REVERSE PARKING SENSOR

Project Report submitted in partial fulfilment of the

Requirement for the degree of

Bachelor of Technology

in

Electronics and Communication Engineering

Under the Supervision of

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By

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CERTIFICATE

This is to certify that project report entitled "**REVERSE PARKING SENSOR**", submitted by **Sharad Kumar (131093)** in partial- fulfilment for the award of degree of Bachelor of Technology in Electronics and Communication Engineering to **Jaypee University of Information Technology**, Waknaghat, Solan(H.P.)has been carried out under my supervision. This work has not been submitted partially or fully to any University or Institute for the award of this or any other degree or diploma

Date:

Supervisor's Name: Mr. Alok Kumar

Signature:

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Date: **Name of the Students:**

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ABSTRACT

In modern day's assistant driving system supports drivers to drive vehicles safely and smoothly. One of the famous features of assistant driving system is to park the vehicles safely. Now-a-days, the controlling is done by the driver of the vehicle. For new drivers it is difficult to park the vehicles in small and congested parking slot which leads traffic congestion, collision, air pollution and waste of time and even cause of accident. This report is dedicated to design and develop an efficient Advanced Parking Guidance System (APGS) which will reduce all the complexity mentioned above. A vehicle using my system leads itself into parking space with little space from the user. My system consists of IR sensor. IR transmitter transmits pulses which are being received by receiver. If IR pulse encounter obstacle then it get observed and receiver did not get the received pulses, and this way our system identify obstacle near-by the vehicles. I introduced a parking scanner and wireless transceiver to track the direction of the wireless signal. In park mode, once the user presses the auto mode button, signal is transmitted and the my system calculates the gap between car bumper and obstacle. It also uses parking scanner to retrieve the information about nearest parking location, when it finds one, it guide itself to reach at the parking place, this way it saves time and increase auto mode driving experience of driver. In retrieve mode, when user presses retrieve button, the car starts to track the direction of the wireless signals emitted by the transmitter and guide itself to get out of the place and drives itself to the point where the user would be available with his receiver.

CHAPTER-1

INTRODUCTION

In noisy and crowded place it is very important to look for a system which can increase the efficiency of drivers and reduce the accident that is happening all around the world.
After the development of automobile industry, vehicles are increasing tremendously.
Drivers feel insecure to drive vehicles in crowdie place and they have to pay more attention to drive smoothly and safely. There is study on drivers to check are they efficient to deal with these issue or not, they said “It’s quite difficult for us to guess the distance or gap between obstacle and vehicle while parking a car for amateur”, and we know amateur are lot’s in number so to take care of them I have represented a system which will guide and lead them.

I have used LED to show how far is obstacle, whether it is 25 cm apart or 20cm or 5cm and LED’s will turned on accordingly. If distance is 25 cm then D7 will turn-on and if it is 20 then D7 and D6 and if it is 5cm then D5, D6 andD7 will turn-on.

Place like Connaught place of Delhi always face parking issue which leads to traffic congestion, violation of law for amateur, air pollution and waste of time by standing in long queue to get a parking slot, In these place system that we have designed can play a crucial role to control or reduce all the issues that we discussed.

CHAPTER-2

CIRCUIT-DESIGN

My system's circuit consists of two sections, one is receiver section and another is transmitter section. The transmitter section uses **NE555 timer IC as an astable multivibrator** for running and synchronizing the IR transmitter and receiver. The frequency is set to be 100Hz. The IR transmitter transmits IR pulses which are reflected back due to the obstacle and tracked by the IR receiver. The received signal is further amplified (at Point A) according to our requirement to meet the desired SNR. The output voltage at R is directly proportional to the gap between obstacle and car. The more is gap more is voltage. Further this output voltage is given to the inputs of three comparators U2: B, U2: C and U2:D. These comparators control the status LED's according to the input voltage and the reference voltage that I have assigned.

