DESIGN AND FABRICATION OF REMOTELY ADJUSTING HEIGHT AND ANGLE OF A WALL MOUNTED TELEVISION FIXER

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ABSTRACT

The invention relates to the remotely operated wall mounted television fixer including motors adjusting height and viewing angle of the television in order to avoid neck or eye strain. The wall mounted television fixer comprises a DC motors, lead screw connected with one shaft, one micro controller and one receiver. A micro controller activates DC motor for adjusting the height of the wall mounted television fixer in a direction for upward movement and downward movement, when it receives the activation signal from remote. Thereafter, microcontroller activates DC motors for adjusting viewing angle of the wall mounted television.

Keyword: *DC Motor, Micro controller, Lead screw.*

1. INTRODUCTION:

The Embedded Technology is now in its prime and the wealth of Knowledge available is mind-blowing. Embedded System is a combination of hardware and software. Embedded technology plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the Department in a closed loop system. This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed to have in built intelligence. Yet another object of the present invention is to provide a method and system for wall mounted television fixer including motors such as DC motors and etc.Yet another object of the present invention is to provide asystem and method for remotely adjusting wall mounted television fixer, said system comprising an output module such as a DC motor,lead screw, another one DC motor to adjust the angle. A processing module and an input module.

2. Working principle:

Asystem for remotely adjusting height and angle of a wall mounted television fixer comprising of a linear housing incorporating at least one shaft. At least one input module inside the housing to receive input from at least one input device. At least one processing module to process the input received by input module. At the one module to provide output signal to regulate the shaft and lever and one television holder attached to the shaft. The output module further comprises at least one DC motor and another one DC motor incorporated in the shaft. The attached television holder is slidably movable across the length of the shaft. One DC motor regulates the height of the fixer by moving the slidably attached television holder in y axis in response to the signal received from the processing module. Another one DC motor regulate the rotatably attached television holder in y axis adjusting the angle in response to the signal received from the

processing module. The system as claimed in claim 1, wherein the processing module is preferably a micro controller. The system as claimed in claim 2, wherein the processing module receives input signal from at least one remote the output module. The system as claimed in claim 3, wherein the remote device is any electronic device capable of remote connection such as a TV remote control. A method of remotely adjusting height and angle of wall mounted television fixer comprising fixer comprising the acquiring an input signal from at least one remote device.Processing the input signal using a processing module to provide an output signal and sending the output signal to activate an output module. The output module comprises one motor capable of moving in upward and downward position for moving the mounted television fixer in response to the signal received from the processing module. The method further includes activating another one motor for moving the mounted television fixer in response to the signal received from the processing module, thereby adjusting the resultant angle.

3. Main parts:

DC motor driver

PIC Microcontroller

Battery (6v)

IR Sensor

Software:

Keil with proteus

3.1 Dc motor driver

L293D Description

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge *Motor Driver integrated circuit* (*IC*).

The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

You can Buy L293D IC in any electronic shop very easily and it costs around 70 Rupees (INR) or around 1 $ Dollar (approx Cost) or even lesser cost. You can find the necessary pin diagram, working, a circuit diagram, Logic description and Project as you read through.

Concept

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor.

