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ADVANCED DRIVER ASSISTANT ROBOT TO AVOID ACCIDENTS

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ABSTARCT

Safety features are implemented to take control of the vehicle during collisions. ADAS relies on inputs from multiple sources like the brake assistant, pressure control system, lane departure warning system, road sign identification, etc. Additional features can also be customized based on the needs of the driver. In this paper methods to prevent over speeding, vehicle collisions, and driver alertness systems are discussed. RFID readers are used for sensing the speed limit in the signboards. The speed of the vehicle is managed based on the reading obtained from the tags. Sensors like ultrasonic, alcohol detector, gas sensor, temperature sensor are used to measure other parameters to enhance the safety measure while driving.Advanced Driver Assistance System (ADAS). ADAS has the potential to increase safety and provide comfort driving. Driving situations are electronically controlled and decisions are simplified for the driver. Old people may also receive plenty of benefits from this technology. DAS is designed with a human-machine interface which tends to improve road safety marginally. ADS relies on inputs from multiple sources like the brake assistant, pressure control system, lane departure warning system, road sign identification Sensors like ultrasonic, alcohol detector, gas sensor are used to measure other parameters to enhance the safety measure while driving.

INTRODUCTION

The prime motive of the automobile industry is to improve safety in driving machines and avoid accidents. Traffic rules and regulations drafted by the law aren't followed by many citizens. This is another reason for an accident. Accidents sometimes are unintentional. Some serious acts like drunk and drive, ignoring the signboards, and over speeding might result in severe causalities. To prevent situations like these we seek the Advanced Driver Assistance System (ADAS). ADAS has the potential to increase safety and provide comfort driving. Driving situations are electronically controlled and decisions are simplified for the driver. Old people may also receive plenty of benefits from this technology.ADAS is designed with a human-machine interface which tends to improve road safety marginally. Accidents caused by human error can also be minimized. ADAS helps the driver to automate, adapt and enhance the vehicle system for safe driving. Passive safety technologies like wearing seatbelts and airbags cannot prevent road fatalities. Modern technology like ADAS is different from traditional and passive technology and minimizes the fatalities consistently. ADAS also alert the driver of potential problems and helps in maintaining the stability of the vehicle under critical circumstances

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PROPOSED METHOD

Now a days there will be self-driving cars which will automatically control and monitor the whole data Automated , Adaptive , Monitoring ,Warning and Controlling Automatic emergency braking , pedestrian detection , surround view , parking assist , driver drowsiness detection and gaze detection It will automatically controls speed according to the area by RFID reader Ultrasonic sensor will detect the distance of the obstacle and warns driverEnhancement of safety systems to promote safe driving. ADAS is designed to avoid collisions on the road by using technologies that assist drivers by notifying them about any potential dangers. It helps to save fuel consumption as well

Since ADAS changes the driving style of the vehicle, it can save up to 15% of fuel. ADAS adaptive features such as adaptive cruise control, automated lighting, pedestrian crash avoidance mitigation (PCAM), etc., This will help alert drivers by giving them navigational warnings such as lane departures, vehicles in blind spots, traffic, etc.

HARDWARE ASPECTS

BLOCK DIAGRAM

ADVANTAGES

- Enhancement of safety systems to promote safe driving. ADAS is designed to avoid collisions on the road by using technologies that assist drivers by notifying them about any potential dangers.
- It helps to save fuel consumption as well. Since ADAS changes the driving style of the vehicle, it can save up to 15% of fuel.
- ADAS adaptive features such as adaptive cruise control, automated lighting, pedestrian crash avoidance mitigation (PCAM), etc.,
- This will help alert drivers by giving them navigational warnings such

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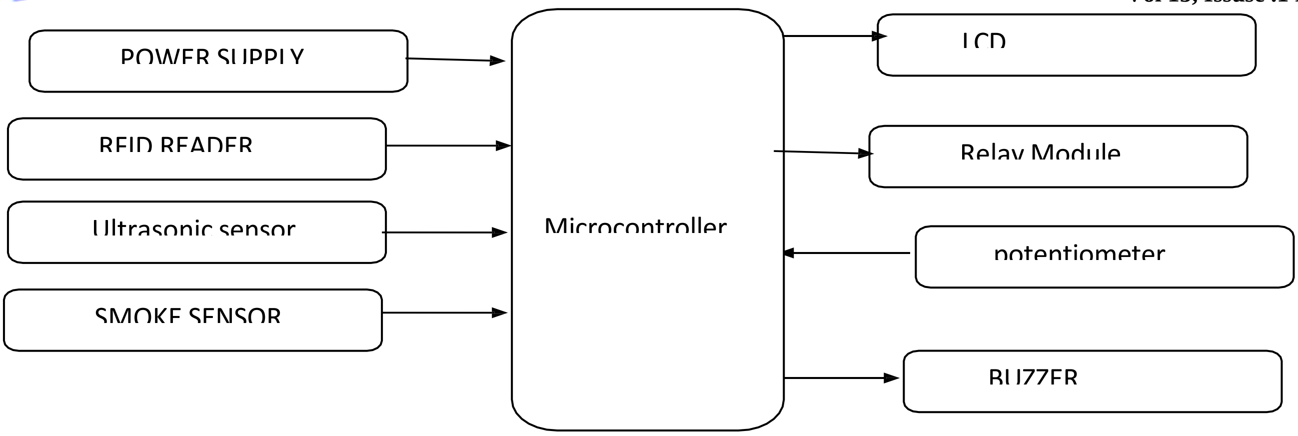