2.1: Astable Multivibrator:

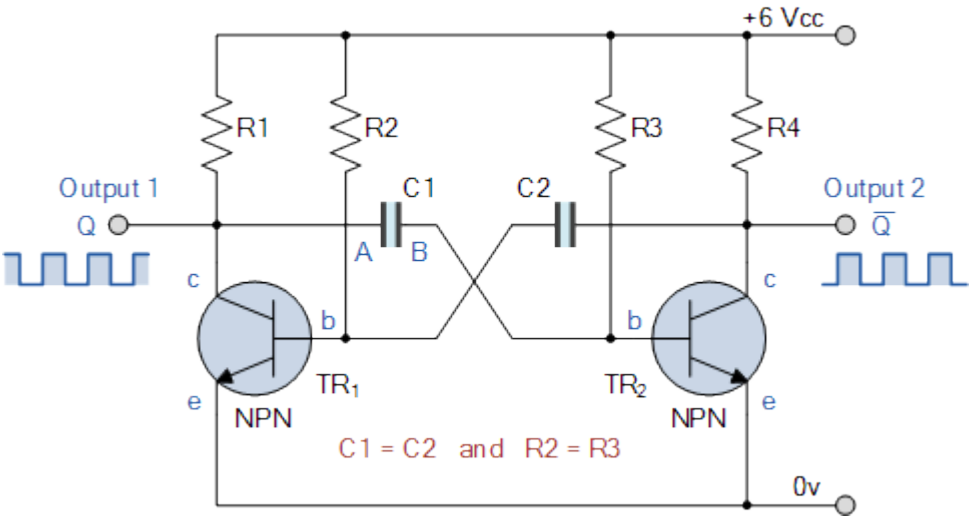


Figure 2.1 : Astable multivibrator

A perfect example of cross-coupled transistor switching circuit is the **Astable Multivibrator** which has **unstable** output states because of changing its state from one to another all the time randomly. This circuit consists of two switching transistors, two time delay capacitors and a cross-coupled feedback network. Delay capacitors allows oscillation between the on and off state with no external triggering.

Astable multivibrators do not require any additional inputs or external assistance to oscillate that's why they are also known as **Free-running Multivibrator in** electronic circuit. The main feature of Astable oscillators are producing a continuous square wave from its output or outputs, (two outputs no inputs) which can be used to flash lights or produce a sound in a loudspeaker. From a couple of grounded producer cross-coupled transistors The Astable Multivibrator produces a square wave yield with Both transistors either NPN or PNP. Astable Multivibrator are one-sided in straight area so enhancement will happen with no voltage chopped down, These circuits are worked as Common Emitter Amplifier with 100% positive criticism.

As per Barkhousen paradigm the condition for swaying when: ($\beta A = 1\angle 0o$). This outcomes in one phase directing "completely OFF" (cut-off) while the other is exchanged "completely ON" (immersion) which gives abnormal state of common intensification between the two transistors. By the releasing activity of a capacitor Conduction is exchanged from one phase to the next. To examine the circuit graph appeared above, expect that transistor, TR1 has recently exchanged "OFF" (cut-off) and gatherer voltage is drawing closer toward Vcc, in the mean time transistor TR2 has quite recently turned "ON". Plate "An" of capacitor C1 is additionally raising towards the +6 volts supply rail of Vcc as it is associated with the gatherer of TR1 which is presently cut-off. Since TR1 is in cut-off, it leads no present so there is no volt drop crosswise over load resistor R1. The other feature of capacitance, C1, plate "B", is associated with the base terminal of semiconductor gadget TR2 and at zero.6v accordingly of semiconductor gadget TR2 is directing (immersion). In this manner, capacitance C1 fuses a voltage of +5.4 volts over its plates,(6.0–0.6v)from reason A to reason B. Since TR2 is completely on, capacitance C2 begins to turn on through resistance R2 towards Vcc. once the voltage crosswise over capacitance C2 ascends to more than 0.6v, it inclinations semiconductor gadget TR1 into physical wonder and into saturation.The moment that transistor, TR1 switches "ON", plate "An" of the capacitor which was initially at Vcc potential, promptly tumbles to 0.6 volts. This quick fall of voltage on plate "A" causes an