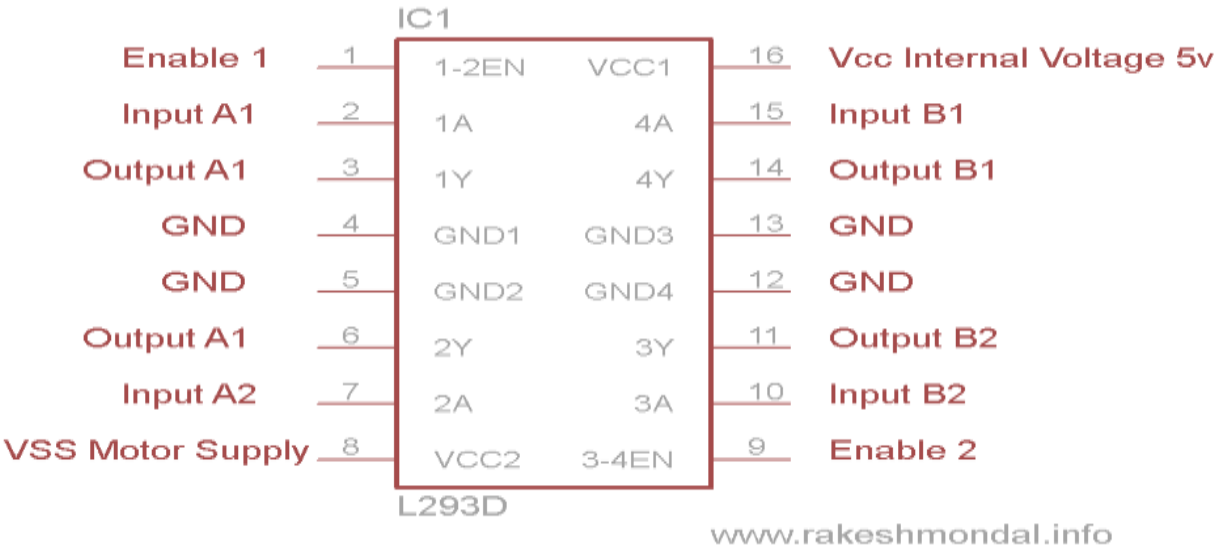
In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller.

There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It's like a switch.

TIP: you can simply connect the pin16 VCC (5v) to pin 1 and pin 9 to make them high.

3.2 PIC Microcontroller

L293D Pin Diagram



Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

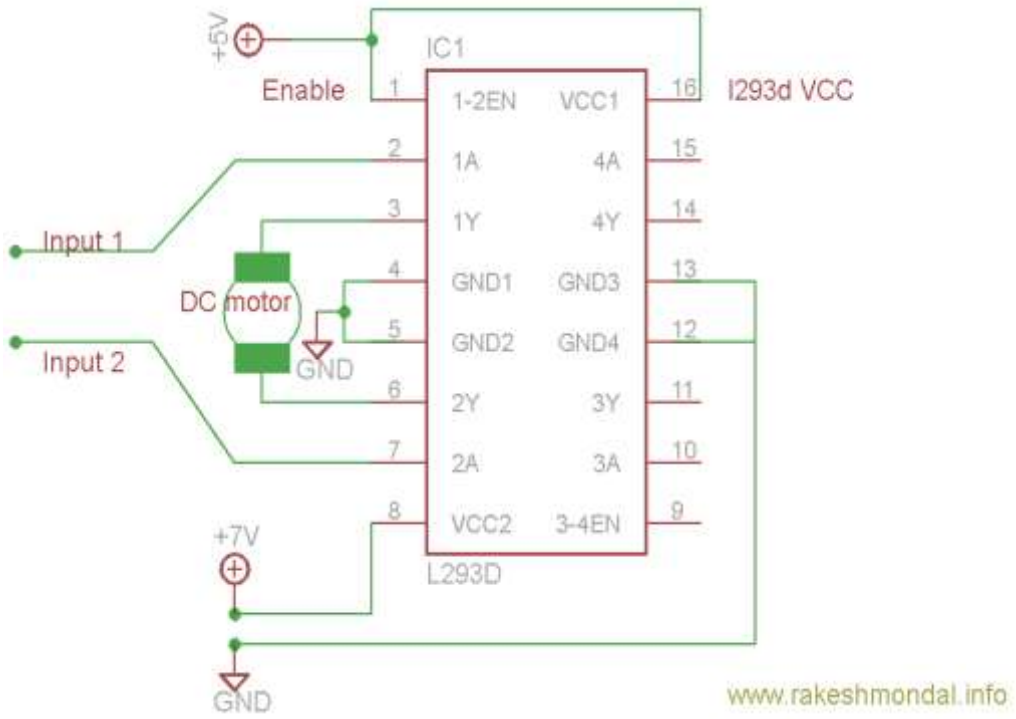
In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

L293D Logic Table.

