WIRELESS CONTROLLED ROBOT

A PROJECT REPORT

Submitted by

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in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION

ENGINEERING

KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE-641049

(An Autonomous Institution Affiliated to Anna University, Chennai)

APRIL 2015

KUMARAGURU COLLEGE OF TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this project report titled **"WIRELESS CONTROLLED ROBOT"** is the bonafied work of "**SRIRAM. R. S, MUTHUHARIDHARAN. D, SARVESWARAN. R, SELVARAJ. S"** who carried out the project work under my supervision.

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The candidates with Register numbers 1110107103, 1110107311, 1110107319 and 1110107322 are examined by us in the project viva-voce examination held on …………………….

INTERNAL EXAMINER **EXTERNAL EXAMINER**

ACKNOWLEDGEMENT

First we would like to express our praise and gratitude to the Lord, who has showered his grace and blessing enabling us to complete this project in an excellent manner. He has made all things in beautiful in his time.

We express our sincere thanks to our beloved Joint Correspondent, **Shri. Shankar Vanavarayar** for his kind support and for providing necessary facilities to carry out the project work.

We would like to express our sincere thanks to our beloved Principal **Dr. R. S. Kumar M.E., Ph. D.,** who encouraged us with his valuable thoughts.

We would like to express our sincere thanks and deep sense of gratitude to our HOD, **Dr. Rajeswari Mariappan M.E., Ph. D.,** for her valuable suggestions and encouragement which paved way for the successful completion of the project.

We are greatly privileged to express our deep sense of gratitude to the Project Coordinator **Ms. A. Kalaiselvi M. E., (Ph. D)**, Assistant Professor, for her continuous support throughout the course.

In particular, We wish to thank and express our everlasting gratitude to the Supervisor **Ms. S. Thilagam M.E.,** Assistant Professor for her expert counselling in each and every steps of project work and we wish to convey our deep sense of gratitude to all teaching and non-teaching staff members of ECE Department for their help and cooperation.

Finally, we thank our parents and our family members for giving us the moral support in all of our activities and our dear friends who helped us to endure our difficult times with their unfailing support and warm wishes.

ABSTRACT:

Our project is to control Robot movement and direction for an application as per the instruction given to microcontroller through wireless keypad. Our project is useful for the industrial remote controlled application such as carrying application and security application. Our project wireless control section consists of keypad, encoder and RF transmitter. The keypad consists of several buttons representing the one operation such as forward, reverse movement and left, right direction. The keypad entered signal is encoded and given to RF transmitter in which the signal is modulated with carrier frequency. After the modulation the encoded signal is transmitted through RF transmitter. The receiver section consists of RF receiver, Decoder, Microcontroller and Robot model. The received signal is demodulated in the RF receiver in which the carrier signal is removed then given to decoder. In the decoder the encoded signal is decoded into original signal as per transmitted from the control section. Then the signal is given to microcontroller. The microcontroller activates the driver circuit as per the instruction from the control side. For example when you press the forward key in the control section, the microcontroller activates the corresponding driver circuit. The driver circuit controls the motor which is attached in the robot model. Now the robot is moving in the forward direction. Similarly we can control the robot remotely in reverse and left, right direction as per the instruction from the wireless keypad.

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

Our project wireless control section consists of keypad, encoder and RF transmitter. The keypad consists of several buttons representing the one operation such as forward, reverse movement and left, right direction. The keypad entered signal is encoded and given to RF transmitter in which the signal is modulated with carrier frequency. After the modulation the encoded signal is transmitted through RF transmitter.

The receiver section consists of RF receiver, Decoder, Microcontroller and Robot model. The received signal is demodulated in the RF receiver in which the carrier signal is removed then given to decoder. In the decoder the encoded signal is decoded into original signal as per transmitted from the control section. Then the signal is given to microcontroller. The microcontroller activates the driver circuit as per the instruction from the control side. For example when you press the forward key in the control section, the microcontroller activates the corresponding driver circuit.

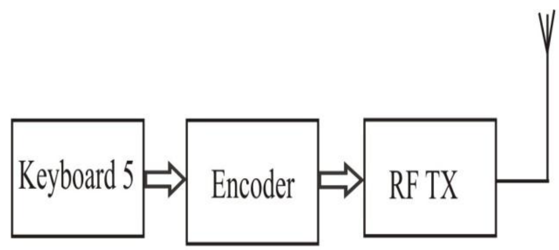
The driver circuit controls the motor which is attached in the robot model. Now the robot is moving in the forward direction. Similarly we can control the robot remotely in reverse and left, right direction as per the instruction from the wireless keypad.

CHAPTER 2

BLOCK DIAGRAM & DISCRIPTION

2.BLOCK DIAGRAM & DISCRIPTION

BLOCK DIAGRAM:



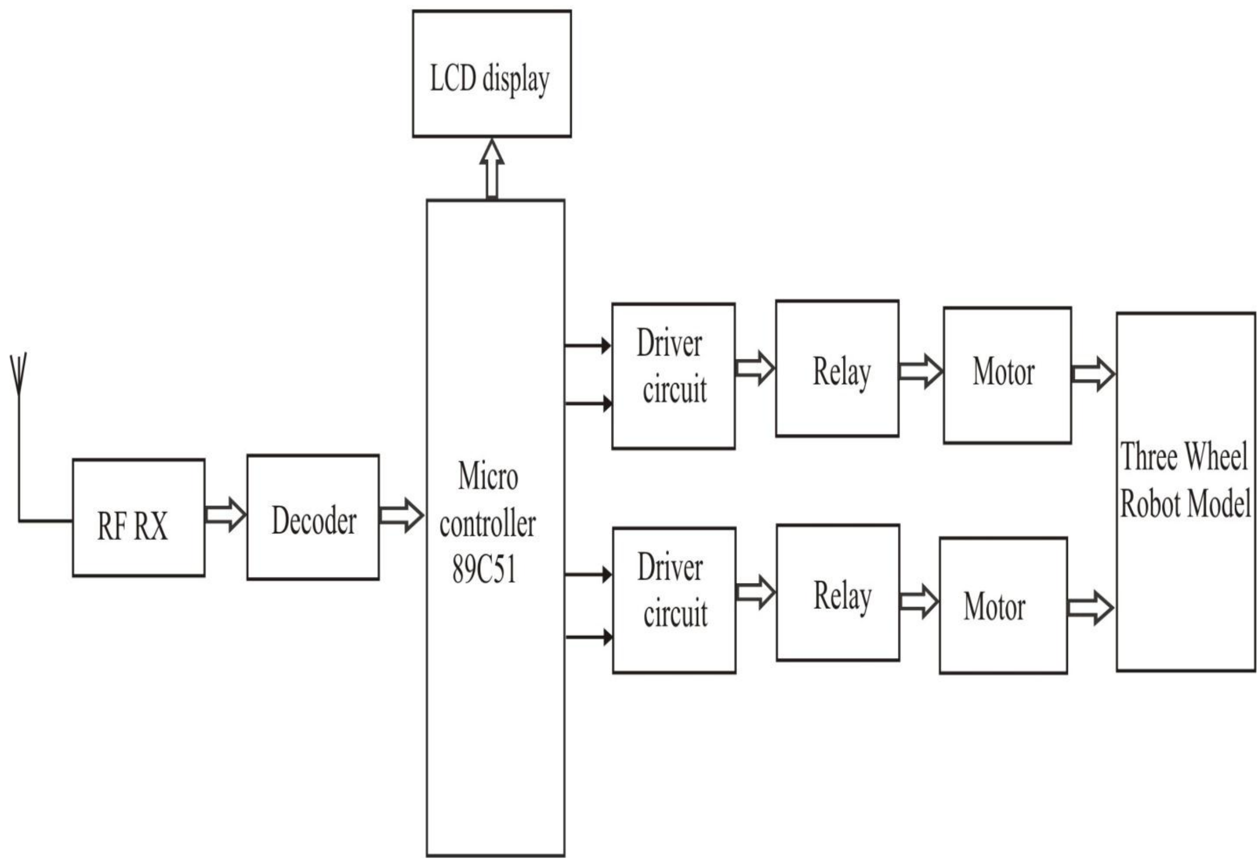


Figure 2.1

DISCRIPTION:

KEYPAD:

The keypad consists of four buttons representing the one operation such as forward, reverse movement and left, right direction.

ENCODER:

The HT12E encoder is used to converts the parallel data from the keypad into the serial data to the RF transmitter.

RF TRANSMITTER:

RF transmitter is modulates the encoded data with carrier frequency of 434 MHz by using Amplitude Shift Keying modulation. After the modulation the encoded signal is transmitted through an antenna.

RF RECEIVER:

The received signal is demodulated in the RF receiver in which the carrier signal is removed then given to decoder.

DECODER:

In the decoder the encoded signal is decoded into original signal as per transmitted. It converts the serial data into the parallel and given to the micro controller.

MICRO CONTROLLER:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. It is used to control the robot movement.

RELAY DRIVER:

Driver circuit is used to increase the current level of micro controller output signal for the motor. Relay is an electronic switch which is used to give the corresponding supply either positive or negative to the motor.

CHAPTER 3

CIRCUIT DIAGRAM

3. CIRCUIT DIAGRAM

TRANSMITTER:

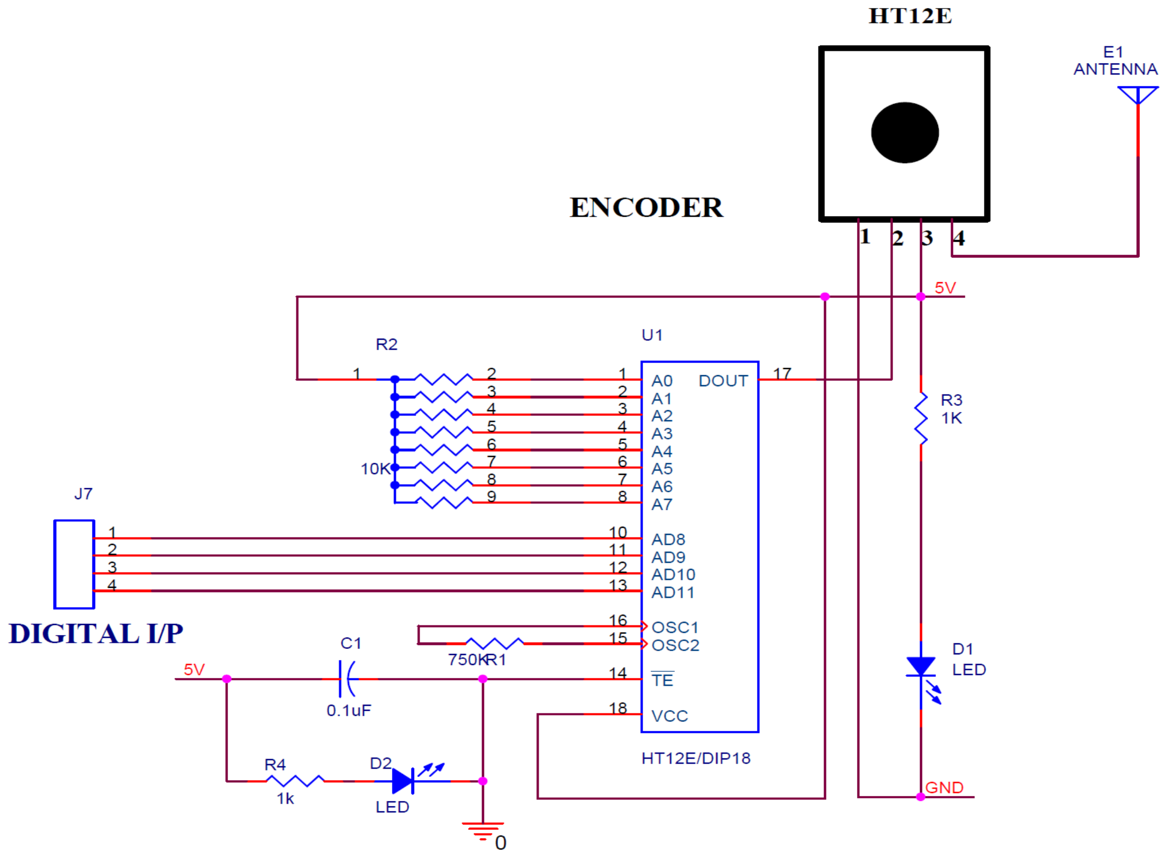


Figure 3.1

The transmitter section consists of keypad, encoder and RF transmitter. The keypad consists of several buttons representing the one operation such as forward, reverse movement and left, right direction. The keypad entered signal is encoded and given to RF transmitter in which the signal is modulated with carrier frequency. After the modulation the encoded signal is transmitted through RF transmitter.

The encoder HT12E IC is used to convert the 4 bit parallel data to the 3 bit serial data. The encoder enables only when the 1st 8 pins are in high level i.e 5v. The output encoded data shown in below.

DIRECTION	**INPUT**	**OUTPUT**
Forward	1000	001
Reverse	0100	010
Right	0010	011
Left	0001	100

The encoder data is given to the 2nd pin of the RF transmitter. The RF transmitter modulates this encoded data with the 434 MHz carrier frequency signal by using ASK modulation. In ASK modulation, if the encoded data will be 1, then 434 MHz carrier signal will be transmitted else no signal will be transmitted for zero level input. Then modulated signal will be transmitted through an antenna.