equivalent and immediate fall in voltage on plate "B" in this way plate "B" of C1 is pulled down to - 5.4v (an invert charge) and this negative voltage swing is connected the base of TR2 turning it hard "OFF". Transistor TR2 is collided with cut-off therefore electrical device C1 by and by begins to charge inside the other path by methods for resistance R3 that is besides connected with the +6 volts offer rail, Vcc. in this way the base of semiconductor contraption TR2 is by and by moving upwards in the midst of a positive bearing towards Vcc with a period predictable agreeable the C1 x R3 mix. In any case, it ne'er achieves the value of Vcc accordingly of as by and by on the grounds that it gets to zero.6 volts positive, semiconductor gadget TR2 turns absolutely "ON" into immersion. This activity begins the total technique once morehowever right now with electrical gadget C2 taking the base of semiconductor gadget TR1 to - 5.4vwhile energizing by means of resistance R2 and coming into the second shaky state. At that point we will see that the circuit substitutes between one shaky state inside which transistor TR1 is "OFF" and transistor TR2 is "ON", and a moment insecure inside which TR1is "ON" and TR2 is "OFF" at a rate dictated by the RC values. This technique can rehash itself over and afresh as long in light of the fact that the offer voltage is gift.The adequacy of the yield waveform is roughly the same as the supply voltage, Vcc with the day and age of each exchanging state dictated when steady of the RC systems associated over the base terminals of the transistors. As the transistors are exchanging both "ON" and "OFF", the yield at either gatherer will be a square wave with marginally adjusted corners in view of the present which charges the capacitors. This could be amended by utilizing more segments as we will talk about later.I On the off chance that the 2 time constants made by C2 x R2 and C1 x R3 inside the base circuits square measure an identical, the check to-space extent connection (t1/t2) will be up to coordinated making the yield wave shape symmetrical fit as a fiddle. By shifted the capacitors, C1, C2 or the resistors, R2, R3 the stamp to-space extent connection thus the recurrence are regularly changed.

the time taken for the voltage over an electrical gadget to tumble to 0.5 the accessibility voltage, 0.5Vcc is up to zero.69 time constants of the electrical gadget and resistance blend. At that point taking one part of the astable multivibrator, the length of your time that intersection transistor TR2 is "OFF" will be up to 0.69 times or 0.69 times the time consistent of C1 x R3. In like manner, the length of your time that intersection transistor TR1 is "OFF" will be dependent upon zero.69T or 0.69 times the time steady of C2 x R2 and this can be illustrated as. If the 2 time constants created by C2 x R2 and C1 x R3 within the base circuits square measure an equivalent, the mark-to-space magnitude relation (t1/t2) are going to be up to matched creating the output wave shape symmetrical in shape. By varied the capacitors, C1, C2 or the resistors, R2, R3 the mark-to-space magnitude relation and so the frequency are often altered.

the time taken for the voltage across an electrical device to fall to 0.5 the availability voltage, 0.5Vcc is up to zero.69 time constants of the electrical device and resistance combination. Then taking one aspect of the astable multivibrator, the length of your time that junction transistor TR2 is “OFF” are going to be up to 0.69 times or 0.69 times the time constant of C1 x R3. Likewise, the length of your time that junction transistor TR1 is “OFF” are going to be up to zero.69T or 0.69 times the time constant of C2 x R2 and this can be outlined as.

$$\text{Periodic Time, } T = t_1 + t_2$$
$$t_1 = 0.69 C_1 R_3$$
$$t_2 = 0.69 C_2 R_2$$

Astable Multivibrators Periodic Time:

By sterilization the time constant of only one RC network the mark-to-space quantitative relation and frequency of the output wave form may be modified however commonly by ever-changing each RCtime constants along at identical time, the output frequency are altered keeping the mark-to-space ratios identical at matched.
If the worth of the condenser C1 equals the worth of the condenser, C2, C1 = C2 and conjointly the worth of the bottom resistance R2 equals the worth of the bottom resistance, R3, R2 = R3 then the full length of your time of the Multivibrators cycle is given below for a symmetrical output wave form.Frequency of Oscillation

$$f = \frac{1}{T} = \frac{1}{1.38RC}$$

2.2: 555 TIMER:

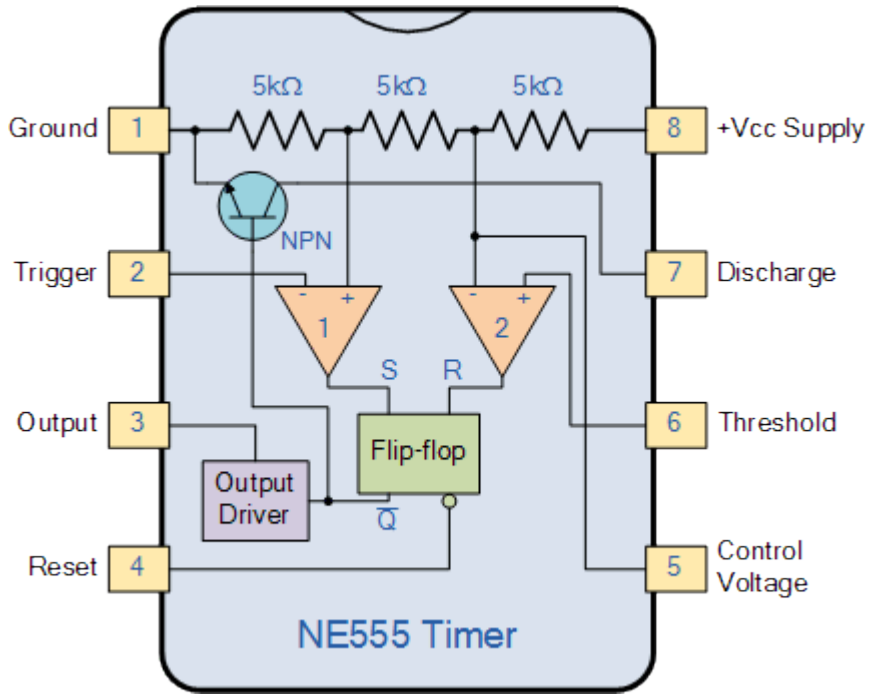


Figure: 555 timer circuit diagram

The 555 clock that gets its name from the 3 5kω resistors it uses to get the 2 comparators reference voltage, might be a record-breaking low, boundless and supportive accuracy fleeting game plan gadget which will go about as either a simple clock to get single

heartbeats or long haul delays, or as an unwinding generator producing stable waveforms of differed obligation cycles from fifty to 100 percent. The 555 clock chip is extremely solid and stable 8-stick gadget which will be worked either as a truly redress Monostable, Bistable or Astable Multivibrator to give a scope of uses like one-shot or defer clocks, beat era, diode and light flashers, alerts and tone era, rationale timekeepers, recurrence division, control gives and converters and so forth, if honestly any circuit that needs some style of time administration on the grounds that the rundown is interminable. The single 555 Timer contribute its essential sort might be a Bipolar 8-stick smaller than usual Dual-in-line Package (DIP) gadget comprising of around a quarter century, a couple of diodes and with respect to sixteen resistors composed to make 2 comparators, a flip-tumble and a high current yield organize as demonstrated as follows. however on the grounds that the 555 Timer there's furthermore available the NE556 Timer generator which blends 2 individual 555's inside one 14-stick DIP bundle and low power CMOS forms of the main 555 clock like the 7555 and LMC555 that utilization MOSFET transistors instead.A streamlined "square graph" speaking to the inward electronic gear of the 555 clock is given underneath with a brisk elucidation of everything about interfacing pins to help offer a clearer understanding of however it works.