Lets consider a Motor connected on left side output pins (pin 3,6). For rotating the motor in clockwise direction the input pins has to be provided with Logic 1 and Logic 0.

- **Pin 2** = **Logic 1** and **Pin 7** = **Logic 0** | Clockwise Direction
- **Pin 2** = **Logic 0** and **Pin 7** = **Logic 1** | Anticlockwise Direction
- **Pin 2** = **Logic 0** and **Pin 7** = **Logic 0** | Idle [No rotation] [Hi-Impedance state]
- **Pin 2** = **Logic 1** and **Pin 7** = **Logic 1** | Idle [No rotation]

In a very similar way the motor can also operate across input pin 15,10 for motor on the right hand side.



Voltage Specification

VCC is the voltage that it needs for its own internal operation 5v; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply.

The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA per channel.Since it can drive motors Up to 36v hence you can drive pretty big motors with this l293d.

VCC pin 16 is the voltage for its own internal Operation. The maximum voltage ranges from 5v and upto 36v.

TIP: Don't Exceed the Vmax Voltage of 36 volts or it will cause damage.

Central Processor Unit (CPU)

I'm not going to bore you with the operation of the CPU at this stage, however it is important to state that the CPU is manufactured with in RISC technology an important factor when deciding which microprocessor to use.

RISC *Reduced Instruction Set Computer*, gives the PIC16F887 two great advantages:

- The CPU can recognizes only 35 simple instructions (In order to program some other microcontrollers it is necessary to know more than 200 instructions by heart).
- The execution time is the same for all instructions except two and lasts 4 clock cycles (oscillator frequency is stabilized by a quartz crystal). The Jump and Branch instructions execution time is 2 clock cycles. It means that if the microcontroller's operating speed is 20MHz, execution time of each instruc tion will be 200nS, i.e. the program will be executed at the speed of 5 million instructions per second!