RECEIVER:

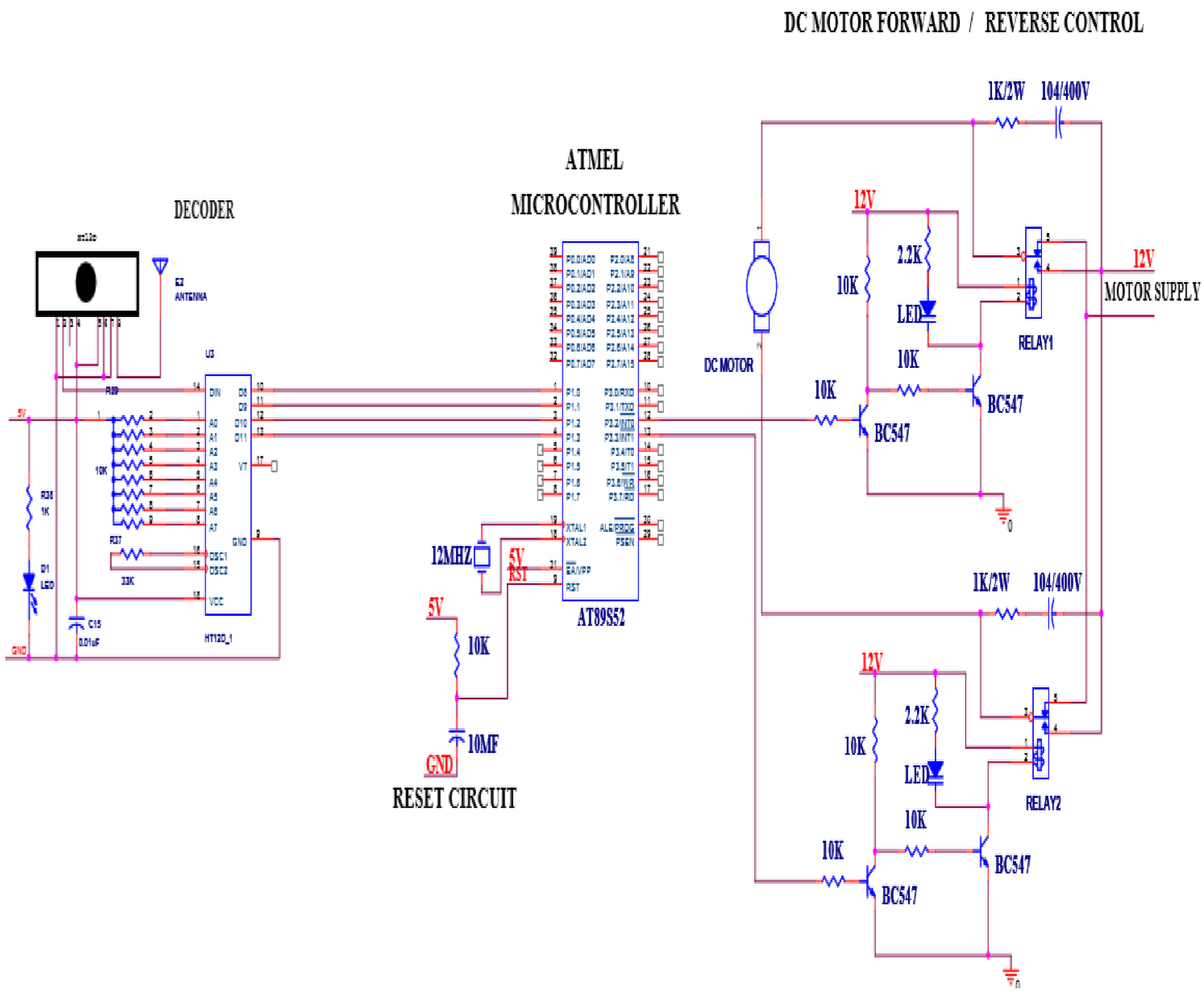


Figure 3.2

The receiver section consists of RF receiver, Decoder, Microcontroller and Robot model. The received signal is demodulated in the RF receiver in which the carrier signal is removed then given to decoder. In the decoder the encoded signal is decoded into original signal as per transmitted from the transmitter section. Then the signal is given to microcontroller.

Here the microcontroller is the flash type reprogrammable microcontroller in which we have already programmed with our objective. The microcontroller activates the driver circuit as per the instruction from the control side.

RF receiver receives the 434 MHz signal through an antenna. The RF transmitter compares received signal with 434 MHz inbuilt oscillator signal, if the both frequencies are same, then it gives output as ‘1’ else ‘0’.

This demodulated data will be given to the decoder. The decoder HT12D converts the serial data into the parallel data shown in below.

INPUT	**OUTPUT**
001	0111
010	1011
011	1101
100	1110

The decoded data is given to the microcontroller. It gives ouput as below

INPUT	**OUTPUT**	**DIRECTION**
0111	0110	Forward
1011	1001	Reverse
1101	0101	Right
1110	1010	Left

