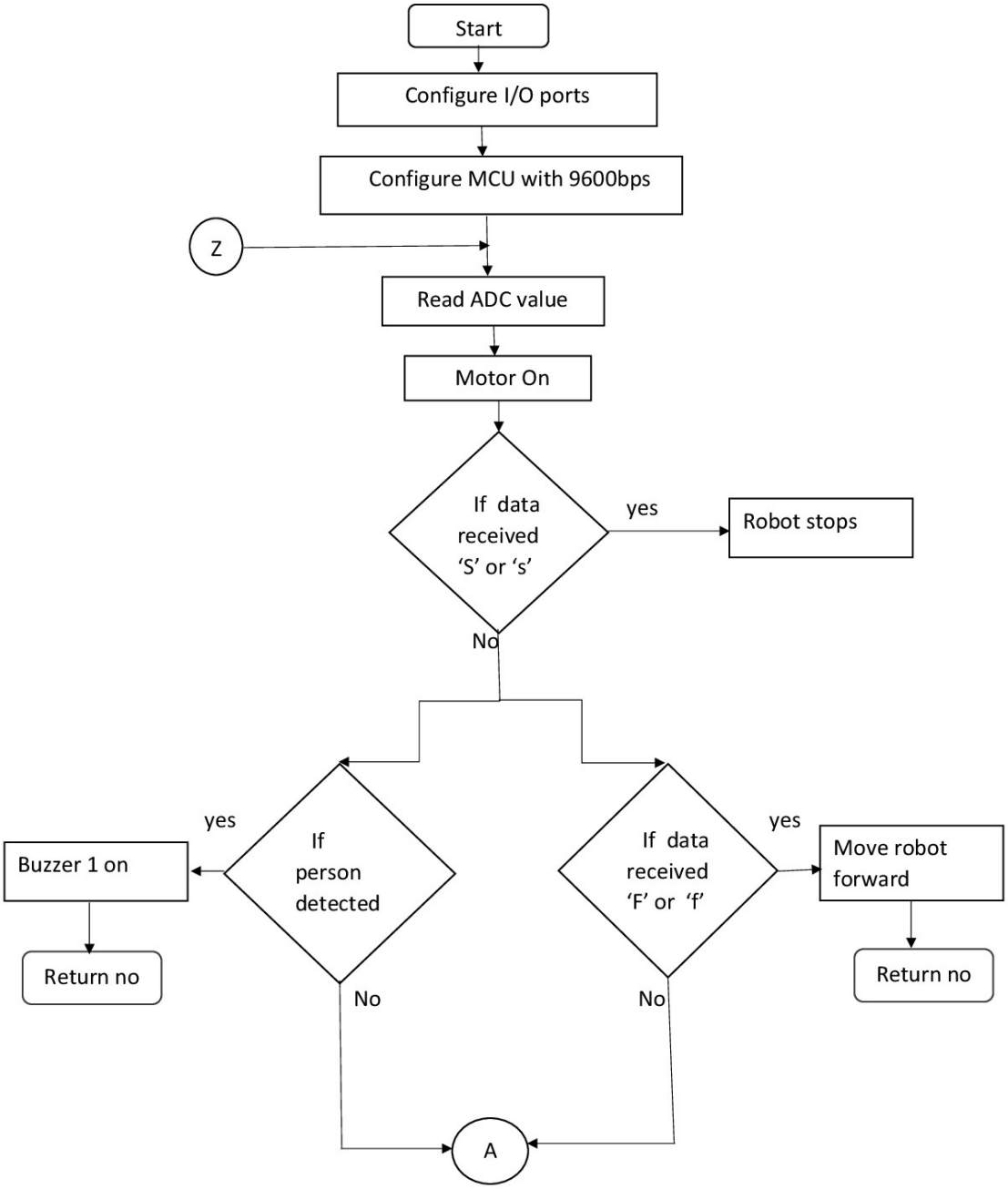

Figure 2.2: Flowchart for working of robo car

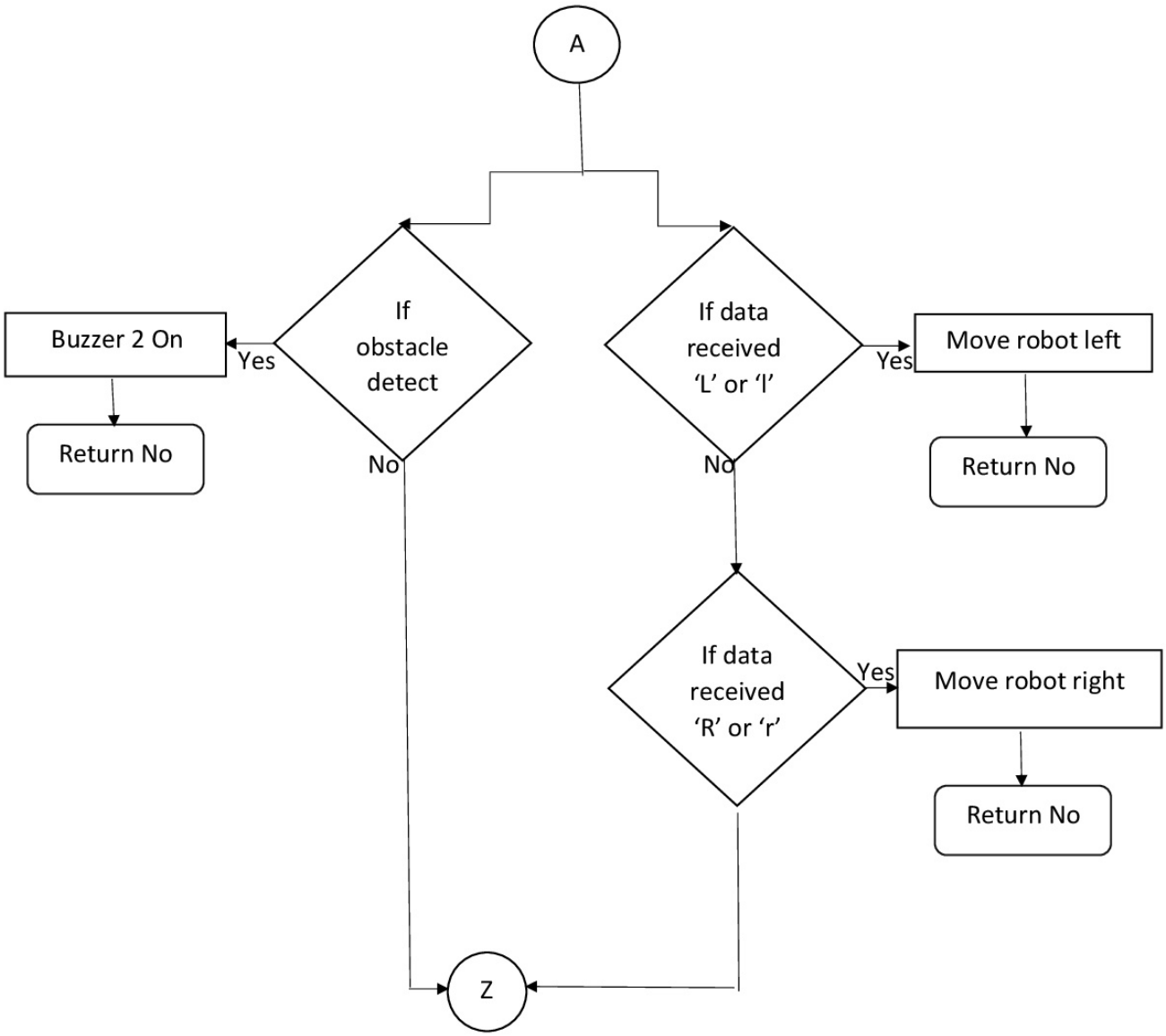

Figure 2.3: Flowchart for working of robo car

2.3 Methodology

The working principle is kept as simple as possible. A DC power supply is required to run the system. The DC power supply feeds the 8051 micrococntroller and the Bluetooth module. The Bluetooth module receives the signal sent from an android smart-phone, where the application software coded in C language is installed. The 8051, thereby, sends instructions, which when executed, helps in functioning of the motor driver. The movement and functioning of the motor can be controlled by using the android based application software.

The android application controlled robot communicates via Bluetooth to the Bluetooth module present on the robot. While pressing each button on the application, corresponding commands are sent via Bluetooth to the robot. The commands that are sent are in the form of ASCII. The microcontroller on the robot then checks the command received with its previously defined commands and controls the DC motors depending on the command received to cause it to move forward, backward, left, right or to stop. Thus allowing us to create an android controlled robot.

The Microcontroller is the heart of the system. Here all motors, PIR sensor and IR sensor are connected to the 8051 microcontroller. The IR sensor is used to detect the obstacles. The output of the IR sensor is connected to microcontroller pins and the microcontroller will take it as digital input either 0 or 1. According to the o/p of the infrared sensor module, the microcontroller will react by glowing LED.

The PIR sensor is used to detect live human beings. To detect the live person byusing 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 sinceliving body is composed of 96 degrees it absorbs the radiation once it detects it sends datato controller through to controller then controller automatically gives buzzer sound byactivating the pin-2 as an indication that person is alive.

The 8051 considers any voltage between 2V and 5V at its port pin as HIGH and any voltage between 0 to 0.8V as LOW. Since the output of PIR sensor has only 2 stages, it can be directly interfaced to the 8051 microcontroller. The LED will switch on when there is any motion detected and switch off when there is no motion detected. The output pin of the PIR sensor is connected to P3.5 of 8051 microcontroller.