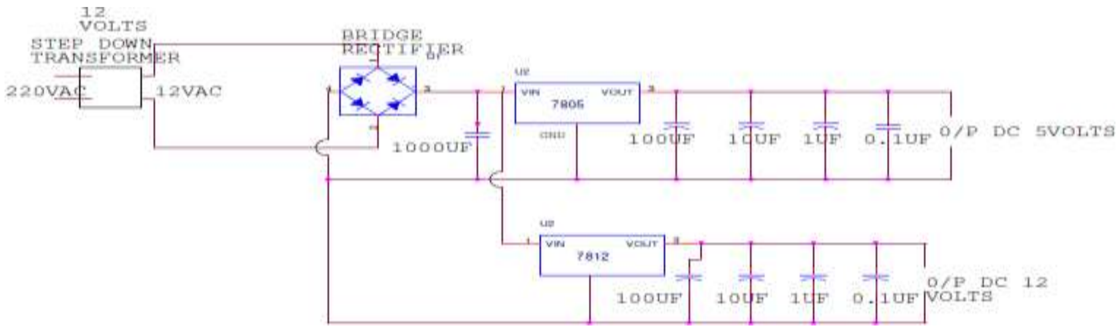
Figure.2.2. Block Diagram of Advanced Driver Assistance System

POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others

This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of
+5V and +12V for various applications.

In this section we have Transformer, Bridge rectifier, are connected serially and voltage regulators for +5V and +12V (7805 and 7812) via a capacitor (1000µF) in parallel are connected parallel as shown in the circuit diagram below. Each voltage regulator output is again is connected to the capacitors of values (100µF, 10µF, 1 µF, 0.1 µF) are connected parallel through which the corresponding output (+5V or +12V) are taken into consideration.



Circuit Explanation

Transformer

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled electrical conductors. A changing current in the first circuit (the primary) creates a changing magnetic field; in turn, this magnetic field induces a changing voltage in the second circuit (the secondary). By adding a load to the secondary circuit, one can make current flow in the transformer, thus transferring energy from one circuit to the other.

The secondary induced voltage V_S, of an ideal transformer, is scaled from the primary V_P by a factor equal to the ratio of the number of turns of wire in their respective windings:

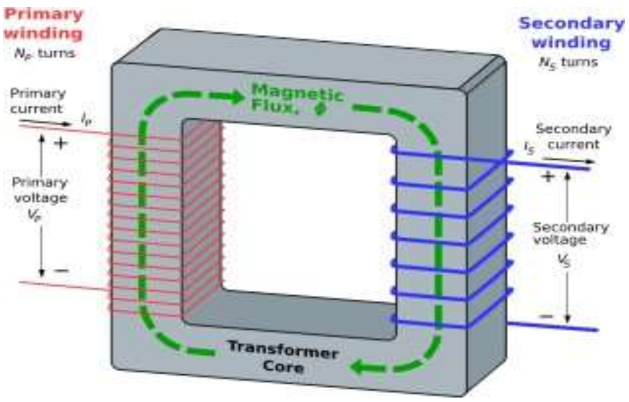
$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

Basic principle

The transformer is based on two principles: firstly, that an electric current can produce a magnetic field (electromagnetism) and secondly that a changing magnetic field within a coil of wire induces a voltage across the ends of the coil (electromagnetic induction).

By changing the current in the primary coil, it changes the strength of its magnetic field; since the changing magnetic field extends into the secondary coil, a voltage is induced across the secondary.

A simplified transformer design is shown below. A current passing through the primary coil creates a magnetic field. The primary and secondary coils are wrapped around a core of very high magnetic permeability, such as iron; this ensures that most of the magnetic field lines produced by the primary current are within the iron and pass through the secondary coil as well as the primary coil.



An ideal step-down transformer showing magnetic flux in the core

Induction law

The voltage induced across the secondary coil may be calculated from Faraday's law of induction, which states that:

$$V_S = N_S \frac{\mathrm{d}\Phi}{\mathrm{d}t}$$

Where V_S is the instantaneous voltage, N_S is the number of turns in the secondary coil and Φ equals the magnetic flux through one turn of the coil. If the turns of the coil are oriented perpendicular to the magnetic field lines, the flux is the product of the magnetic field strength B and the area A through which it cuts. The area is constant, being equal to the cross-sectional area of the transformer core, whereas the magnetic field varies with time according to the excitation of the primary.