CHAPTER-3

IR Tansmitter

An infrared transmitter is solely lightweight|a light-weight|a lightweight} Emitting Diode that generates IR light (invisible IR light)--light with a wavelength of between one millimeter and 750 nanometers, and a few associated electronic equipment. In associate infrared remote, as an example, pushing a button sends an electrical signal to the semiconductor diode, that converts the signal into a beam of infrared emission. The receiving device detects the sunshine with a photograph diode associated converts it to an electrical signal that, via associate computer circuit, controls its actions.Components Req:

1. NE555 timer
2. IR transmitter
3. Electrolytic capacitor – 1uF, 16V
4. Resistors – 10k, 1k, 330 ohm

Infrared transmitters are widely used as a means of wireless communication by remote controls for televisions and other electronic devices. Police, firefighters and ambulance drivers, for example, carry a special IR transmitter that they can use to change traffic lights from red to green within two seconds, as they approach an intersection.

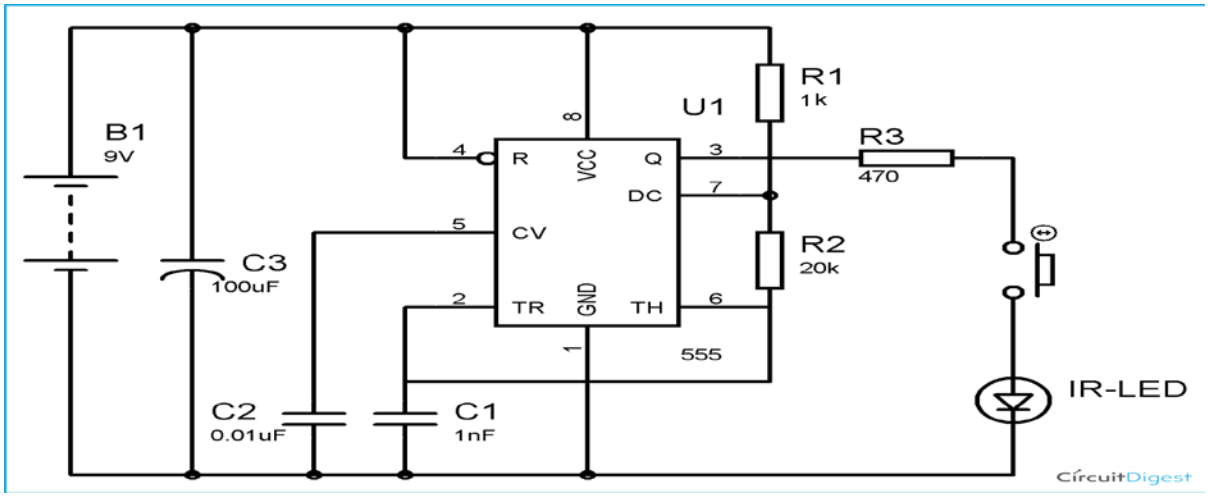


Figure 3.1: Ir transmitter

a 555 timer s used as AN periodic mode so it generates a thirty eight kc sq. wave. mistreatment the shift output of the 555 timer to drive AN infrared (IR) LED; which means the LED can shut down at concerning thirty eight,000 times per second. this can be done so the receiver can find the signal employing a IR receiver detector that's tuned to find that frequency and switch the red LED on. When we press a button it sends AN infrared signal to a receiver designed into your TV; the TV then carries out the command you send it. This works terribly kind of like it, albeit, slightly additional dumb. the IR LED can perpetually be causing out a symptom and once the automotive starts to tug into the garage the car's head light-weights can bounce the signal back to the IR receiver and switch the red LED light on. We square measure mistreatment TSOP1738 for receiver, thus we'd like to come up with the modulated IR of thirty eight kc. you'll be able to use any TSOP, however you wish to come up with IR of several frequency as TSOP. thus we have a tendency to square measure mistreatment 555 timer in Astable mode to oscillate the IR at 38KHz frequency. As we all know oscillation frequency of 555 timer is set by electrical device R1, R2 and capacitance C1. we've used 1k R1, 20K R2 and 1nF capacitance to come up with the frequency of approx. 38 KHz. It is calculated with this formula: 1.44/((R1+2*R2)*C1).