Chapter 3

Hardware description

3.1 Microcontroller

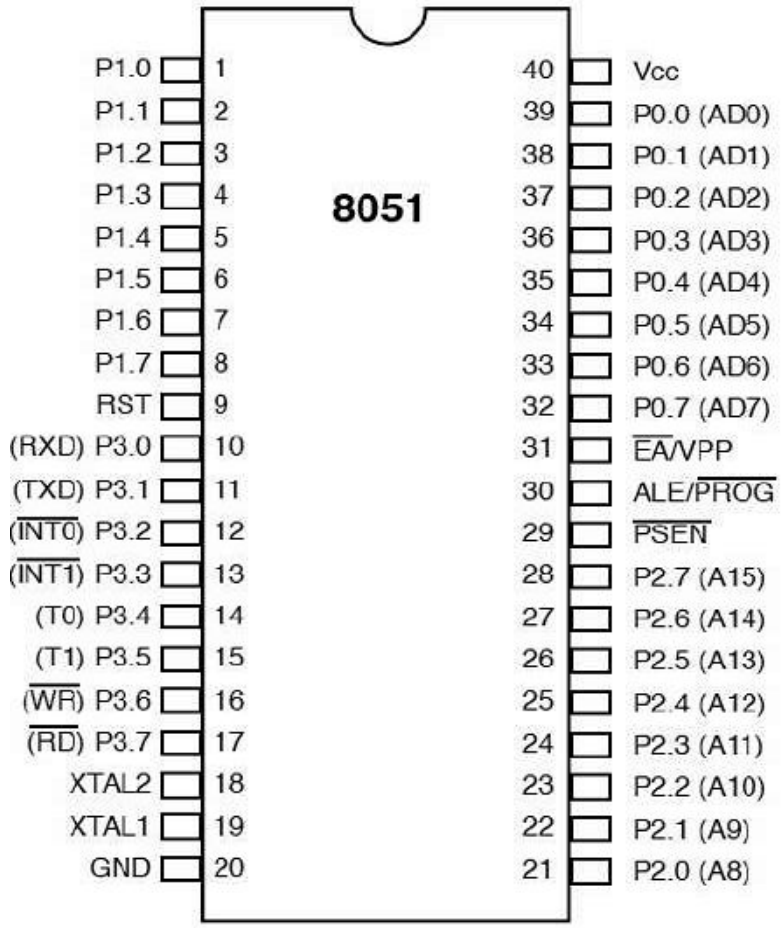

Figure 3.1: Pin diagram of 8051

3.1.1 Features of 8051 Microcontroller

1. Compatible with MCS-51TM Products.
2. 8K byte of in system re-programmable flash memory.

3. Endurance: 1000 write / Erase cycle.
4. Fully static operation.
5. 3 Level program memorial clocks.
6. 256 X 8 bit internal RAM.
7. 32 programmable I/O Line.
8. 3-16 bit timer/Counter.
9. 8-Interupt Source.
10. Programmable serial channel.
11. Low power, Ideal and Power down modes.
12. Four register Banks each containing 8 registers

3.1.2 Pin description

1. Port O: Port O is an 8 bit open drain bi-directional I/O port. Each pin can sink 8 TTL I/Ps. It can be configured to be multiplexed low order Address / Data bus during access to external program and data memory. When a pin is to be used as an I/P, A1 must be written to a corresponding port O latch by the program, thus turning both of the transistor OFF, which in turn causes the pin to float in high impedance state, and the pin is connected to I/P buffer. When used as an O/P the pin latches that are programmed to A0 will turn ON the lower FET grounding the pin. All latches that are programmed to A1 still float; thus, external pull-up resistors will be needed to supply a logic high when using port O as an O/p. Port O also receives the code bytes during flash programming and O/Ps the code bytes during program verification.
2. Port 1 : Port 1 is an 8-bit bi-directional I/O port with internal pull-ups. The port 1 O/P buffers can sink/source four TTL I/Ps. When 1s are written to port 1 pin, they are pulled high by internal pull-ups and can be used as I/Ps. Port 1 pins that are externally being pulled low will source current in because of the internal pull-ups. In addition port 1.0 and port 1.1 can be configured to be the timer/counter 2 external count I/Ps (P1.0/t2) and the timer counter 2 trigger I/P (P1.1/T2(Ex)) respectively.
3. Port 2 : Port 2 may be used as an input/output similar in operation to port 1. Port 2 emits the high order address byte during fetches from external program memory and during accesses to external data memory that use 16 bit addresses. In this application,

Table 3.1: Port description of 8051

Port pin	Alternate functions
P3.0	RXD(serial input port)
P3.1	TXD(serial output port)
P3.2	INT0 (external interrupt 0)
P3.3	INT1(external interrupt 1)
P3.4	T0(timer 0 external input)
P3.5	T1(timer 1 externl input)
P3.6	WR (external data memory write strobe)
P3.7	RD (external data memory read strobe)

Port 2 uses strong internal pull-ups. During excesses to external data memory that 8 bit address, Port 2 emits the contents of the P2 Special function Register. Port 2 also receiveres the high order address bits and some control signals during flash programming and verification.

4. Port 3 : Port 3 is an input/output port similar to port 1. The input and output functions can be programmed under the control of the P3 latches or under the control of various other special function registers. The port 3 alternate uses are shown in the following table.

   Unlike port O and 2, which can have external addressing functions and change all eight port bit when in alternate use, each pin of Port 3 may be individually programmed to be used either as I/O or as one of the alternate functions.

5. Reset: A Reset can be considered to be the ultimate interrupt because the program may not block the action of the voltage on the RST pin. This type of interrupt is often called non-maskable because no combination of bits in any register can stop or mask, the reset action. A reset is an absolute command to jump to program address 0000h and commence running from there. When ever a high level is applied to the RST pin the 89C52 enters a reset condition.

6. ALE /PROG: Address latch enable is an O/p pulse for latching the low byte of the addressing during accesses to external memory. This pin is also the program pulse I/p (PROG) during flash programming. In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. However that one ALE pulse is skipped during each access to external data memory.

7. PSEN : Program store enable is the read strobe to external program memory. When

the 89C52 is executing code from external program memory. PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

8. EA/VPP : External access enable. EA must be strapped to ground in order to enable the device to fetch code from external program memory location starting at 0000H up to FFFFH. However that if lock bit 1 is programmed. EA will be internally latched on Reset. EA should be strapped to Vcc for internal program executions. Bit EA is a master or global bit that can enable or disable all of the interrupts. This pin also receives the 12 volt programming enable voltage VPP during flash programming when 12 volt programming is selected.

9. T0 and T1 : Counters and Timers : Timers 0 and 1 : Many Microcontroller applications require the counting of external event, such as the frequency of pulse train, or the generation of precise internal time delays between computer action. Both of these task on be accomplished using software techniques, but software loops for counting or timing keep the processor occupied so that other, perhaps more important, functions are not done. To relive the processor of this burden, two 16 bit up counters, named T0 and T1 are provided for general use of the programmer. Each counter may be programmed to count internal clock pulses, acting as timer or programmed to count external pulse as a counter.

   The counters are divided into two 8 bit registers called the timer low TL0 , TL1 and high TH0, TH1 bytes. All counter action is controlled by bit states in the timer mod control register TMOD, the timer/counter control register TCON and certain program instructions.

10. Timer 2: Timer 2 is a 16 bit timer/counter that can operate as either a timer or an event counter. The type of operation is selected by bit CT12 in the SFRs T2CON. Timer 2 has 3 operating modes:

    (a) Capture mode

    (b) Auto reload mode

    (c) Baud rate generator mode.

    The modes are selected by bits in T2CON Timer 2 Consists of two 8 bit registers TH 2 and TL2. In the timer function, the TL2 register is incremented every machine cycle. Since a machine cycle consists of 12 oscillators period, the count rate is 1/12 of the oscillator frequency.

11. XTALI and XTAL2: The heart of the 89C52 is the circuitary that generates the clock pulses by which all internal operations are synchronized. Pins XTALI and XTAL2 are provided for connecting a resonant network to form an Oscillator. The Crystal frequency is the basic interna l clock frequency of the microcontroller. The manufacturers make available 89C52 designs that can run at specified maximum and minimum frequencies. Typically 1MHz to16 MHz . Minimum frequency imply that some internal memories are dynamic must always operate above a minimum frequency or data will be lost.

    Typically, a Quartz Crystal of frequency 11.059MHz and capacitors are employed as shown in figure. Here 1 machine cycle consists of 6 T-states and each T-state is of 2 pulses.

    To calculate the time for any particular instruction is

    Given by: Tints = Cx12d / crystal frequency

    Consider a 1 byte instruction. If the crystal frequency is 11.0592 MHz then the time to execute one byte instruction is 1.0850 sec.

3.2 Motor drive

Generally, L293D motor driver can control two motor at one time or called is a dual H-Bridge motor driver. By using this IC, it can interface DC motor which can be controlled in both clockwise and counter clockwise direction. The motor operations of two motors can be controlled by input logic at pins 2 and 7 and 10 and 15. Below shown the pin diagram of L293D motor driver.