CHAPTER 4

POWER SUPPLY

4. POWER SUPPLY

4.1 BLOCK DIAGRAM

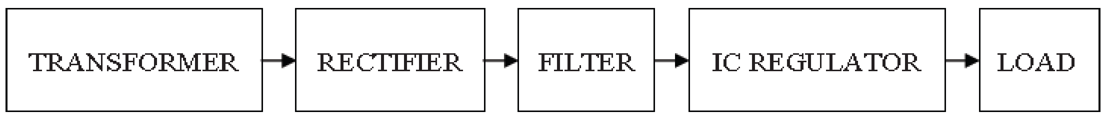
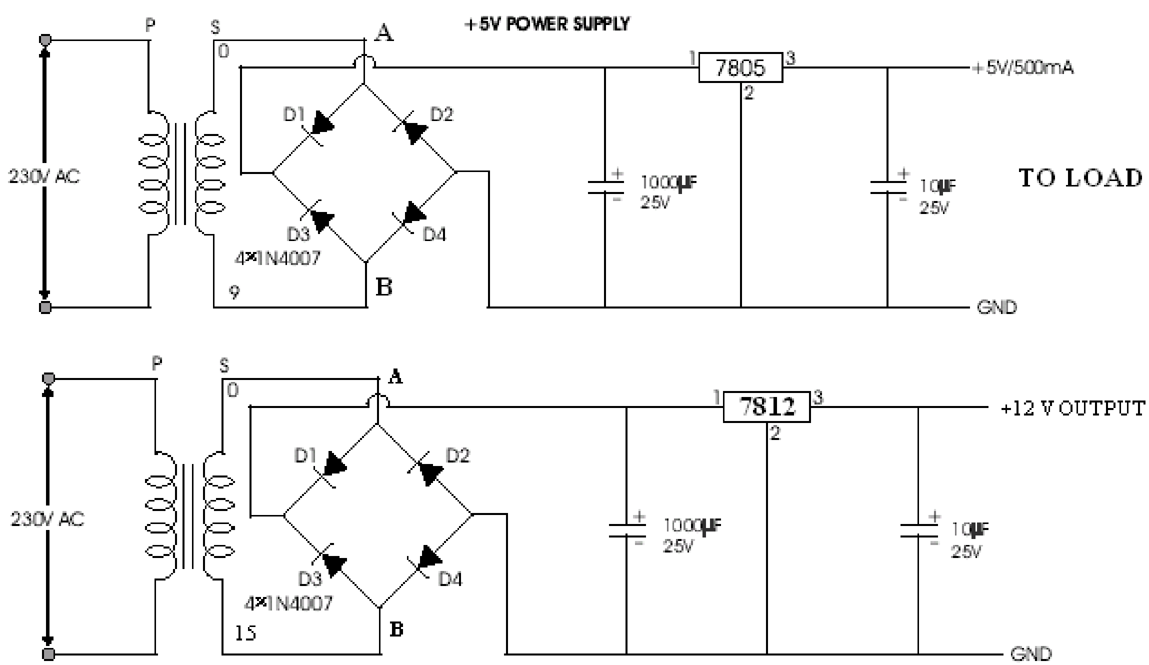


Figure 4.1

The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

4.2 SCHEMATIC DIAGRAM



4.3 WORKING PRINCIPLE

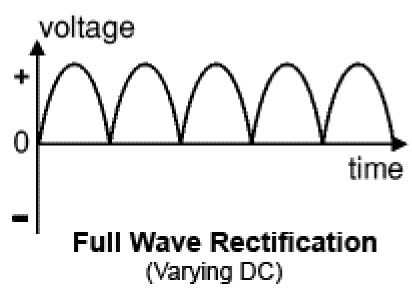
4.3.1 Transformer

The potential transformer will step down the power supply voltage (0-230V) to (0-15V and 0-9V) a level. If the secondary has less turns in the coil then the primary, the secondary coil's voltage will decrease and the current or AMPS will increase or decreased depend upon the wire gauge. This is called a STEP-DOWN transformer. Then the secondary of the potential transformer will be connected to the rectifier.

4.3.2 Bridge rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.

Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4.



The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biased and will block current flow. The path for current flow is from point B through D1, up through Load, through D3, through the secondary of the transformer back to point B.

One-half cycle later the polarity across the secondary of the transformer reverse, forward biasing D2 and D4 and reverse biasing D1 and D3. Current flow will now be from point A through D4, up through Load, through D2, through the secondary of transformer, and back to point A. Across D2 and D4. The current flow through Load is always in the same direction. In flowing through Load this current develops a voltage corresponding to that. Since current flows through the load during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier.

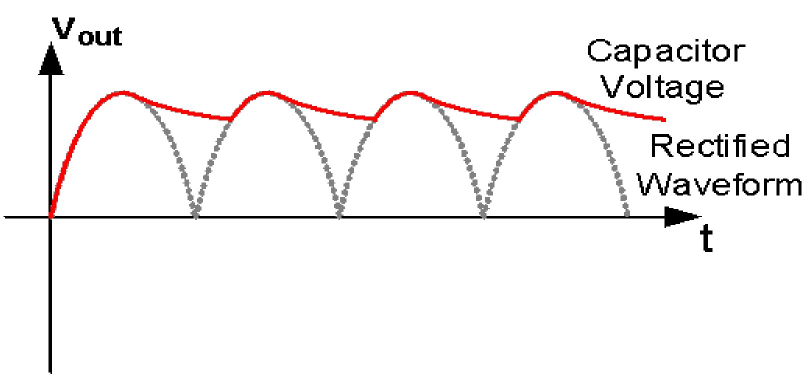
One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional half-wave circuit.

This bridge rectifier always drops 1.4Volt of the input voltage because of the diode. We are using 1N4007 PN junction diode, its cut off region is 0.7Volt.

So any two diodes are always conducting, total drop voltage is 1.4 volt.

4.4.3 Filter

figure 4.2



If a Capacitor is added in parallel with the load resistor of a Rectifier to form a simple Filter Circuit, the output of the Rectifier will be transformed into a more stable DC Voltage. At first, the capacitor is charged to the peak value of the rectified Waveform. Beyond the peak, the capacitor is discharged through the load until the time at which the rectified voltage exceeds the capacitor voltage. Then the capacitor is charged again and the process repeats itself.

4.3.4 Regulator

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage.

A fixed three-terminal voltage regulator has an unregulated dc input voltage, it is applied to one input terminal, a regulated dc output voltage from a third terminal, with the second terminal connected to ground.

The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.

This is a regulated power supply circuit using the 78xx IC series. These regulators can deliver current around 1A to 1.5A at a fix voltage levels. The common regulated voltages are 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, and 24V. It is important to add capacitors across the input and output of the regulator IC to improve the regulation.

In this circuit we are using 7805 and 7812 regulator so it converts variable dc into constant positive 5V and 12V power supply respectively.

CHAPTER 5

KEYPAD

5. KEYPAD

GENERAL EXPLANATION:

A group of keys in a single printed circuit board is call key pad. These key pads are classified into two types.

1) Key pad
2) Matrix keypad

1. KEYPAD

In a key pad it has a one or more then one keys are placed in a PCB. And all the keys are commonly grounded. This is the main difference to compared to matrix keypad. This key pads having maximum 8 numbers of keys. more then 8 keys are can not be connected because its not a efficient one. If we need more then 8 keys means, then only we can operate it a matrix keypad.

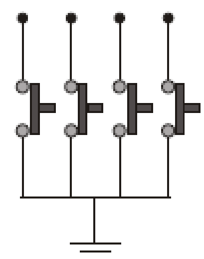


Figure 5.1

2. MATRIX KEYPAD:

Above same keys are connected in a matrix principle it is called as a matrix key pad. This matrix key pad is working with the help of software. Otherwise it can not work. This key pad is normally 3X3, 4X3, 4X4 like that.