Since the same magnetic flux passes through both the primary and secondary coils in an ideal transformer, the instantaneous voltage across the primary winding equals

$$V_P = N_P \frac{\mathrm{d}\Phi}{\mathrm{d}t}$$

Taking the ratio of the two equations for V_S and V_P gives the basic equation for stepping up or stepping down the voltage

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

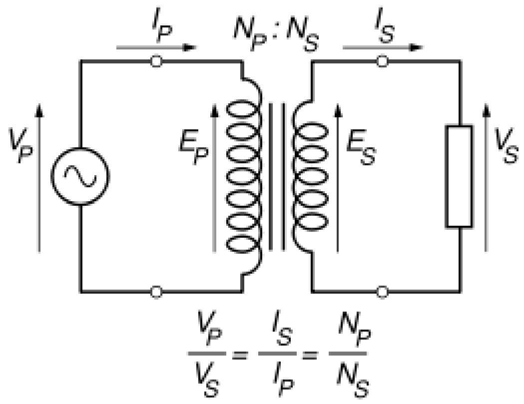
Ideal power equation

If the secondary coil is attached to a load that allows current to flow, electrical power is transmitted from the primary circuit to the secondary circuit. Ideally, the transformer is perfectly efficient; all the incoming energy is transformed from the primary circuit to the magnetic field and into the secondary circuit. If this condition is met, the incoming electric power must equal the outgoing power.

$P_{incoming} = I_P V_P = P_{outgoing} =$

$I_S V_S$ giving the ideal transformer equation

$$\frac{V_S}{V_P} = \frac{N_S}{N_P} = \frac{I_P}{I_S}$$



$P_{in\text{-}coming} = I_P V_P = P_{out\text{-}going} =$

$I_S V_S$ giving the ideal transformer equation

$$\frac{V_S}{V_P} = \frac{N_S}{N_P} = \frac{I_P}{I_S}$$

If the voltage is increased (stepped up) ($V_S > V_P$), then the current is decreased (stepped down) ($I_S < I_P$) by the same factor. Transformers are efficient so this formula is a reasonable approximation.

If the voltage is increased (stepped up) ($V_S > V_P$), then the current is decreased (stepped down) ($I_S < I_P$) by the same factor. Transformers are efficient so this formula is a reasonable approximation.

The impedance in one circuit is transformed by the *square* of the turns ratio. For example, if an impedance Z_S is attached across the terminals of the secondary coil, it appears to the primary circuit to have an impedance of

$$Z_S\left(\frac{N_P}{N_S}\right)^2$$

This relationship is reciprocal, so that the impedance Z_P of the primary circuit appears to the secondary to be

$$Z_P\left(\frac{N_S}{N_P}\right)^2$$

Detailed operation

The simplified description above neglects several practical factors, in particular the primary current required to establish a magnetic field in the core, and the contribution to the field due to current in the secondary circuit.

Models of an ideal transformer typically assume a core of negligible reluctance with two windings of zero resistance. When a voltage is applied to the primary winding, a small current flows, driving flux around the magnetic circuit of the core. The current required to create the flux is termed the magnetizing current; since the ideal core has been assumed to have near-zero reluctance, the magnetizing current is negligible, although still required to create the magnetic field.

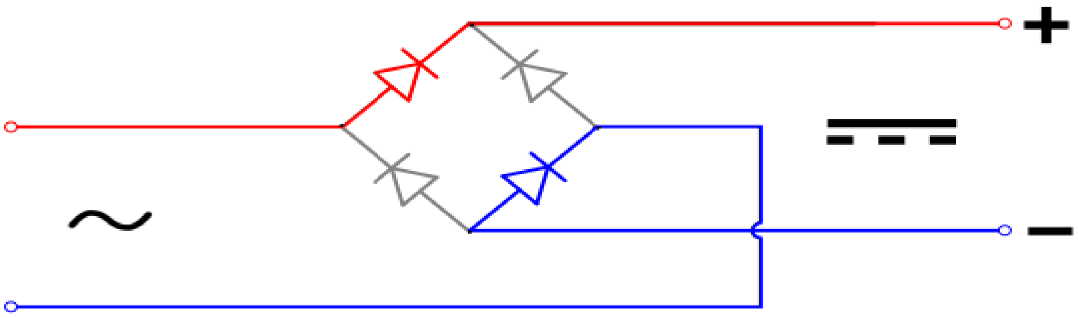
The changing magnetic field induces an electromotive force (EMF) across each winding. Since the ideal windings have no impedance, they have no associated voltage drop, and so the voltages V_P and V_S measured at the terminals of the transformer, are equal to the corresponding EMFs. The primary EMF, acting as it does in opposition to the primary voltage, is sometimes termed the "back EMF". This is due to Lenz's law which states that the induction of EMF would always be such that it will oppose development of any such change in magnetic field.

Bridge Rectifier

A diode bridge or bridge rectifier is an arrangement of four diodes in a bridge configuration that provides the same polarity of output voltage for any polarity of input voltage. When used in its most common application, for conversion of alternating current (AC) input into direct current (DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a center-tapped transformer design, but has two diode drops rather than one, thus exhibiting reduced efficiency over a center-tapped design for the same output voltage.