CHAPTER-4

IR-RECIEVER

An infrared receiver, or IR receiver, is hardware that sends information from an infrared remote control to another device by receiving and decoding signals. In general, the receiver outputs a code to uniquely identify the infrared signal that it receives. This code is then used in order to convert signals from the remote control into a format that can be understood by the other device. It is the part of a device that receives infrared commands from a remote control. Because infrared is light, it requires line-of-sight visibility for the best possible operation, but can however still be reflected by items such as glass and walls. Poorly placed IR receivers can result in what is called "tunnel vision", where the operational range of a remote control is reduced because they are set so far back into the chassis of a device.

4.1: Types of Infrared Receivers

There are many different kinds of infrared receivers and at Future Electronics we stock many of the most common types categorized by supply voltage, carrier frequency, transmission distance, power dissipation, packaging type and supply current. The parametric filters on our website can help refine your search results depending on the required specifications. The most common sizes for carrier frequency are 36 kHz, 37.9 kHz, 38 kHz and 40 kHz. We also carry infrared receivers with carrier frequency up to 56 kHz. The transmission distance can range from 8 m to 45 m, with the most common infrared receivers having a transmission distance of 45 m.

4.2: Applications for Infrared Receivers:

Infrared receivers can often be found in consumer products such as television remote controls or infrared ports such as PDAs, laptops, and computers. They are also present in devices such as home theatres, cable or satellite receivers, VCRs, DVD and Blu-Ray players and audio amplifiers. Infrared receivers can also be found in the industrial, military, aerospace and photography markets.

4.3: Choosing the Right Infrared Receiver:

When you are looking for the right infrared receivers, with the FutureElectronics.com parametric search, you can filter the results by various attributes: by Supply Current (5 uA, 450 uA, 1.5 mA,…), Transmission Distance (8m, 12 m, 35 m,…) and Supply Voltage (up to 32 V) to name a few. You will be able to find the right chip for your USB IR receiver, IR receiver circuit, IR receiver for PC, IR receiver cable, IR receiver IC, IR remote receiver, wireless IR receiver or any other IR module.

Circuit Diagram:

RECEIVER;-

1. LM324 IC (low power quad op-amp)
2. IR receiver
3. 1n4148 diodes – 2
4. Electrolytic capacitors – 100u (2), 10u, 47p, 1u
5. LED's – 1 (5mm)
6. 1k resistors – 7
7. 1M ohm resistors – 2
8. 4.7m , 2.1k resistors
9. DC battery

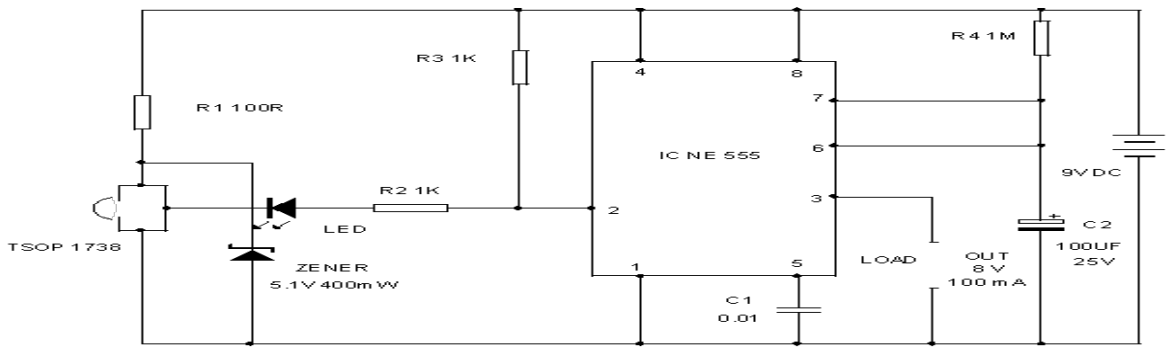


Figure 4.3: Ir receiver

CHAPTER-5

Reverse Parking Sensor Circuit Design & Working:

In transmitter section, 555 timer is operated in astable mode to generate a signal with frequency of 120 Hz. The 4th pin of 555 timer is connected to supply to avoid sudden resets. The output pulse is produced at 3rd pin of 555 timer. Here resistors R1, R2 and C1 set the output frequency of 555 timer.The received by the IR receiver is amplified the by the operational amplifier U2:A. Resistor R4 and C4 forms peak detector to detect peak of the amplified signal.

5.1: Op – amp as Comparator:

Op-amp has two inputs (non-inverting and inverting) and one output. The output of operational amplifier is high when non-inverting voltage is greater than inverting voltage.

The output voltage is low, when inverting voltage is greater than non-inverting voltage.In the above circuit the voltages at non inverting pins of comparators acts as a reference voltage and inverting input voltages at comparators are compared with reference voltages to produce the output.Here resistors R8 to R11 are used to set different reference voltages at their non inverting pins.Resistors R12, R13 and R14 are used to protect the LED's from high voltages,

5.2: Working:

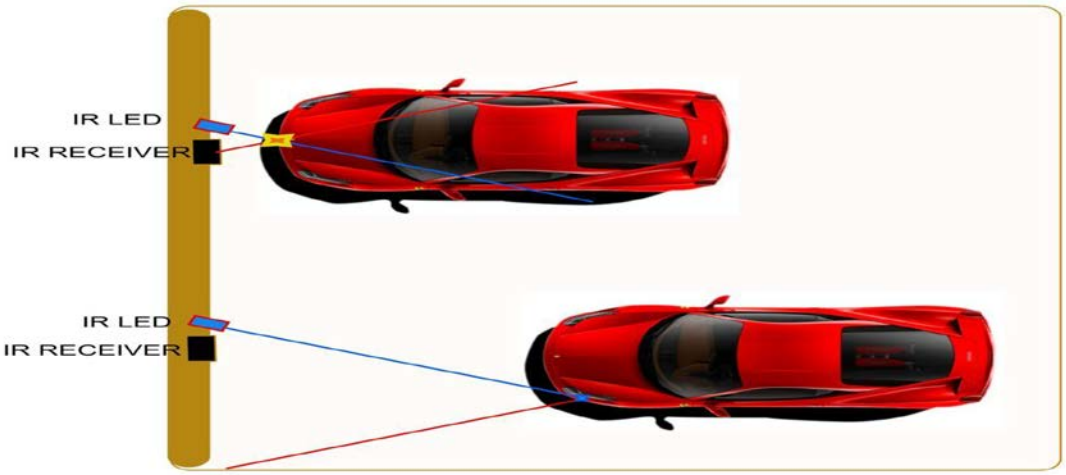
Working of circuits is very simple as we know LM358 compares the voltage applied at input pin and provide you the output. The voltage level which we want to detect is applied on either of the input pins (may be 2 or 3) and the voltage to be detected is applied on the other pin (may be 2 or 3). For dark sensor circuits we are applying voltage on negative pin (pin 2) and voltage to be detected is applied on positive pin (pin 3).