4 x 4 matrix keypad

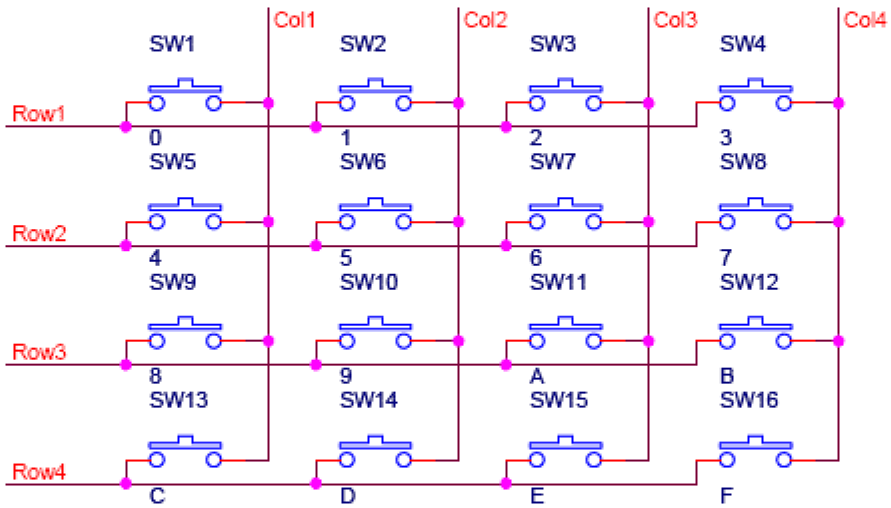


Figure 5.2

SCHMATIC EXPLANATION:

There are many methods depending on how you connect your keypad with your controller, but the basic logic is same. We make the columns as i/p and we drive the rows making them o/p, this whole procedure of reading the keyboard is called scanning. In order to detect which key is pressed from the matrix, we make row lines low one by one and read the columns. Lets say we first make Row1 low, then read the columns. If any of the key in row1 is pressed will make the corresponding column as low i.e. if second key is pressed in Row1, then column2 will give low. So we come to know that key 2 of Row1 is pressed. This is how scanning is done. So to scan the keypad completely, we need to make rows low one by one and read the columns. If button 1 of a row is pressed then Column 1 will become low, if button 2 then column2 and so on.

CHAPTER 6

ENCODER

6. ENCODER

Encoder IC (HT12E) receives parallel data in the form of address bits and control bits. The control signals from remote switches along with 8 address bits constitute a set of 12 parallel signals. The encoder HT12E encodes these parallel signals into serial bits. Transmission is enabled by providing ground to pin14 which is active low. The control signals are given at pins 10-13 of HT12E. The serial data is fed to the RF transmitter through pin17 of HT12E.

Transmitter, upon receiving serial data from encoder IC (HT12E), transmits it wirelessly to the RF receiver. The receiver, upon receiving these signals, sends them to the decoder IC (HT12D) through pin2. The serial data is received at the data pin (DIN, pin14) of HT12D. The decoder then retrieves the original parallel format from the received serial data.

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits. HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

Pin Description

Pin Number	Function	Name
1	8 BIT ADDRESS PINS FOR INPUT	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	GROUND (0V)	GROUND
10	4 BIT DATA/ADDRESS PINS FOR INPUT	D0
11		D1
12		D2
13		D3
14	TRANSMISSION ENABLE (ACTIVE LOW)	TE
15	OSCILLATOR OUTPUT	OSC 2
16	OSCILLATOR INPUT	OSC 1
17	VALID TRANSMISSION, ACTIVE HIGH	VT
18	SUPPLY VOLTAGE; 5V (2.4 – 12V)	Vcc

PIN DIAGRAM

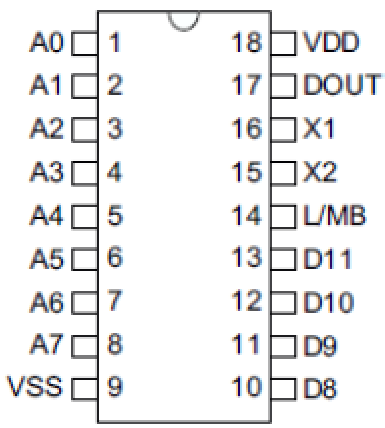


Figure 6.1

CHAPTER 7

RF TRANSMITTER

7. RF TRANSMITTER

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter/receiver (Tx/Rx) pair operating at 434 MHz. The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission.

The system allows one way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. Here HT12E & HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. These outputs can be observed on corresponding LEDs.

This circuit utilizes the RF module (Tx/Rx) for making a wireless remote, which could be used to drive an output from a distant place. RF module, as the name suggests, uses radio frequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency. A four channel encoder/decoder pair has also been used in this system. The input signals, at the transmitter side, are taken through four switches while the outputs are monitored on a set of four LEDs corresponding to each input switch. The circuit can be used for designing Remote Appliance Control system. The outputs from the receiver can drive corresponding relays connected to any household appliance.

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

PIN DIAGRAM

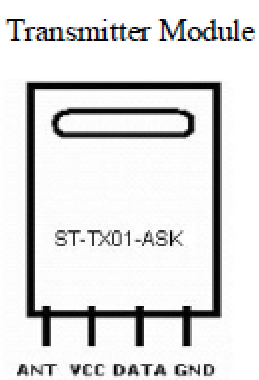


Figure 7.1

CHAPTER 8

RF RECIEVER

8. RF RECEIVER

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PIN DIAGRAM

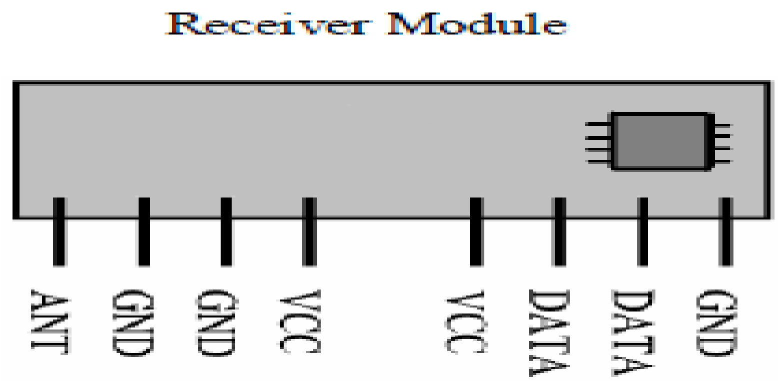

Figure 8.1

PIN DISCRIPTION

Receiver Module

Pin Number	Function	Name
1	Ground (0V)	GND
2	Serial Data Output Pin	DATA
3	Linear Output Pin; Not Connected	NC
4	Supply Voltage (5V)	VCC
5	Supply Voltage (5V)	VCC
6	Ground (0V)	GND
7	Ground (0V)	GND
8	Antenna Input Pin	ANT

CHAPTER 9

DECODER

9. DECODER

HT12D IC comes from HolTek Company. HT12D is a decoder integrated circuit that belongs to 212 series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 212 series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format. In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin. HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.