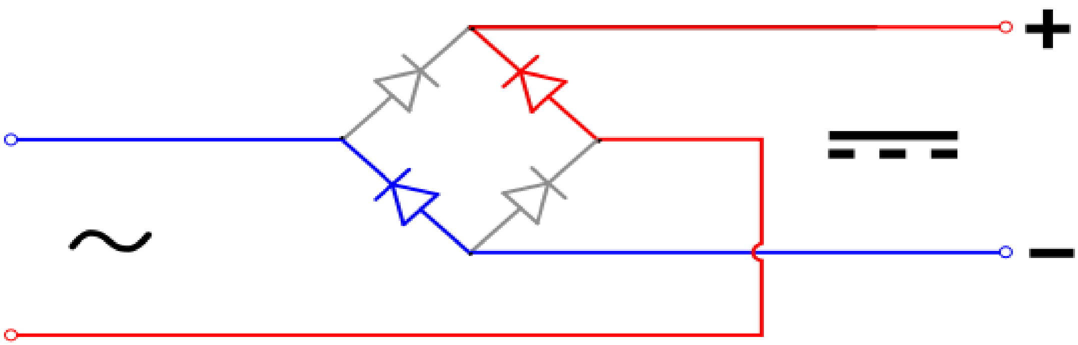
Basic Operation

When the input connected at the left corner of the diamond is positive with respect to the one connected at the right-hand corner, current flows to the right along the upper colored path to the output, and returns to the input supply via the lower one.



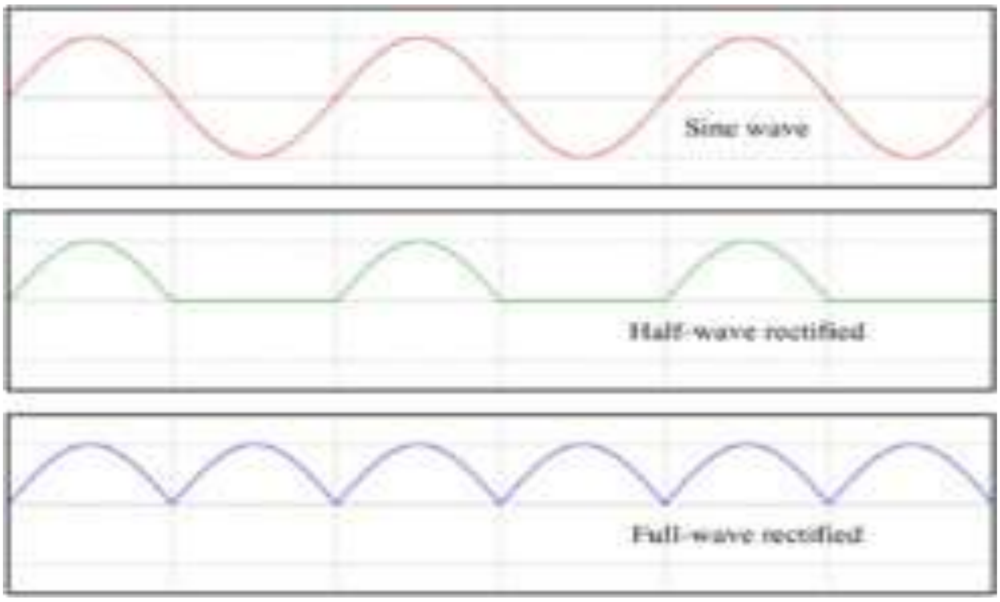
2.4.1 circuit representation of bridge rectifier

When the right-hand corner is positive relative to the left-hand corner, current flows along the upper colored path and returns to the supply via the lower colored path.



In each case, the upper right output remains positive with respect to the lower right one. Since this is true whether the input is AC or DC, this circuit not only produces DC power when supplied with AC power: it also can provide what is sometimes called "reverse polarity protection". That is, it permits normal functioning when batteries are installed backwards or DC input-power supply wiring "has its wires crossed" (and protects the circuitry it powers against damage that might occur without this circuit in place).

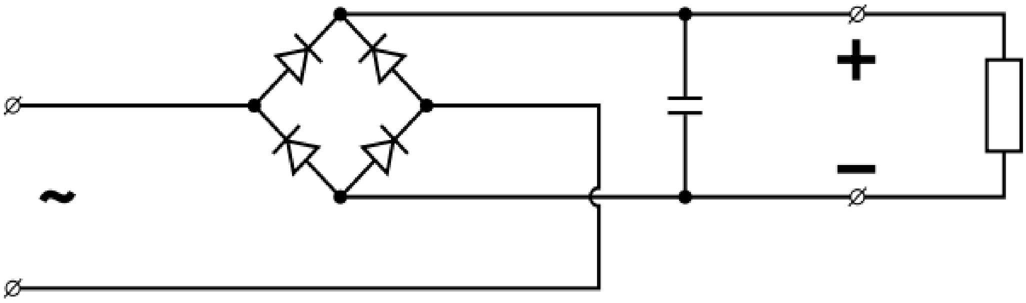
Prior to availability of integrated electronics, such a bridge rectifier was always constructed from discrete components. Since about 1950, a single four-terminal component containing the four diodes connected in the bridge configuration became a standard commercial component and is now available with various voltage and current ratings.