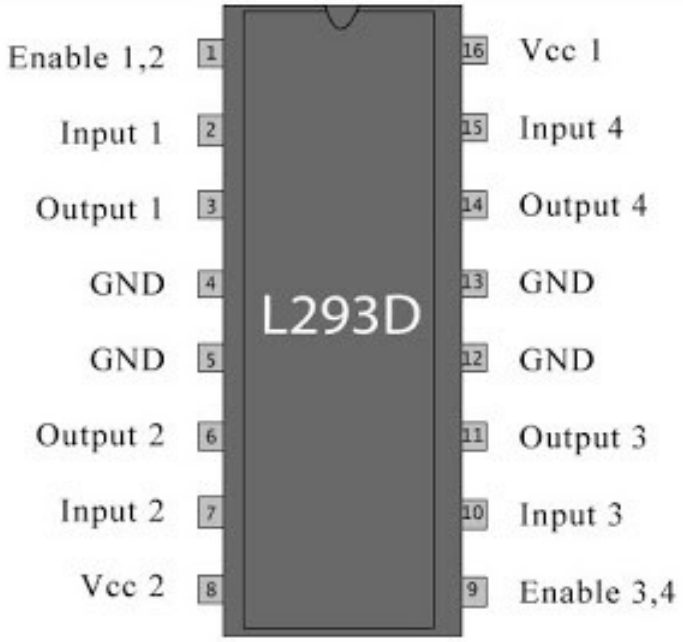

Figure 3.2: Pin Diagram of L293D

The pin description of L293D motor driver is given in table 3.1

The name H-bridge is derived from the actual shape of the switching circuit which controls the motion of the motor. It is also known as Full Bridge. Basically there are four switching elements in the H-bridge as shown in the figure below. As shown in the above figure there are four switching elements named as High side left,high side right, low side left, low side right. When these switches are turned on in pairs motor changes its direction accordingly. Like if we switch on high side left and lowside right then the motor rotates in forward direction., as the current flows from power supply through the motor coil goes to the ground via switch low side right.

Besides that, with this L293D driver motor it will control four DC motors at one time but with fix direction of motion. L293D has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back EMF output diode are included within the L293D. The output supply which is external supply has a wide range from 4.5V to 36V which has made L293D a best choice for DC motor driver.

Table 3.2: Pin description of motor drive

Pin no.	Functions	Name
1	Enable pin for motor 1;active high	enable 1,2
2	input 1 for motor 1	input 1
3	output 1 for mor motor 1	output 1
4	ground(0V)	ground
5	ground(0V)	ground
6	output 2 for mor motor 1	output 2
7	input 2 for motor 1	input 2
8	supply voltage for motors;9-12V(upto 36V)	$Vcc2$
9	enable pin for motor 2;active high	enable 3,4
10	input 1 for motor 2	input 1
11	output 1 for motor2	output 3
12	ground(0V)	ground
13	ground(0V)	ground
14	output 2 for mor motor 2	output 4
15	input 2 for motor 2	input 4
16	supply voltage for motors;5V(upto 36V)	$Vcc1$

Table 3.3: Pin description to run dc motor

A	B	Description
0	0	Motor stops
0	1	Motor runs clockwise
1	0	Motor runs anti clockwise
1	1	Motor stops

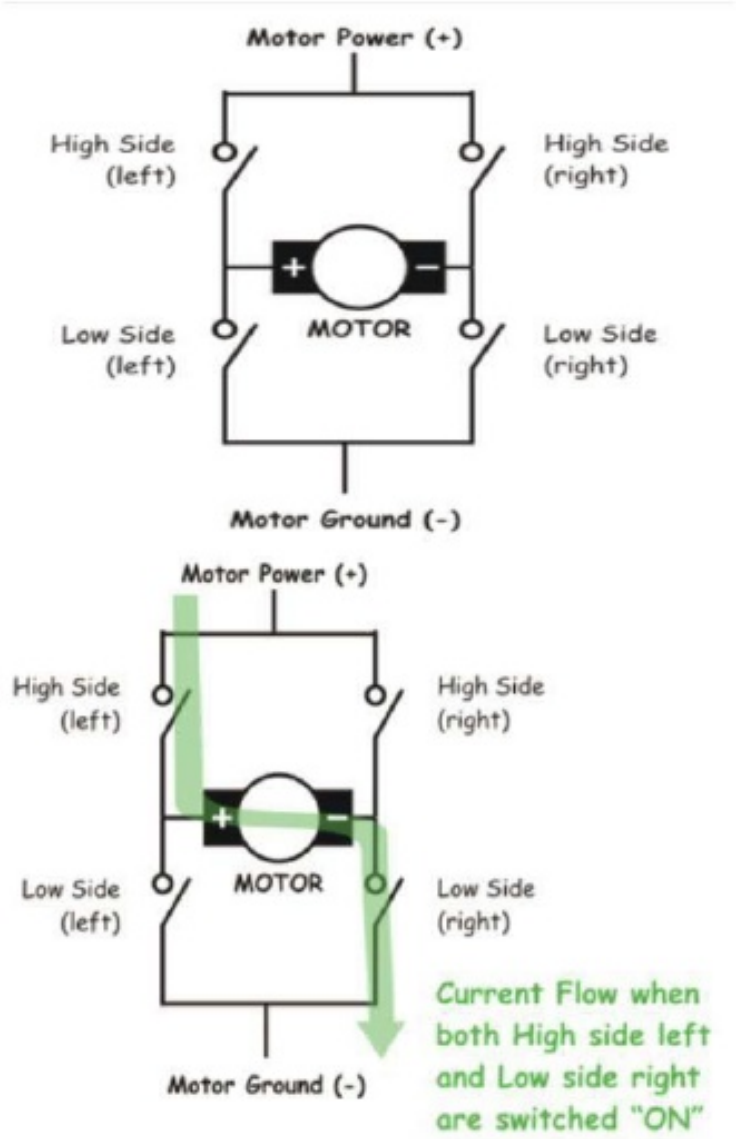

Figure 3.3: Working of motor drive

For truth table above, the Enable has to be set to 1 and motor power used is 12V but it is depends on motor power that used (range 4.5V to 36V). The rotation of the DC motor can be control by combinations of A and B in programming assembling and from the truth table it is clear to explain the rotations of the motor. Picture below shown the connection of DC gear motor to L293D driver motor.

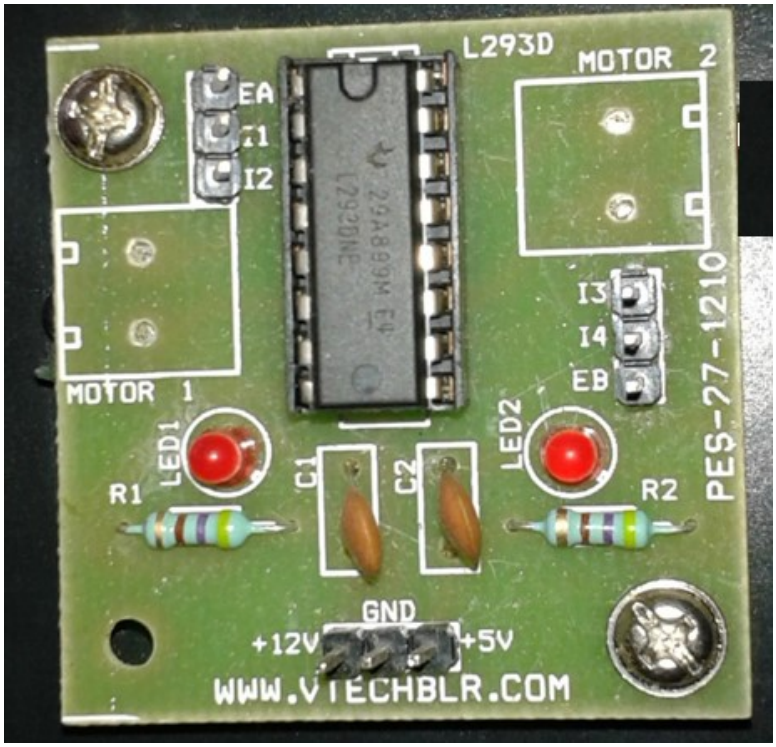

Figure 3.4: A veiw of L293D

3.3 DC Motor

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

External Structure:
At the first sight, the external structure of a DC geared motor looks as a straight expansion over the simple DC ones.

The lateral view of the motor shows the outer protrudes of the gear head. A nut is placed near the shaft which helps in mounting the motor to the other parts of the assembly.

The DC motor works over a fair range of voltage. The higher the input voltage more is the RPM (rotations per minute) of the motor. For example, if the motor works in the range of 6-12V, it will have the least RPM at 6V and maximum at 12 V. In terms of voltage, we can put the equation as: RPM= K1 * V, where, K1= induced voltage constant V=voltage applied The working of the gears is very interesting to know. It can be explained by the principle of conservation of angular momentum. The gear having smaller radius will cover more RPM than the one with larger radius. However, the larger gear will give more torque to the smaller gear than vice versa. The comparison of angular velocity between input gear (the one that transfers energy) to output gear gives the gear ratio. When multiple gears are connected together, conservation of energy is also followed. The direction in which the other gear rotates is always the opposite of the gear adjacent to it.

In any DC motor, RPM and torque are inversely proportional. Hence the gear having more torque will provide a lesser RPM and converse. In a geared DC motor, the concept of pulse width modulation is applied. The equations detailing the working and torque transfer of gears are shown below: ely proportional. Hence the gear having more torque will provide a lesser RPM and converse. In a geared DC motor, the concept of pulse width modulation is applied.