PIN DIAGRAM

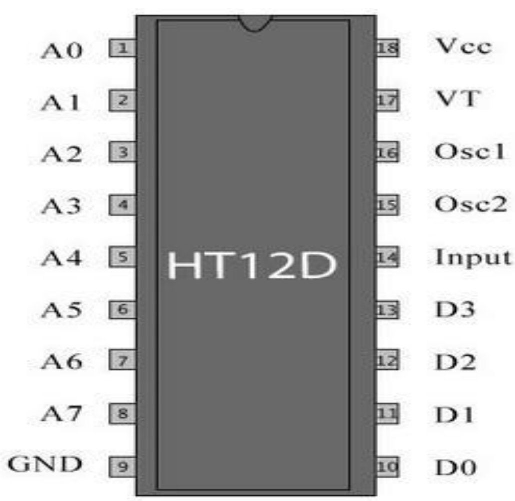

Figure 9.1

PIN DISCRIPTION

Pin Number	Function	Name
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2		A1
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4		A3
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6		A5
7		A6
8		A7
9	GROUND (0V)	GROUND
10	4 BIT DATA/ADDRESS PINS FOR OUTPUT	D0
11		D1
12		D2
13		D3
14	SERIAL DATA INPUT	INPUT
15	OSCILLATOR OUTPUT	OSC 2
16	OSCILLATOR INPUT	OSC 1
17	VALID TRANSMISSION, ACTIVE HIGH	VT
18	SUPPLY VOLTAGE; 5V (2.4 – 12V)	Vcc

CHAPTER 10

MICROCONTROLLER

10. MICROCONTROLLER

10.1 DESCRIPTION

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. 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 in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 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, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. 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 con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

10.2 FEATURES

• Compatible with MCS®-51 Products

• 8K Bytes of In-System Programmable (ISP) Flash Memory – Endurance: 10,000 Write/Erase Cycles

• 4.0V to 5.5V Operating Range

• Fully Static Operation: 0 Hz to 33 MHz

• Three-level Program Memory Lock

• 256 x 8-bit Internal RAM

• 32 Programmable I/O Lines

• Three 16-bit Timer/Counters

• Eight Interrupt Sources

• Full Duplex UART Serial Channel

• Low-power Idle and Power-down Modes

• Interrupt Recovery from Power-down Mode

• Watchdog Timer

• Dual Data Pointer

• Power-off Flag

• Fast Programming Time

• Flexible ISP Programming (Byte and Page Mode) and Green (Pb/Halide-free) Packaging Option.