2.4.2 Output Wave forms of rectifier

Output smoothing (Using Capacitor)

For many applications, especially with single phase AC where the full-wave bridge serves to convert an AC input into a DC output, the addition of a capacitor may be important because the bridge alone supplies an output voltage of fixed polarity but pulsating magnitude (see diagram above).



2.4.3 Representation of Circuit smoothing

The function of this capacitor, known as a reservoir capacitor (aka smoothing capacitor) is to lessen the variation in (or 'smooth') the rectified AC output voltage waveform from the bridge. One explanation of 'smoothing' is that the capacitor provides a low impedance path to the AC component of the output, reducing the AC voltage across, and AC current through, the resistive load. In less technical terms, any drop in the output voltage and current of the bridge tends to be cancelled by loss of charge in the capacitor.

This charge flows out as additional current through the load. Thus, the change of load current and voltage is reduced relative to what would occur without the capacitor. Increases of voltage correspondingly store excess charge in the capacitor, thus moderating the change in output voltage / current. Also see rectifier output smoothing.

The simplified circuit shown has a well-deserved reputation for being dangerous, because, in some applications, the capacitor can retain a lethal charge after the AC power source is removed. If supplying a dangerous voltage, a practical circuit should include a reliable way to safely discharge the capacitor. If the normal load cannot be guaranteed to perform this function, perhaps because it can be disconnected, the circuit should include a bleeder resistor connected as close as practical across the capacitor.

This resistor should consume a current large enough to discharge the capacitor in a reasonable time, but small enough to avoid unnecessary power waste.

Because a bleeder sets a minimum current drain, the regulation of the circuit, defined as percentage voltage change from minimum to maximum load, is improved. However, in many cases the improvement is of insignificant magnitude.

The capacitor and the load resistance have a typical time constant $\tau = RC$ where C and R are the capacitance and load resistance respectively. As long as the load resistor is large enough so that this time constant is much longer than the time of one ripple cycle, the above configuration will produce a smoothed DC voltage across the load.

In some designs, a series resistor at the load side of the capacitor is added. The smoothing can then be improved by adding additional stages of capacitor–resistor pairs, often done only for sub-supplies to critical high-gain circuits that tend to be sensitive to supply voltage noise.

The idealized waveforms shown above are seen for both voltage and current when the load on the bridge is resistive. When the load includes a smoothing capacitor, both the voltage and the current waveforms will be greatly changed. While the voltage is smoothed, as described above, current will flow through the bridge only during the time when the input voltage is greater than the capacitor voltage. For example, if the load draws an average current of n Amps, and the diodes conduct for 10% of the time, the average diode current during conduction must be 10n Amps. This non-sinusoidal current leads to harmonic distortion and a poor power factor in the AC supply.

In a practical circuit, when a capacitor is directly connected to the output of a bridge, the bridge diodes must be sized to withstand the current surge that occurs when the power is turned on at the peak of the AC voltage and the capacitor is fully discharged. Sometimes a small series resistor is included before the capacitor to limit this current, though in most applications the power supply transformer's resistance is already sufficient.

Output can also be smoothed using a choke and second capacitor. The choke tends to keep the current (rather than the voltage) more constant. Due to the relatively high cost of an effective choke compared to a resistor and capacitor this is not employed in modern equipment.

Some early console radios created the speaker's constant field with the current from the high voltage ("B +") power supply, which was then routed to the consuming circuits, (permanent magnets were considered too weak for good performance) to create the speaker's constant magnetic field. The speaker field coil thus performed 2 jobs in one: it acted as a choke, filtering the power supply, and it produced the magnetic field to operate the speaker.

Voltage Regulator

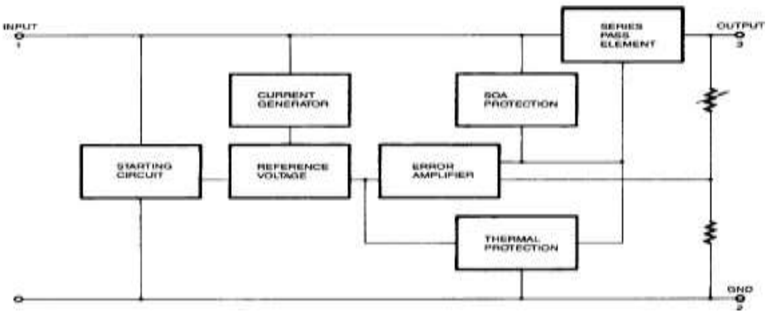
A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level.

The 78xx (also sometimes known as LM78xx) series of devices is a family of self- contained fixed linear voltage regulator integrated circuits. The 78xx family is a very popular choice for many electronic circuits which require a regulated power supply, due to their ease of use and relative cheapness.