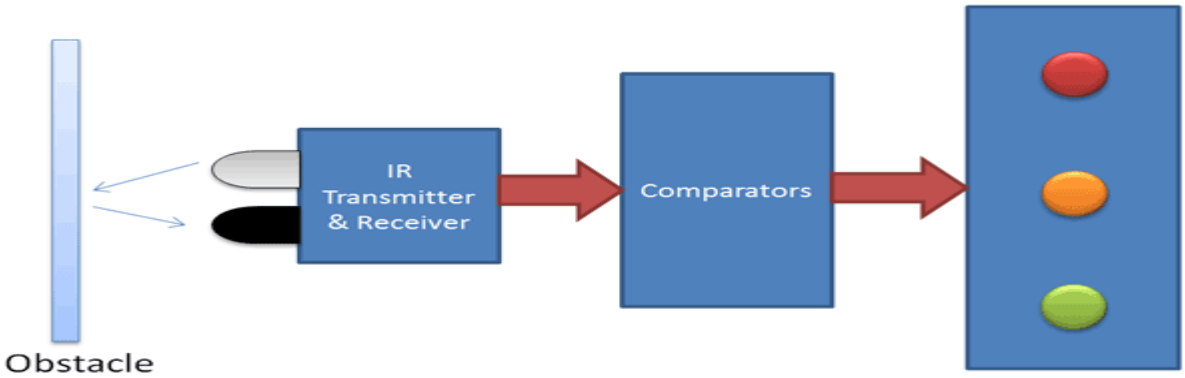
Whenever input voltage applied on positive pin because of light which falls on LDR, photodiode and phototransistor slightly rises above the voltage on negative pin. The output suddenly rises to the positive maximum and remains positive until the input voltage falls below the level to be detected. This causes the output pin 1 of IC1 to go high which provide power supply to IC2 that is UM66 pin 2 and we receive output at pin 1. The speaker

connected at output gives you a alarm. We have used transistor T1 to amplify the weak signals from UM66.Be care full in alignment of LDR.

5.3: **How to Operate this Reverse Parking Sensor Circuit?**

1. Give the connections according to the circuit diagram.
2. Arrange transmitter and receiver in such a way that IR receiver should receive the IR rays when obstacle is present.
3. Switch on the supply and place the obstacle beyond 25cm, now you can observe that no LED will glow.
4. Reduce the obstacle distance to 25 cm, now you can observe that D7 led will glow.
5. Now reduce the distance to below 20 cm, then both D7 and D6 led's will glow.
6. Still if you reduce the distance to 5 cm, then all LED's will turn on.





APPLICATION & LIMITATION

Reverse Parking Sensor Circuit Applications:

- This circuit can be used in auto mobiles to park the vehicle safely.
- We can use this circuit to measure the distance.
- We can also use this circuit as IR Liquid Level Detector by making few modifications.

Limitations of this Circuit:

1. IR receiver may receive the normal light. As a result, parking sensor may not work properly.
2. We should arrange IR sensors accurately; otherwise they may not detect the obstacle

CONCLUSION & FUTURE

We have shown the reference voltage and relative parameters in the below table. But one can set distance by changing the value of potentiometer.

Obstacle v/s Vehicle	**LED status**	**Reference Voltage**	**Distance**
not close	**All OFF**		**Greater than 15 cm**
Close	**Green ON**	**2.0 Volt**	**About 15 cm**
More Close	**Yellow ON**	**4.0 Volt**	**About 10 cm**
More Close	**Red ON**	**6.0 Volt**	**About 5 cm**
Touch	**Car Damaged**		**About 0 cm**

This system is placed at the rear of the car and sensor's front side toward the obstacle (wall). Now suppose car is moving back toward the wall or obstacle in the parking slot. If distance between car and obstacle is more than 15 cm then no LED will glow. Now if car moves toward the obstacle and suppose greed light turned ON, it means car is about 15 cm away from the obstacle. Now car is moving more close toward the obstacle and yellow light appears or turned on it means car is about 10 cm away from the obstacle. Now car is moving closer toward the obstacle and red light appears it means car is about 5 cm away from the obstacle and same time buzzer start beeping. Buzzer and red light indicates that the car need to stop now otherwise car may be damaged.

Future Scope:

In future, Prevention of key fob is very important. It will prevented by implementing the encrypted signal giving by the user through air gesture or some codes. By adopting new technology, vehicle to vehicle communication will be implemented in future. It will help to automatically adjusting of vehicles in the parking area to park and our retrieve our vehicle without need of human intervention.

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