In a geared DC motor, the gear connecting the motor and the gear head is quite small, hence it transfers more speed to the larger teeth part of the gear head and makes it rotate. The larger part of the gear further turns the smaller duplex part. The small duplex part receives the torque but not the speed from its predecessor which it transfers to larger part of other gear and so on. The third gears duplex part has more teeth than others and hence it transfers more torque to the gear that is connected to the shaft

Figure 3.5: A veiw of DC motor

Features of DC Gear Motors

1. Gear materials: Plastic or metal.
2. Motor types: Wound-field, permanent-magnet, brushless, intermittent and continuous duty motors.
3. Brush-type and brushless motors: The brushed motor gains torque from the power supplied to the motor using stationary magnets, commutation and rotating electrical magnets. Brushless motors use a soft magnetic core in the rotor or a permanent magnet, as well as stationary magnets in the housing.
4. Uncommutated motors: Homopolar motors or ball bearing motors.
5. Connection types: Shunt, series and compound connections.
6. Motor constants: Kv and Km.
7. Speed control and reversibility: Smoothly control a speed down to zero without power circuit switching, even after accelerating in the opposite direction.
8. Dynamic braking and regenerative braking: Ideal for applications that require quick stops so you dont need a mechanical brake.
9. Magnet types: Rare earth, ceramic or ferrite magnets.
10. Winding resistance: Choose a motor that doesnt adversely affect the Km.
11. Gear ratios: Several varieties available, such as 28:1 or 18:1.
12. Environment: Motors are available for indoor or outdoor use.
13. Torque multiplication: Generate a large force at a low speed.

14. Custom-built: You can have a DC gear motor designed and manufactured to suit your size, power, torque and mounting needs.

3.4 Bluetooth HC05

HC serial Bluetooth products consist of Bluetooth serial interface and Bluetooth adapter. There are two types of Bluetooth serial interface module: Industrial level and civil level. HC-05 belongs to civil level Bluetooth serial interface module.

Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slave. The device named after even number is defined to be master or slaver when out of factory and cant be changed to the other mode. But for the device named after odd number, users can set the work in either mode (master or slave) of the device by AT commands.

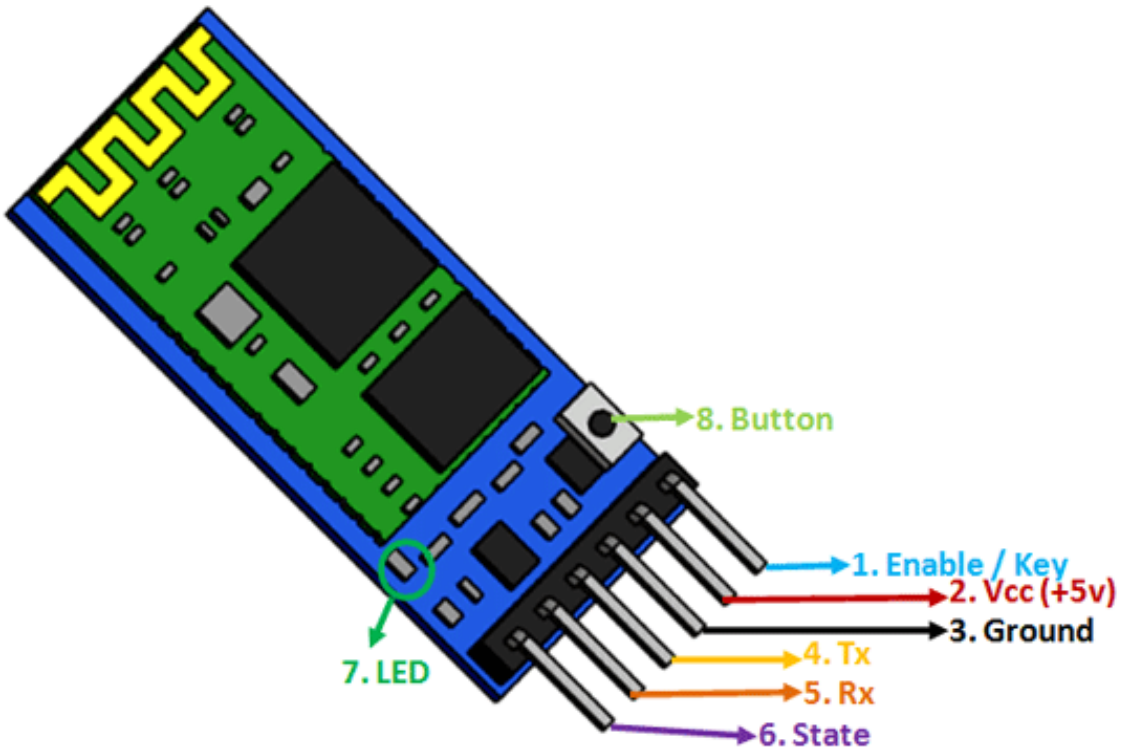

Figure 3.6: Bluetooth HC05 pin diagram

The main function of Bluetooth serial module is replacing the serial port line, such as:

1. If there are two MCUs, desiring to communicate with each other, one connects to Bluetooth master device while the other one connects to slave device. Their

Table 3.4: Pin description of hc05

HC05	Pin name	Pin Number	RIoT board
State	State	NA	Not connected
Serial receive	RXD	Pin 26	$UART - TXD$
Serial transmit	TXD	Pin 24	$UART - RXD$
Ground	GND	Pin 4	GND
Power pin	Vcc	Pin 2	Vcc
AT Mode	WAKEUP	Pin 5	$GPIO4 - 16$

connection can be built once the pair is made, hence communicating between each other.

2. When MCU has Bluetooth salve module, it can communicate with Bluetooth adapter of computers and smart phones.

3. The Bluetooth devices available in the market are mostly slave device. Examples are Bluetooth printer, Bluetooth GPS.etc., Hence we can use master module to make pair and communicate with them.

Communication between two Bluetooth modules requires at least two conditions:

1. The communication must be between master and slave.

2. Password must be correct.

In principle, HC-05 can work when UART-TXD, UART-RXD, VCC and GND are connected. However, for better testing results, connecting LED and KEY are recommended (when testing the master).

While 3.3v TXD of MCU connects to UART-RXD of HC-05, 3.3v RXD of MCU connects to UART-TXD of HC-05. For operating the Bluetooth device, 3.3V and GND are supplied to respective pins of HC-05.

Note that, PIN2: UART-RXD of Bluetooth module has no pull-up resistor. If the MCU TXD doesnt have pull-up function, then user should add a pull-up resistor to the UART-RXD. It may be easy to be ignored.

If there are two MCU which connect to master and slave device respectively, then before paired (LED will flicker) user can send AT commands by serial port when the system is power on.If the LED glows constant, it indicates the pairing is finished. The two MCUs can communicate with each serially.

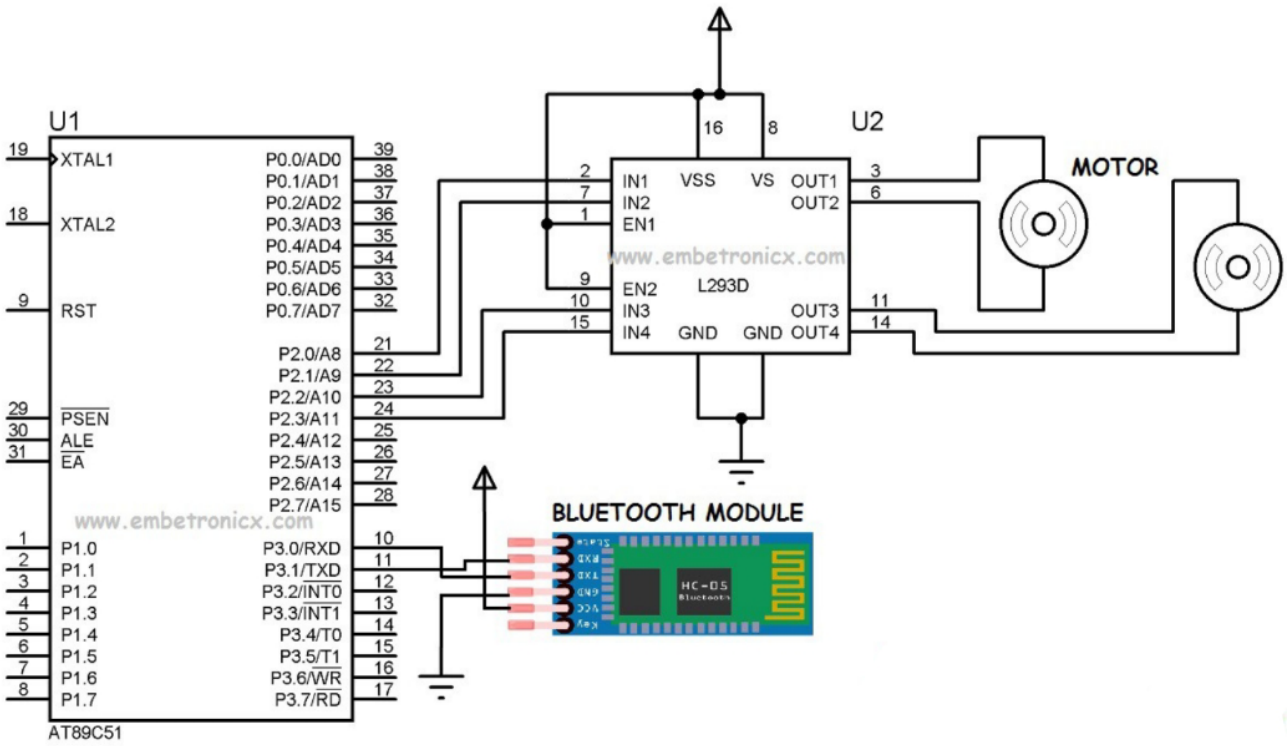

Figure 3.7: Interface of L293d,DC motor and bluetooth with 8051

3.5 7805 Power supply

A DC power supply system, which maintains constant voltage irrespective of fluctuations in the main supply or variation in the load, is known as Regulated Power supply.