10.3 PIN DIAGRAM:

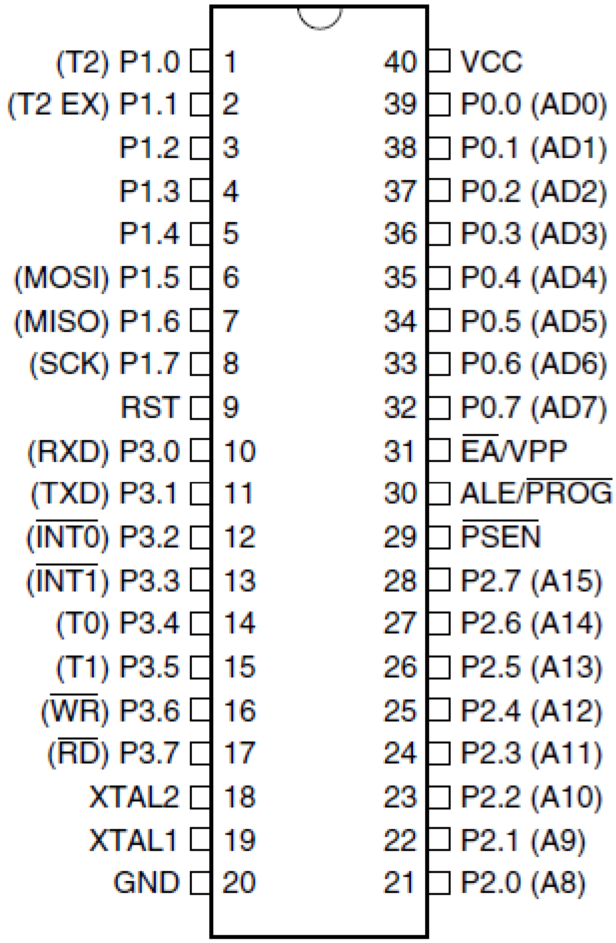

Figure 10.1

10.4 BLOCK DIAGRAM:

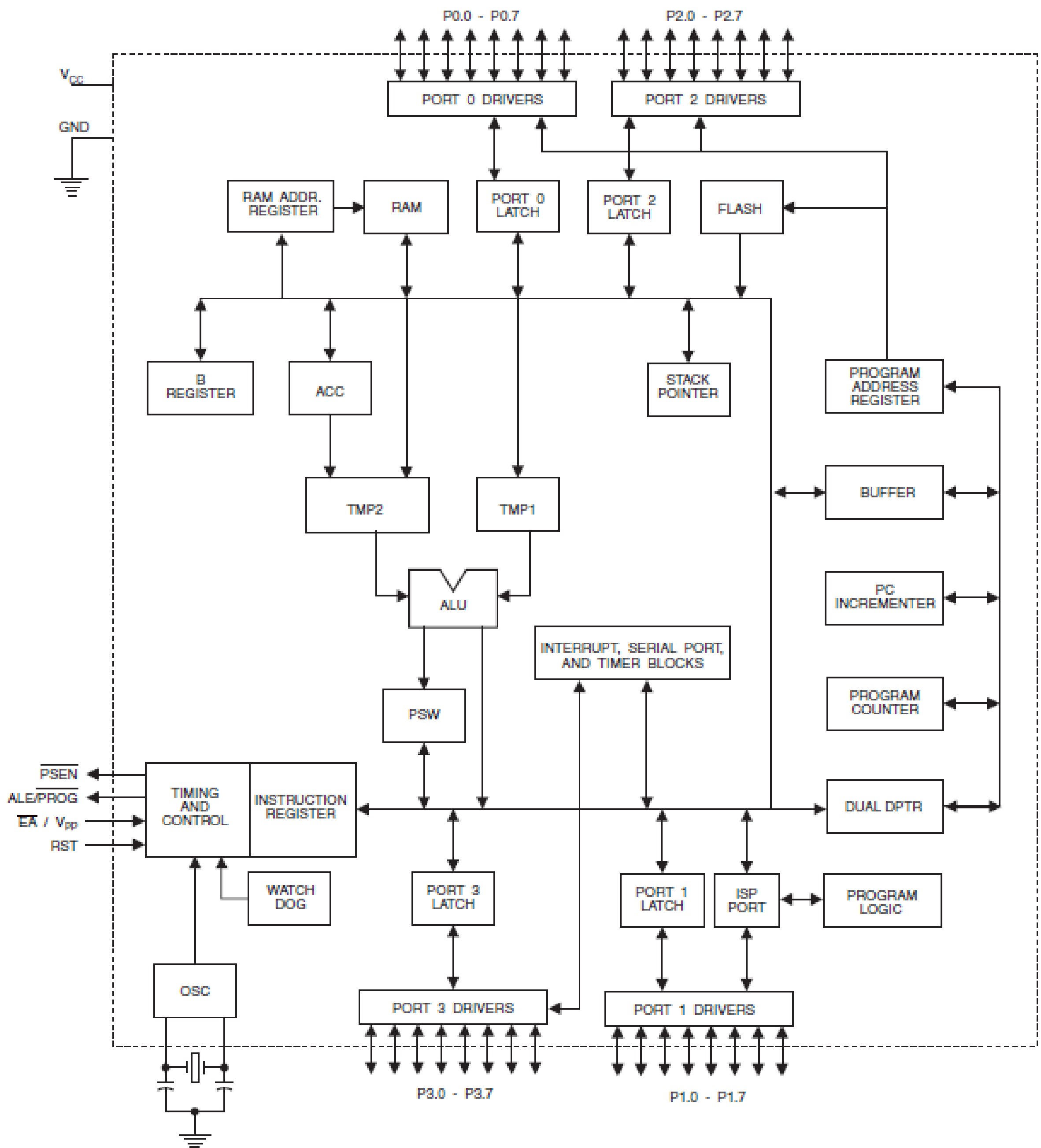

Figure 10.2

10.5 Pin Description

VCC

Supply voltage.

GND

Ground.

Port 0

Port 0 is an 8-bit open drain bidirectional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high-impedance inputs. Port 0 can also be configured to be the multiplexed low-order address/data bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups. Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

Port 1

Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX), respectively, as shown in the following table. Port 1 also receives the low-order address bytes during Flash programming and verification.

Port 2

Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. 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 (MOVX @ DPTR). In this application, Port 2 uses strong internal pull-ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @ RI), Port 2 emits the contents of the P2 Special Function Register. Port 2 also receives the high-order address bits and some control signals during Flash programming and verification.

Port 3

Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull-ups. Port 3 receives some control signals for Flash programming and verification. Port 3 also serves the functions of various special features of the AT89S52.

RST

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device. This pin drives high for 98 oscillator periods after the Watchdog times out. The DISRTO bit in SFR AUXR (address 8EH) can be used to disable this feature. In the default state of bit DISRTO, the RESET HIGH out feature is enabled.

ALE/PROG

Address Latch Enable (ALE) is an output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (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. Note, however, that one ALE pulse is skipped during each access to external data memory. If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

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 external input) P3.6 WR (external data memory write strobe) P3.7 RD (external data memory read strobe)

PSEN

Program Store Enable (PSEN) is the read strobe to external program memory. When the AT89S52 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.

EA/VPP

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, 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. This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming.

XTAL1

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2

Output from the inverting oscillator amplifier.

MEMORY ORGANIZATION

MCS-51 devices have a separate address space for Program and Data Memory. Up to 64K bytes each of external Program and Data Memory can be addressed.

PROGRAM MEMORY

If the EA pin is connected to GND, all program fetches are directed to external memory. On the AT89S52, if EA is connected to VCC, program fetches to addresses 0000H through 1FFFH are directed to internal memory and fetches to addresses 2000H through FFFFH are to external memory.

DATA MEMORY

The AT89S52 implements 256 bytes of on-chip RAM. The upper 128 bytes occupy a parallel address space to the Special Function Registers. This means that the upper 128 bytes have the same addresses as the SFR space but are physically separate from SFR space. When an instruction accesses an internal location above address 7FH, the address mode used in the instruction specifies whether the CPU accesses the upper 128 bytes of RAM or the SFR space. Instructions which use direct addressing access the SFR space.

WATCHDOG TIMER (ONE-TIME ENABLED WITH RESET-OUT)

The WDT is intended as a recovery method in situations where the CPU may be subjected to software upsets. The WDT consists of a 14-bit counter and the Watchdog Timer Reset (WDTRST) SFR. The WDT is defaulted to disable from exiting reset. To enable the WDT, a user must write 01EH and 0E1H in sequence to the WDTRST register (SFR location 0A6H). When the WDT is enabled, it will increment every machine cycle while the oscillator is running. The WDT timeout period is dependent on the external clock frequency. There is no way to disable the WDT except through reset (either hardware reset or WDT overflow reset). When WDT over-flows, it will drive an output RESET HIGH pulse at the RST pin.

USING THE WDT

To enable the WDT, a user must write 01EH and 0E1H in sequence to the WDTRST register (SFR location 0A6H). When the WDT is enabled, the user needs to service it by writing 01EH and 0E1H to WDTRST to avoid a WDT overflow. The 14-bit counter overflows when it reaches 16383 (3FFFH), and this will reset the device. When the WDT is enabled, it will increment every machine cycle while the oscillator is running. This means the user must reset the WDT at least every 16383 machine cycles. To reset the WDT the user must write 01EH and 0E1H to WDTRST. WDTRST is a write-only register. The WDT counter cannot be read or written. When WDT overflows, it will generate an output RESET pulse at the RST pin. The RESET pulse duration is 98xTOSC, where TOSC = 1/FOSC. To make the best use of the WDT, it should be serviced in those sections of code that will periodically be executed within the time required to prevent a WDT reset.

With WDIDLE bit enabled, the WDT will stop to count in IDLE mode and resumes the count upon exit from IDLE.

UART

The UART in the AT89S52 operates the same way as the UART in the AT89C51 and AT89C52.

TIMER 0 AND 1

Timer 0 and Timer 1 in the AT89S52 operate the same way as Timer 0 and Timer 1 in the AT89C51 and AT89C52

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 C/T2 in the SFR T2CON (shown in Table 5-2). Timer 2 has three operating modes: capture, auto-reload (up or down counting), and baud rate generator. The modes are selected by bits in T2CON, as shown in Table 10-1. Timer 2 consists of two 8-bit registers, TH2 and TL2. In the Timer function, the TL2 register is incremented every machine cycle. Since a machine cycle consists of 12 oscillator periods, the count rate is 1/12 of the oscillator frequency. In the Counter function, the register is incremented in response to a 1-to-0 transition at its corresponding external input pin, T2. In this function, the external input is sampled during S5P2 of every machine cycle. When the samples show a high in one cycle and a low in the next cycle, the count is incremented. The new count value appears in the register during S3P1 of the cycle following the one in which the transition was detected. Since two machine cycles (24 oscillator periods) are required to recognize a 1-to-0 transition, the maximum count rate is 1/24 of the oscillator frequency. To ensure that a given level is sampled at least once before it changes, the level should be held for at least one full machine cycle.