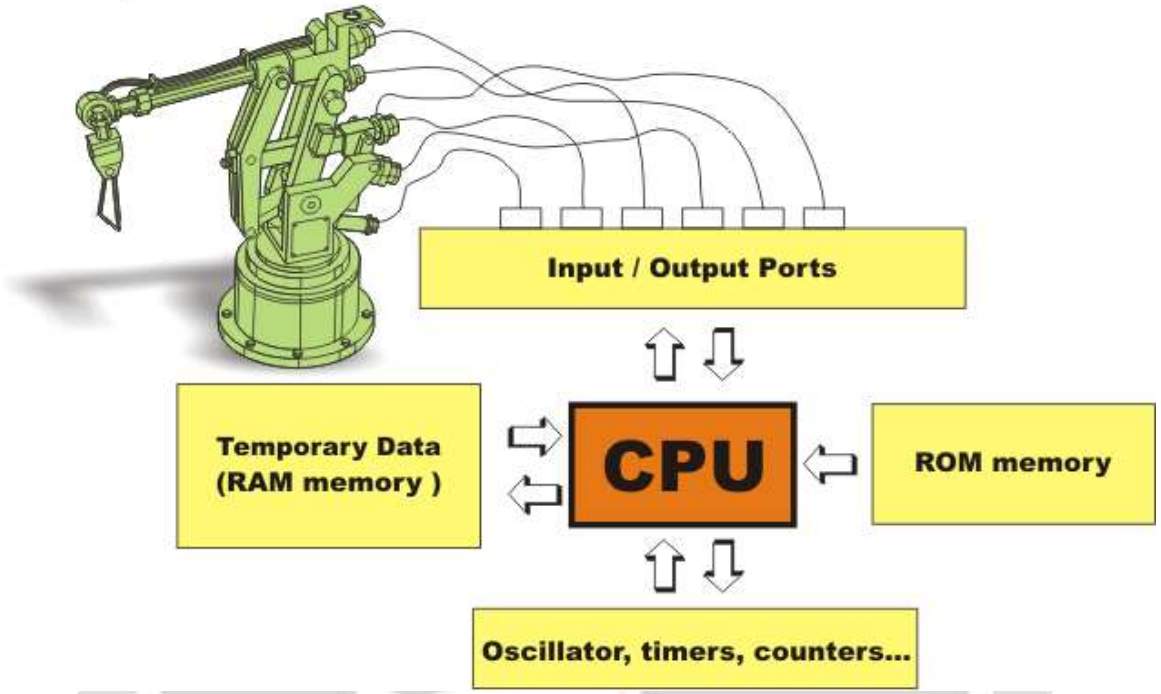


Fig. 1-4 CPU Memory

Memory

This microcontroller has three types of memory- ROM, RAM and EEPROM. All of them will be separately discussed since each has specific functions, features and organization.

ROM Memory

ROM memory is used to permanently save the program being executed. This is why it is often called "program memory". The PIC16F887 has 8Kb of ROM (in total of 8192 locations). Since this ROM is made with FLASH technology, its contents can be changed by providing a special programming voltage (13V).

Anyway, there is no need to explain it in detail because it is automatically performed by means of a special program on the PC and a simple electronic device called the Programmer.

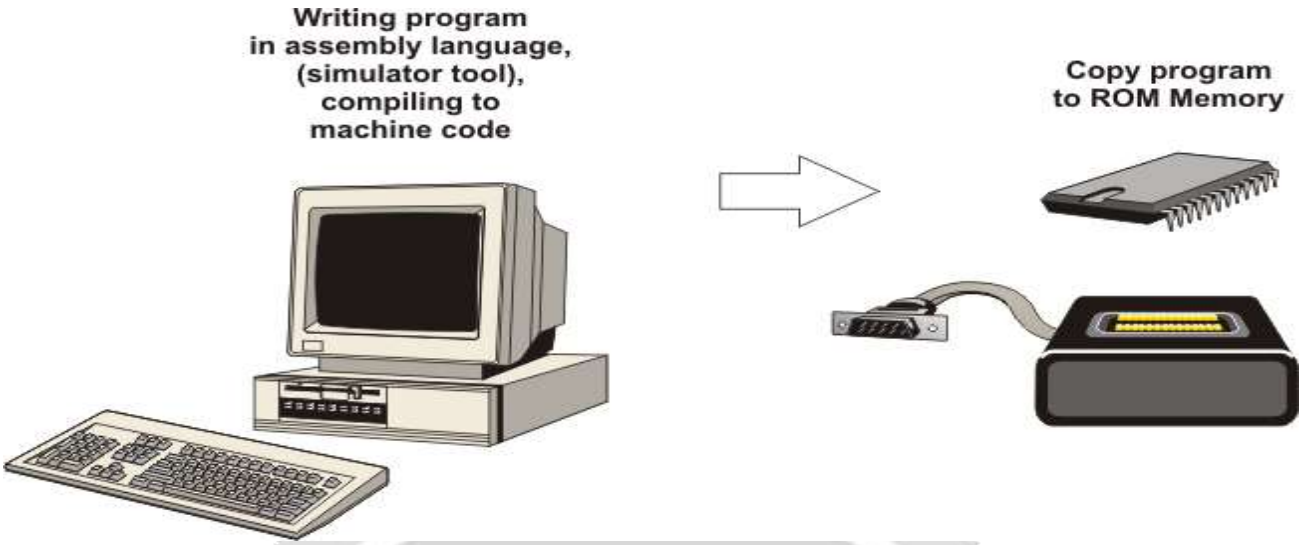


Fig. 1-5 ROM Memory Consept

EEPROM Memory

Similar to program memory, the contents of EEPROM is permanently saved, even the power goes off. However, unlike ROM, the contents of the EEPROM can be changed during operation of the microcontroller. That is why this memory (256 locations) is a perfect one for permanently saving results created and used during the operation.