The 7805 IC referred to fixed positive voltage regulator, which provides fixed voltage 5 volts. The 7805 regulator is known as fixed voltage regulator.

Fixed Voltage regulator design has been greatly simplified by the introduction of 3-terminal regulator ICs such as the 78xx series of positive regulators and the 79xxx series of negative regulators, which incorporate features such as built-in fold back current limiting and thermal protection, etc. These ICs are available with a variety of current and output voltages ratings, as indicated by the xxx suffix; current ratings are indicated by the first part of the suffix and the voltage ratings by the last two parts of the suffix. Thus, a 7805 device gives a 5V positive output at a 1a rating, and a 79L15 device gives a 15V negative output at a 100mA rating.

3-terminal regulators are very easy to use. The regulators ICs typically give about 60dB of ripple rejection, so 1V of input ripple appears as a mere 1mV of ripple on the regulated output.

A rectified filter and unregulated DC voltage is given to pin of IC regulator. A bypass capacitor is connected between input and ground to bypass the ripples and oscillations. The

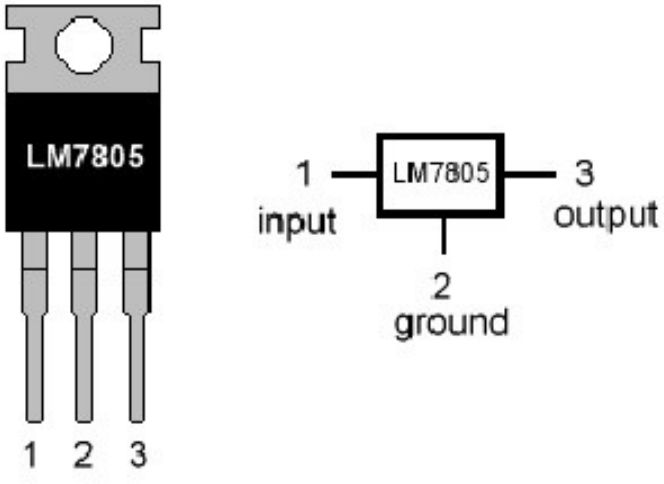

Figure 3.8: A veiw of LM7805

output capacitor is connected between output and ground to improve transient response. The unregulated input is applied to the IC must be always more than the regulated output.

3.6 PIR sensor

PIR sensors (PIR Directional Infrared Radial Sensor D203S) allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and dont wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses.

Along with the pyroelectic sensor is a bunch of supporting circuitry, resistors and capacitors. It seems that most small hobbyist sensors use the BISS0001 (Micro Power PIR Motion Detector IC), undoubtedly a very inexpensive chip. This chip takes the output of the sensor and does some minor processing on it to emit a digital output pulse from the analog sensor.How does it work?

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.

Infrared radiation exists in the electromagnetic spectrum at a wavelength that is longer than visible light. It cannot be seen but it can be detected. Objects that generate heat also

generate infrared radiation and those objects include animals and the human body whose radiation is strongest at a wavelength of 9.4um.

Infrared in this range will not pass through many types of material that pass visible light such as ordinary window glass and plastic. However it will pass through, with some attenuation, material that is opaque to visible light such as germanium and silicon. An unprocessed silicon wafer makes a good IR window in a weatherproof enclosure for outdoor use. It also provides additional filtering for light in the visible range. 9.4um infrared will also pass through polyethylene which is usually used to make Fresnel lenses to focus the infarared onto sensor elements.

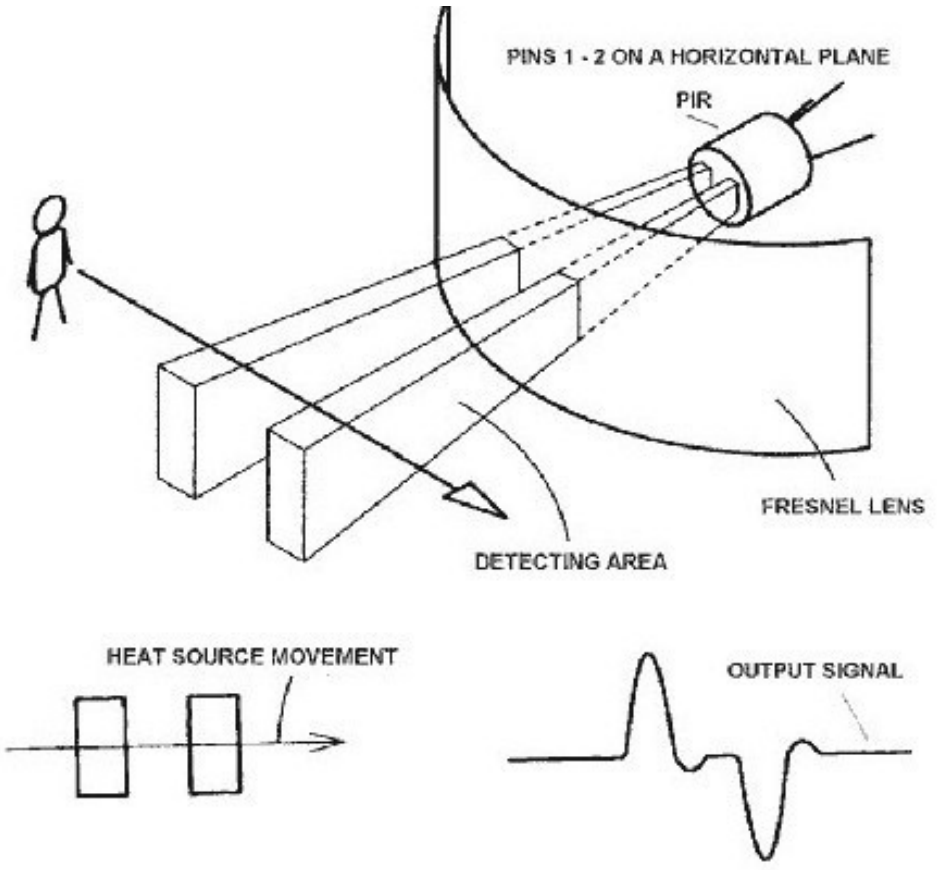

Figure 3.9: Working of PIR sensor

3.6.1 Pyroelectric sensors

The pyroelectric sensor is made of a crystalline material that generates a surface electric charge when exposed to heat in the form of infrared radiation. When the amount of radiation striking the crystal changes, the amount of charge also changes and can then be measured with a sensitive FET device built into the sensor. The sensor elements are sensitive to radiation over a wide range so a filter window is added to the TO5 package to

Figure 3.10: A veiw of PIR sensor

limit detectable radiation to the 8 to 14mm range which is most sensitive to human body radiation.

3.7 IR sensor

To monitor the density of the traffic, we will be keeping a few sets of IR transmitter and receiver sensors on the side of the roads. On side IR transmitter will be placed and right opposite to the IR transmitter, an IR receiver will be kept. This set of IR transmitter and receiver will be kept on roads at different intervals.The IR transmitters are connected to supply, so that they will transmit high signal all the time. The IR receivers are connected to the comparator circuit, to get digital signals.

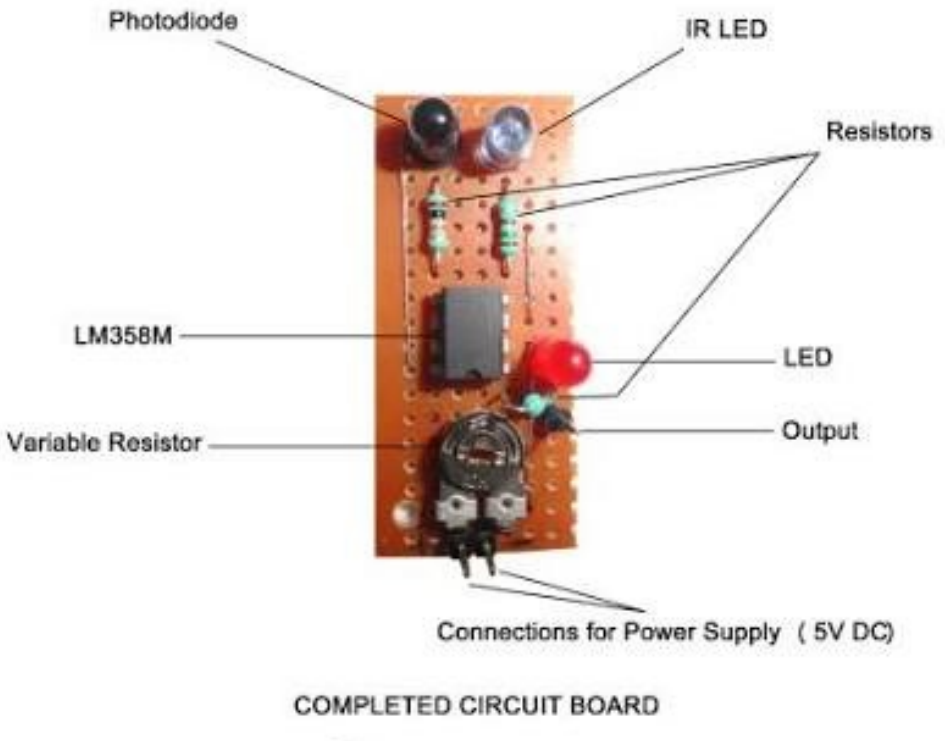

Figure 3.11: A veiw of IR sensor

3.8 Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. Relays thus enables controlling an AC device through DC.