OSCILLATOR CHARACTERISTICS

XTAL1 and XTAL2 are the input and output, respectively, of an inverting amplifier that can be configured for use as an on-chip oscillator, as shown in Figure below. Either a quartz crystal or ceramic resonator may be used. To drive the device from an external clock source, XTAL2 should be left unconnected while XTAL1 is driven, as shown in Figure below. There are no requirements on the duty cycle of the external clock signal, since the input to the internal clocking circuitry is through a divide-by-two flip-flop, but minimum and maximum voltage high and low time specifications must be observed.

POWER-DOWN MODE

In the Power-down mode, the oscillator is stopped, and the instruction that invokes Power-down is the last instruction executed. The on-chip RAM and Special Function Registers retain their values until the Power-down mode is terminated. Exit from Power-down mode can be initiated either by a hardware reset or by an enabled external interrupt. Reset redefines the SFRs but does not change the on-chip RAM.

CHAPTER 11

RELAY DRIVER

11. RELAY DRIVER

11.1 DC MOTOR FORWARD - REVERSE CONTROL

SCHEMATIC DIAGRAM:

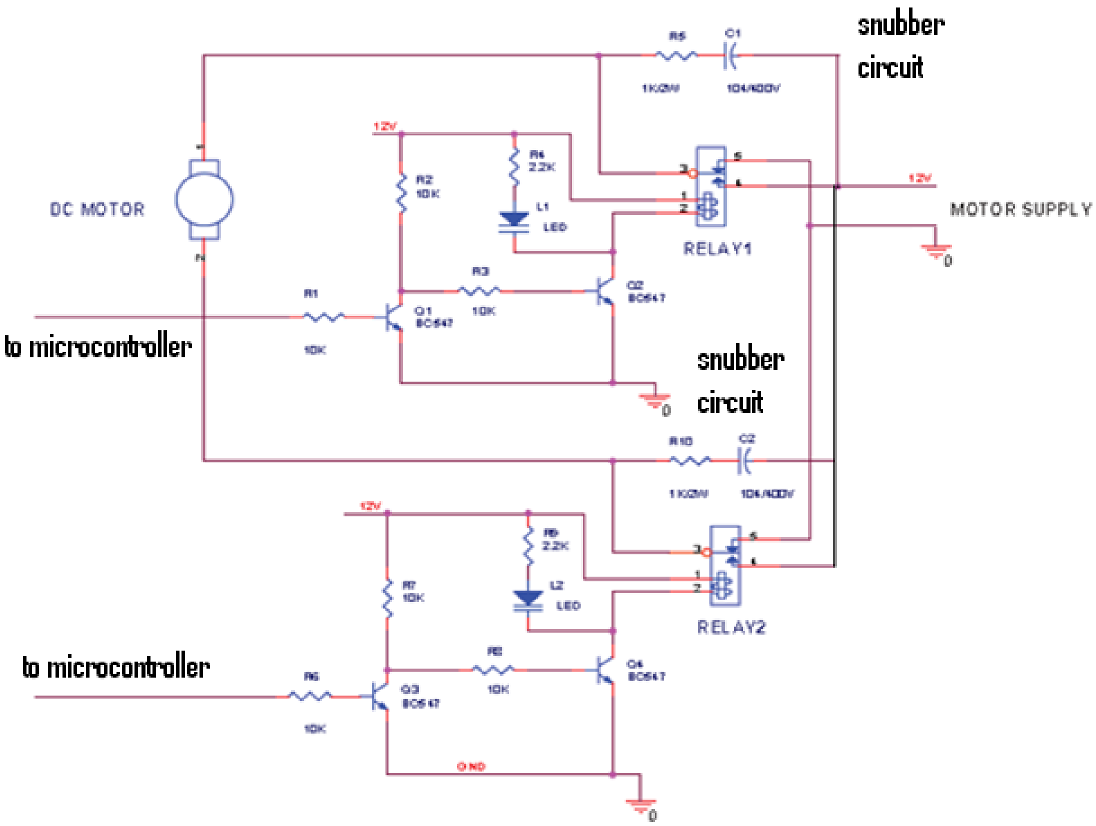

Figure 11.1

SCHEMATIC EXPLANATION:

This circuit is designed to control the DC motor in the forward and reverse direction. It consists of two relays named as relay1, relay2. The relay ON and OFF is controlled by the pair of switching transistors. A Relay is nothing but electromagnetic switching device which consists of three pins. They are Common, Normally close (NC) and normally open (NO). The common pin of two relay is connected to positive and negative terminal of DC motor through snubber circuit respectively. The relays are connected in the collector terminal of the transistors Q2 and Q4.

When high(5 Volt) pulse signal is given to either base of the Q1 or Q3 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero (Zero volt)signals given to base of the Q2 or Q4 transistor. So the relay is turned OFF state.

When low pulse is given to either base of transistor Q1 or Q3 transistor, the transistor is turned OFF. Now 12v is given to base of Q2 or Q4 transistor so the transistor is conducting and relay is turn ON. The NO and NC pins of two relays are interconnected so only one relay can be operated at a time.

The series combination of resistor and capacitor is called as snubber circuit. When the relay is turn ON and turn OFF continuously, the back EMF may fault the circuit. So the back EMF is grounded through the snubber circuit.

- When relay 1 is in the ON state and relay 2 is in the OFF state, the motor is running in the forward direction.
- When relay 2 is in the ON state and relay 1 is in the OFF state, the motor is running in the reverse direction.

11.2 RELAY:

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 they are double throw (changeover) switches. 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 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. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

CHAPTER 12

FUTURE SCOPE

12. FUTURE SCOPE

1. We can interface PIR sensor to this robot so that it can identify whether the human is present or not.
2. We can add wireless camera to this robot to act as a spy robot.
3. With few additions and modification, this robot can be used in borders for detecting and disporing hidden landmines.
4. This robot can be used in surveillance.

CHAPTER 13

CONCLUSION

13. CONCLUSION

In our project, this robot is designed to move by our command given by the program. Our project is very much useful in the places where a human cannot go into the places like ground canal, smoke oriented caves and our project is very useful in such situation and also we can also use our project in hospitals and industries.

CHAPTER 14

BIBLIOGRAPHY

14. BIBLIOGRAPHY

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