When specifying individual ICs within this family, the xx is replaced with a two-digit number, which indicates the output voltage the particular device is designed to provide (for example, the 7805 has a 5-volt output, while the 7812 produces 12 volts). The 78xx line is positive voltage regulators, meaning that they are designed to produce a voltage that is positive relative to a common ground. There is a related line of 79xx devices which are complementary negative voltage regulators. 78xx and 79xx ICs can be used in combination to provide both positive and negative supply voltages in the same circuit, if necessary.

78xx ICs have three terminals and are most commonly found in the TO220 form factor, although smaller surface-mount and larger TrO3 packages are also available from some manufacturers. These devices typically support an input voltage which can be anywhere from a couple of volts over the intended output voltage, up to a maximum of 35 or 40 volts, and can typically provide up to around 1 or 1.5 amps of current (though smaller or larger packages may have a lower or higher current rating).

Internal Block Digram



Internal block diagram of voltage regulator

Circuit Diagram

- The circuit diagram for the smoke detection system is as follows:

16 x 2 Alphanumeric LCD Module Features

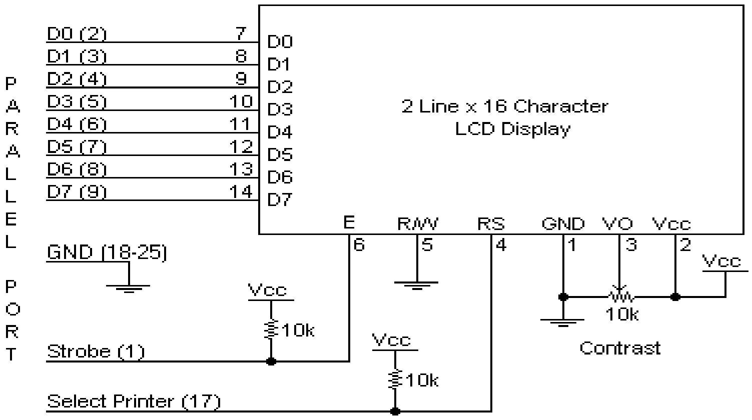
- Intelligent, with built-in Hitachi HD44780 compatible LCD controller and RAM
- As soon as the system is powered, the sensor starts giving output according to the smoke present. It gives the output in the form of a number.
- We set the threshold for a smoke at 400. So as soon as the sensor gives output higher than 400, the system triggers the condition that smoke is detected.
- Now in this condition, the Arduino board sends the signal to the buzzer to make noise and it will send the signal to light up the red led.
- As soon as the smoke value falls below the threshold, the condition will be lifted and

Tl

providing simple interfacing

- 61 x 15.8 mm viewing area
- 5 x 7 dot matrix format for 2.96 x 5.56 mm characters, plus cursor line
- Can display 224 different symbols
- Low power consumption (1 mA typical)
- Powerful command set and user-produced characters
- TTL and CMOS compatible
- Connector for standard 0.1-pitch pin headers

Schematic



Specifications

Connector Pin Assignment:

Pin	*Symbol*	*Function*	*Pin*	*Symbol*	*Function*
14	DB7	Data Bus Line	6	E	Enable
13	DB6	Data Bus Line	5	R/W	Read/Write
12	DB5	Data Bus Line	4	RS	Register select input
11	DB4	Data Bus Line	3	Vcontrast	Contrast (0V for max contrast)
10	DB3	Data Bus Line	2	**GND (0V)**	Power supply
9	DB2	Data Bus Line	1	**Vcc +5V**	Power supply
8	DB1	Data Bus Line			
7	DB0	Data Bus Line			