Commonly used Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. The relay's switch connections are usually labeled COM, NC and NO:

1. COM = Common, always connect to this, it is the moving part of the switch.
2. NC = Normally Closed, COM is connected to this when the relay coil is off.
3. NO = Normally Open, COM is connected to this when the relay coil is on.
4. Connect to COM and NO if you want the switched circuit to be on when the relay coil is on.
5. Connect to COM and NC if you want the switched circuit to be on when the relay coil is off.

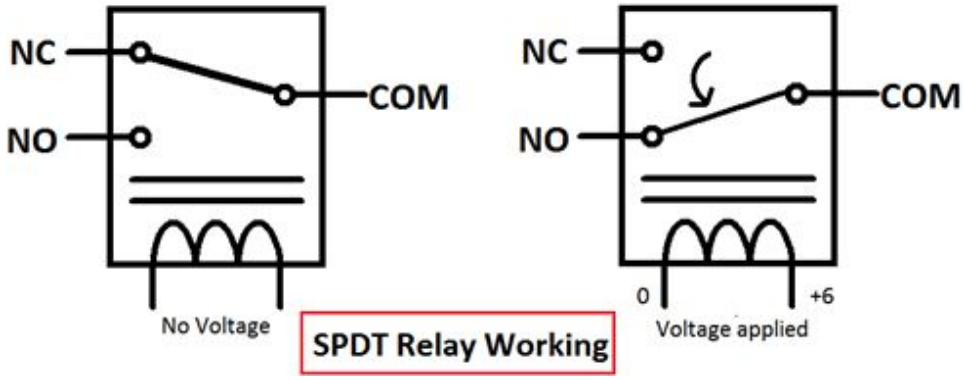

Figure 3.12: Relay

3.9 Overall Interface diagram

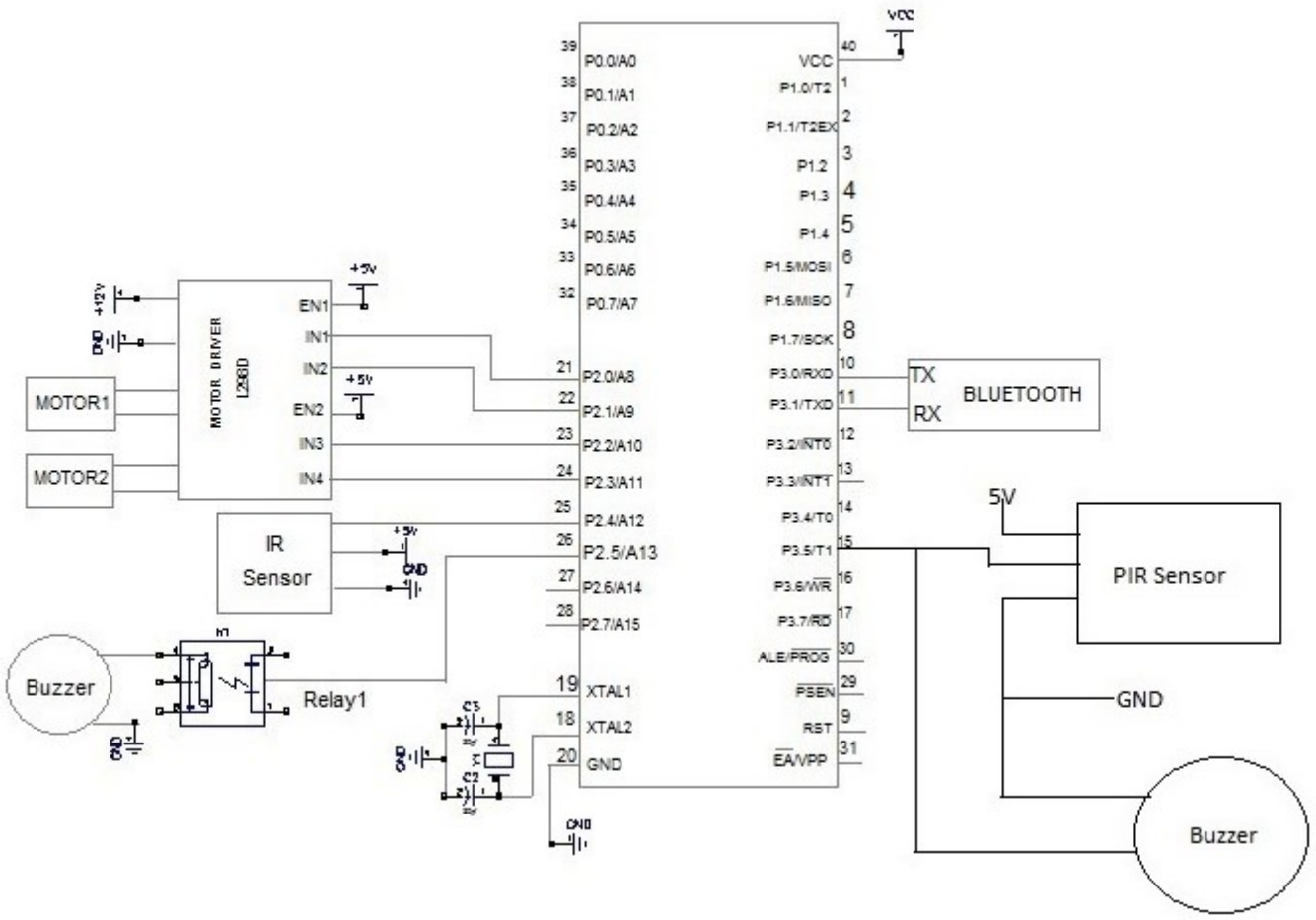

Figure 3.13: Interface diagram

Chapter 4

Software description

4.1 Keil software

Keil software provides the ease of writing the code in either C or ASSEMBLY. U-VISION 2, the new IDE from Keil Software combines Project management, Source Code Editing and Program Debugging in one powerful environment. It acts as a CROSS-COMPILER.

4.1.1 How to create new project

1. Select the Project from the menu bar.
2. Select New Project.
3. Give the File Name. A project with extension of .uv2 will be created

4.1.2 Selecting the device

1. After giving the file name the device list windows opens.
2. Select the respective companys microcontroller IC that is going to be implemented in hardware.
3. From the drop down arrow, we get a list of all the chips from that particular manufacturer. Choose the appropriate one.
4. Now the target is ready.
5. The data sheets and user manuals are automatically added.