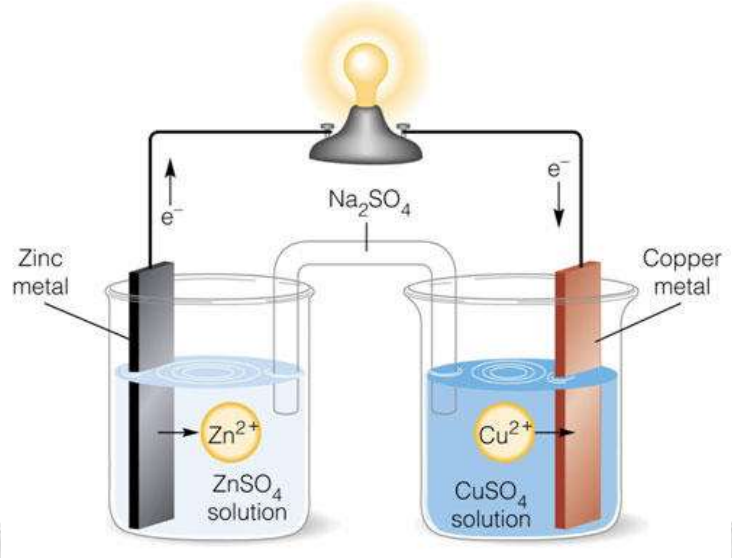
RAM Memory

This is the third and the most complex part of microcontroller memory. In this case, it consists of two parts: general-purpose registers and special-function registers (SFR).

Even though both groups of registers are cleared when power goes off and even though they are manufactured in the same way and act in the similar way, their functions do not have many things in common.

3.3 BATTERY:

An electric battery is a device consisting of two or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell has a positive terminal, or cathode, and a negative terminal, or anode. The terminal marked positive is at a higher electrical potential energy than is the terminal marked negative. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work.[1] Although the term battery technically means a device with multiple cells, single cells are also popularly called batteries.



Battery is used to store the electrical energy in the form of DC (Direct current). The energy generated by solar panel is stored in the battery which is used to glows the light during night time. Low maintenance tubular lead acid type battery is normally used for street lights. The battery is housed inside a battery box, which is fixed on to the pole at a suitable height from the ground for easy maintenance and replacement. Here, we are using 350 AH and 100 AH battery

State-of-Charge

The amount of energy remaining in the battery is often measured by State-of-Charge (SOC). SOC is measured using different techniques ranging from very simple Voltage Method (most inaccurate) to Complex Quantum Magnetism and Impedance spectroscopy. Use of Hydrometer for lead acid battery systems is also common. Laptops and professional portable devices use Coulomb Counting technique to measure SOC. It works on the principle of measuring the current flowing in and out of the battery which would be almost equal when fully charged. Though the performance deteriorates with age of the battery, periodic calibration by full discharge and charging helps keep the system error to around a few percent's. Capacity rating is often specified as Ampere-Hour product which is indicative of the value of constant current that can be supplied over an hour. For example, a 50mA-Hr battery can deliver 50mA constant current for one hour.

3.4 IR Sensor:

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

IR Sensor Circuit Diagram and Working Principle

An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real time. This circuit comprises of the following components

- LM358 IC 2 IR transmitter and receiver pair
- Resistors of the range of kilo ohms.
- Variable resistors.
- LED (Light Emitting Diode).

IR Sensor Circuit

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram.

CONCLUSION:

This paper concludes that the system design needs to consider to the remotely operated wall mounted television fixer including motors adjusting height and viewing angle of the television fixer in order to achieve. Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the suitable modification and equivalents may be resorted to, falling within the scope of the invention.