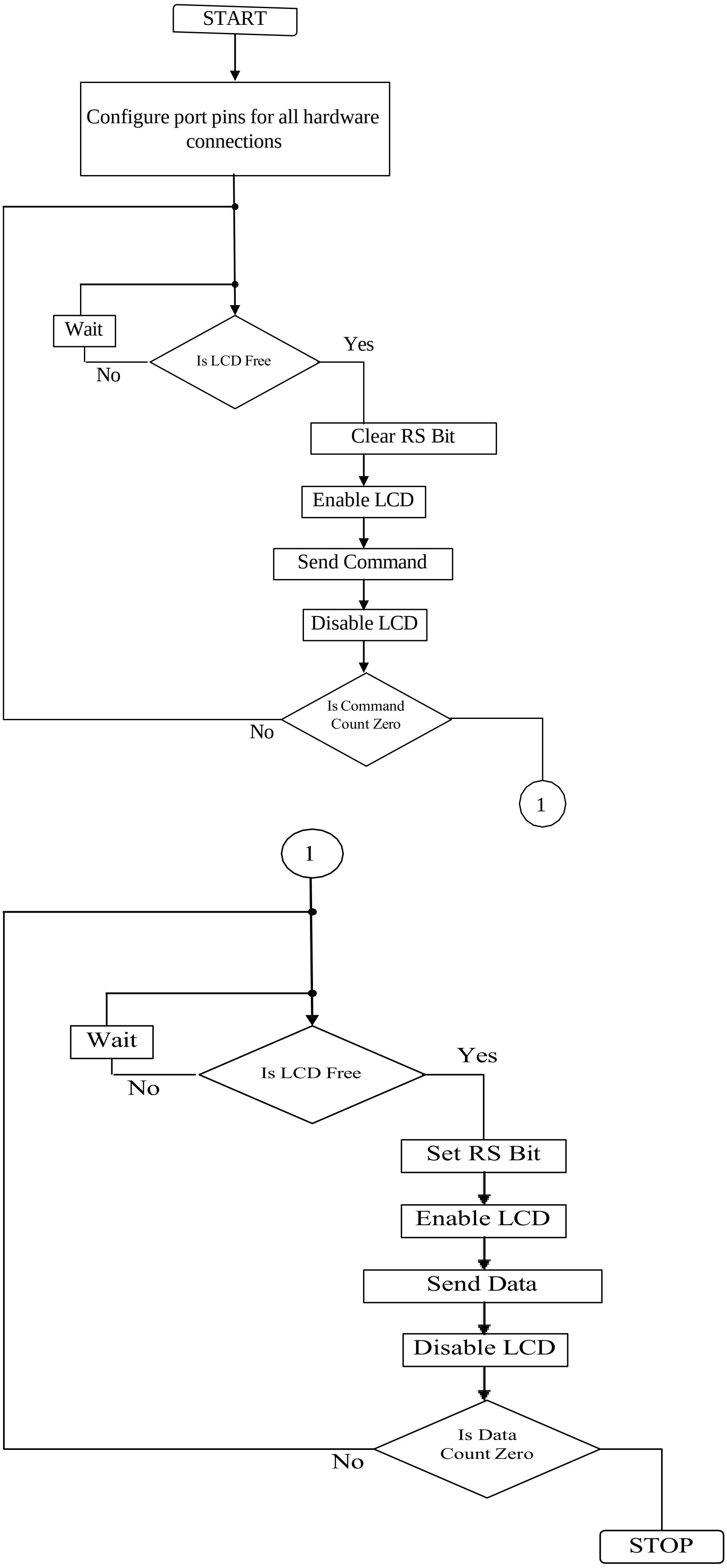
Note1: Pin 1 is +5V and pin 2 is GND! This is different from most other HD44780 compatible models.
Note2: Pin 14 is marked with a "1" on the back of the PCB. Do not get confused by this.

Above is the quite simple schematic. The LCD panel's Enable and RegisterSelect is connected to the Control Port. The Control Port is an open collector / open drain output. While most Parallel Ports have internal pull-up resistors, there are a few which don't. Therefore by incorporating the two 10K external pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no internal pull up resistors.

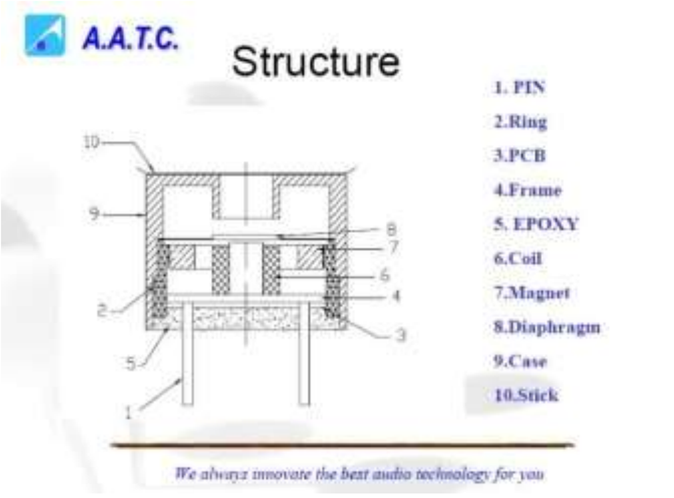
We make no effort to place the Data bus into reverse direction. Therefore we hard wire the *R/W* line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into our program.

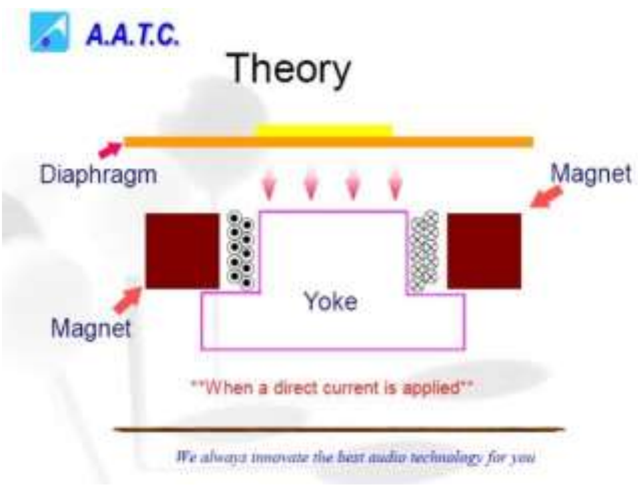
The 10k Potentiometer controls the contrast of the LCD panel. You can use a bench power supply set to 5v or use a onboard +5 regulator. Remember a few de-coupling capacitors, especially if you have trouble with the circuit working properly. The 2 line x 16 character LCD modules are available from a wide range of manufacturers and should all be compatible with the HD44780. Hardware connections