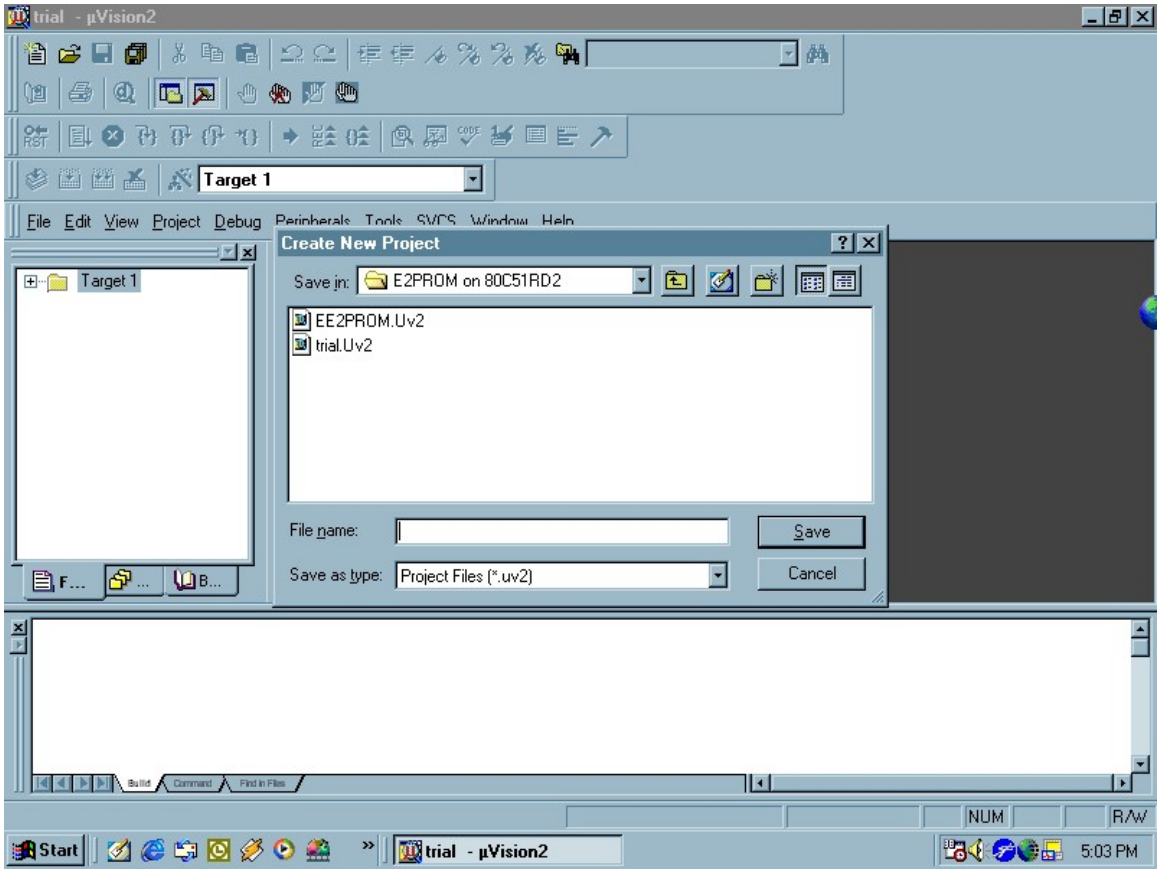

Figure 4.1: How to create project

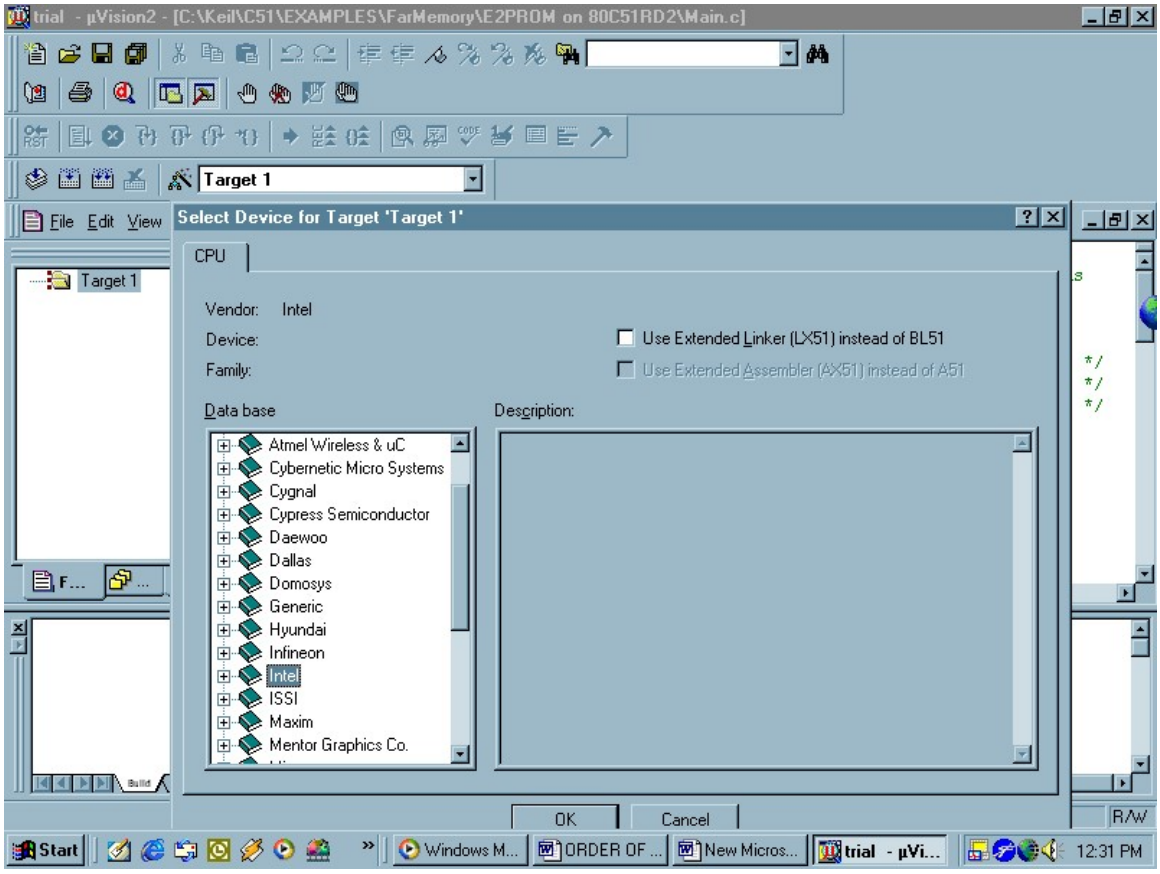

Figure 4.2: Selecting the device

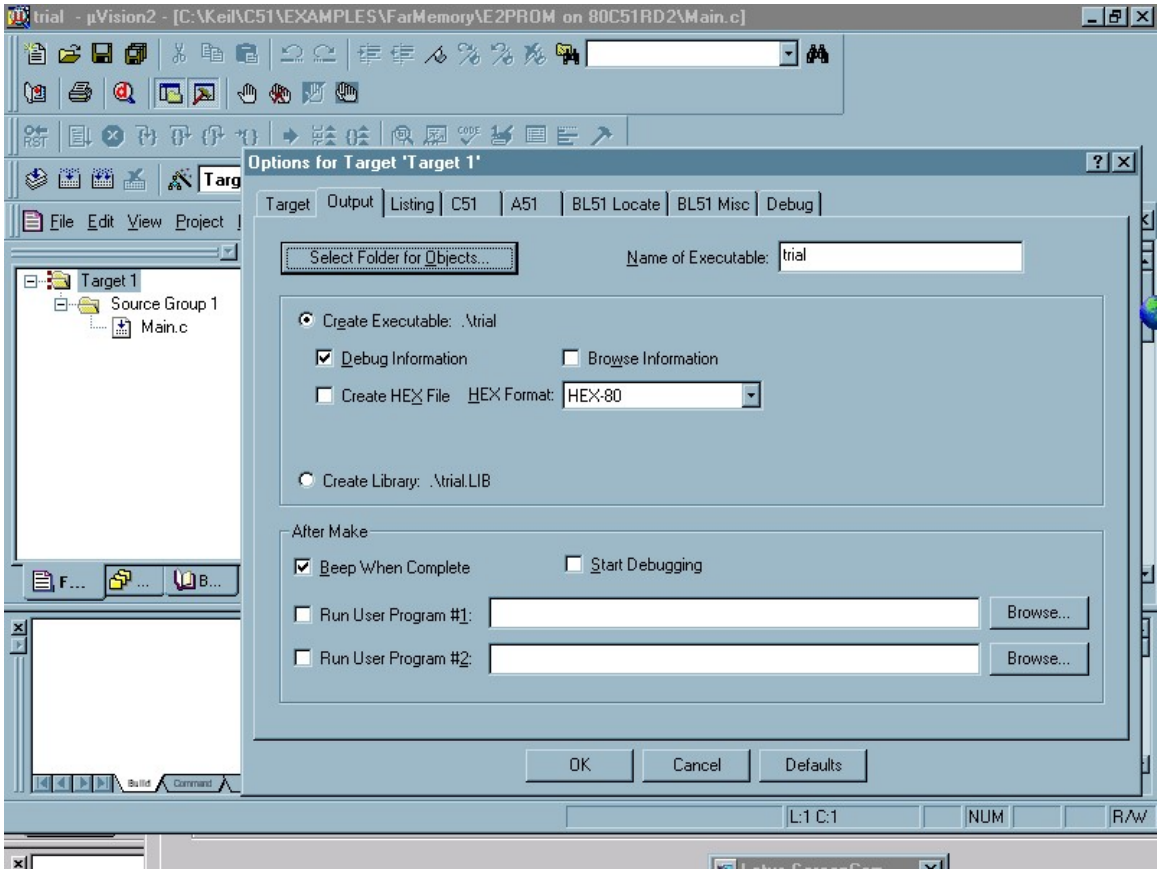

Figure 4.3: Configuring the essentials

4.1.3 Configuring the essentials

1. Right Click on Target to view the options for Target 1.
2. The Target tab enables to give the Starting address and size of RAM and ROM. We also have to specify the frequency of the crystal used which in our case is 11.0592Hz.
3. The Output tab has the option to create the HEX file. Confirm the check box given beside it.
4. The A166 and C51 tabs shows the compiler options.

4.1.4 Additional files in the source group

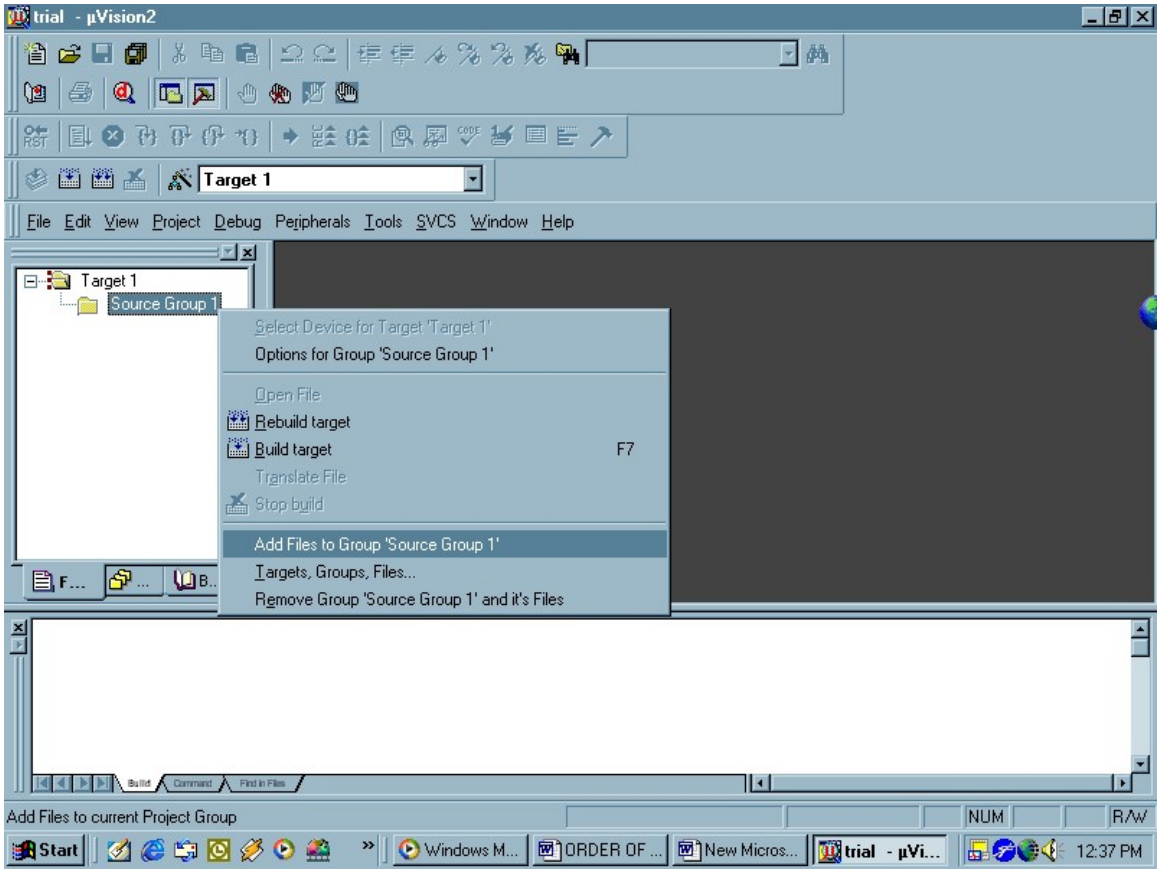

Figure 4.4: Additional files in the source group

1. After the Target is created the source group is added to it.
2. Select the file menu and choose the New option in it to get a page. Save the same with a .a51 or .asm extension. These assembler files are the ones recognized by the compiler.

3. Right click on source group and select add files to include the program. Select the assembler files created earlier and confirm the action. The selected files appear in the left-hand side project window.

4. These files will contain your actual program in assembly or in embedded C language

5. Options for source group includes the compilers C51 and A51 paths.

4.1.5 Running the program

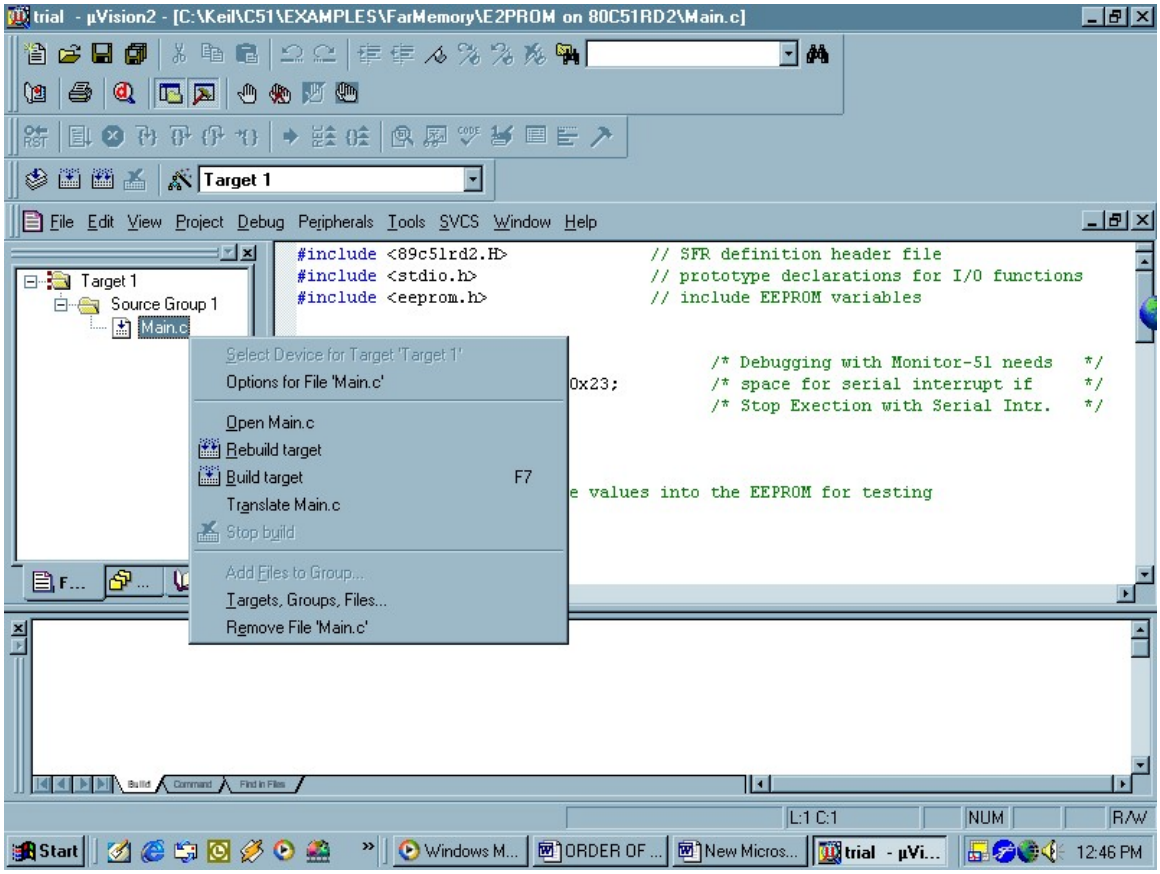

Figure 4.5: Running the program

1. Any number of sub programs can be added to source group.

2. To run the program right click on it and select Build Target. When you build an application with syntax errors, Vision2 will display errors and warning messages in the Output Window Build page. A double click on a message line opens the source file on the correct location in a Vision2 editor window.

3. Then select rebuild all the target files too. With the Rebuild Target command, all source files are translated, regardless of modifications.

4. After the target is built, debugging is done.

5. After all the debugging the file is built again which creates a hex file. This hex file is then used to download to the microcontroller using a programmer kit.

4.1.6 Target Program Execution and Debugging

Vision2 lets execute your application program in several different ways:

1. With the Debug Toolbar buttons and the Debug Menu and Debug Commands.

2. With the Run till Cursor line command in the local menu. The local menu opens with a right mouse click on the code line in the Editor or Disassembly window.

3. In the Output Window Command page you can use the Go, Ostep, Pstep, and Tstep commands.

Chapter 5

Advantages and Disadvantages

5.1 Advantages

1. This system is an effective and safe.
2. It is feasible to implement Bluetooth communication between smart phone and microcontroller.
3. The development of apps for Android in Android SDK is easy and free of cost.
4. The system is safe for the user because of the use of the robotics and no manual work.
5. The system uses transceiver and this makes the system both accurate and reliable.

5.2 Disadvantages

1. Battery backup for camera is weak which can be overcome by using solar panel.
2. The intial cost may be high if very high range sensors are being used in commercial usage.

5.3 Applications

1. For detecting humans in destructive environment.
2. War feild or in the earthquake affective areas.
3. Military applications.

Chapter 6

Conclusion

The rescue operation by the workers in inaccessible area during earthquake is very difficult and time consuming because it involves large area. This project proposed an autonomous robotic vehicle that move in the earth quake prone area and helps in identifying the live people and give them immediate medical treatment to carry out rescue operation.Advanced equipments and rugged structure make it more feild effective keeping in mind the whole scenario of earthquake disaster area.

6.1 Result

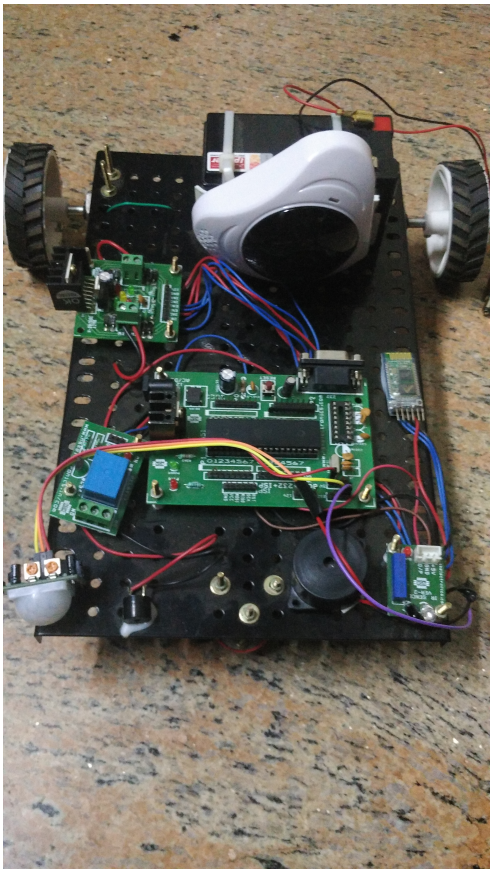

Figure 6.1: A view of our project

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[4] M D Singh and K B Khanchandan,”Power Electronics”

[5] . Roy Choudary And Sahil Jain, ”Linear Integrated Circuits”

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