CONTROLLER PINS	LCD PINS	PIN NAME WITH FEATURE
(P1.0)	4	RS (Control Pin)
(P1.1)	5	RW (Control pin)
(P1.2)	6	EN (Control pin)
Port 0	7 to 14	Data Port
40	15 & 2	Vcc
20	16 & 1	Gnd


START
Configure port pins for all hardware connections
Wait
Is LCD Free
Yes
No
Clear RS Bit
Enable LCD
Send Command
Disable LCD
Is Command Count Zero
No
1
1
Wait
Is LCD Free
Yes
No
Set RS Bit
Enable LCD
Send Data
Disable LCD
Is Data Count Zero
No
STOP

2.12.1 Introduction of Magnetic Buzzer (Transducer)





Specifications:

Rated Voltage: A magnetic buzzer is driven by 1/2 square waves (V o-p). **Operating Voltage**: For normal operating. But it is not guaranteed to make the minimum Sound Pressure Level (SPL) under the rated voltage.

Consumption Current: The current is stably consumed under the regular operation. However, it normally takes three times of current at the moment of starting to work.

Direct Current Resistance: The direct current resistance is measured by ammeter directly.

Sound Output: The sound output is measured by decibel meter. Applying rated voltage and 1/2 square waves, and the distance of 10 cm.

Rated Frequency: A buzzer can make sound on any frequencies, but we suggest that the highest and the most stable SPL comes from the rated frequency.

Operating Temp.: Keep working well between -30℃and +70℃.

Driving methods: AX series with built drive circuit will be the best choice when we cannot provide frequency signal to a buzzer, it only needs direct current.

Dimension: Dimension affects frequency, small size result in high frequency.

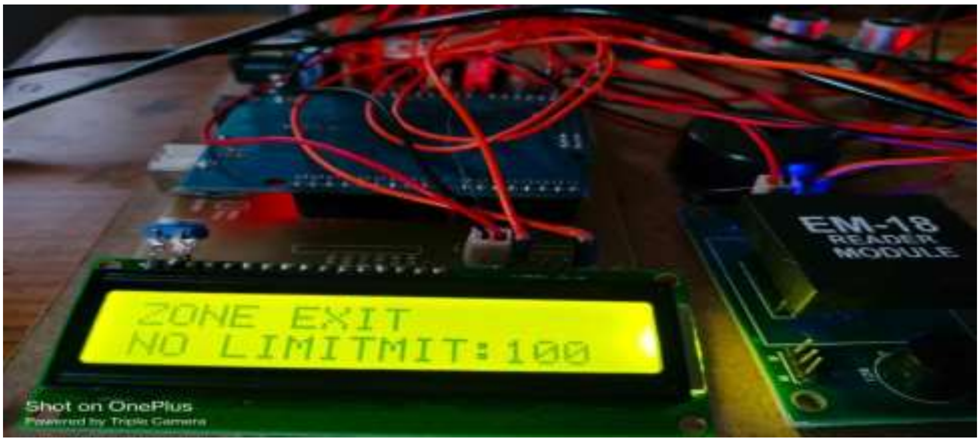
Voltage: Depend on V o-p (1/2 square waves)

Fixed methods: From the highest cost to the lowest- DIP, wires/ connector, SMD.

Soldering methods: AS series is soldered by hand, the frequency is lower because of the holes on the bottom. On the other hand, we suggest AC series for the reflow soldering, the reliability is better.

RESULTS

5.2 School Zone Enter and speed limit indication



5.3 School zone exit No speed limit

Figure.5.4 Photocopy of Result

CONCLUSION

- Advanced driver assistant systems have tremendous potential to increase the safety, comfort and effectiveness' of our vehicle and transportation systems
- Advanced driver assistant system is aimed to prevent collisions by warning drivers of potential dangers or taking control of the vehicles to avoid them
- In-vehicles sensors are fitted to monitor metrics such as fuel level, tire pressure, engine status, navigation route, speed, temperate
- In this project we are with most advanced sensors which will monitors, warns and if driver not responds to instructions then automatically controls the vehicle.

FUTURE SCOPE

- The future ADAS will come up with wireless network connectivity that you can easily install in your cars.
- In simpler words, cars will communicate better, resulting in a safer and more convenient automated driving experience.
- As technology continues to advance, we can expect to see even more advanced and sophisticated ADAS features in the coming years
- Some potential new features include augmented reality displays, which could provide drivers with real-time information about their surroundings,
- Which could use machine learning algorithms to anticipate potential hazards before they occur
- Self-Driving Cars will become one of the revolution in this ADAs system

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