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Automatic Safety Door Lock System for Car

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Abstract:- Cars are a very important part of this modern world because they give luxury and comfort. Even though they are comfortable, some problems always keep arising on the safety side. After a lot of research they rectified certain problems using air bags, auto parking, turbo charger, pedal shift…, etc.

And now we are going to discuss about one such problem that arises on the safety side. An unsuspected accident occurs when people smash their fingers in between the car doors. Due to this kind of accident around 120,000 people are injured every year. But this was not taken as a very major safety concern for the customer.

To avoid this kind accident due to car doors, we are introducing "**SAFETY DOOR LOCK SYSTEM**" with the help of "**HYDRAULIC PISTON AND IR SENSORS**".

The major working process of the "SAFETY DOOR LOCK SYSTEM"is, when a person places his/her hand or fingers in the gap between the door and the outer panel, at the time when the closing action of the door takes place, the Sensors start to transmit the Infra Red Rays to the Receivers at the
other end, and so even if someone closes the door without anybody's knowledge the hydraulic piston will automatically come out and stop the door from closing and prevent the person from the unsuspected accident and minor injuries by the car door and ensure maximum safety to the customer.

I. INTRODUCTION

While most of us are aware that 1,21,360 peoples die each year in car crashes, it's shocking to hear that the unsuspected car door also causes a huge amount of widespread human carnage. According to a report released by the National Highway Traffic Safety Administration, nearly 15,000 people in the U.S. are injured every year by CLOSING CAR DOORS.

The automatic door controller system which is used to operate the door in automatic action due to the requirement. In mostly door sensor were used in the door for proper closing, but it will not checking whether any object placed or not. Our project is based on reducing the minor injuries from the car doors.

In this project we planning our research in the HYUNDAI i10 car door, the total area of door are 80 inches, the range of IR sensor were 5mm ,so we placed
40 couple of sensors per 2 inches. The 40 couple of transmitters and receivers are fixed in the opposite side of door and outer panel of car door.

The IR sensors with the transmitter and receiver are placed in the basics Of logical gate. In the DOOR (Male part) the Transmitter were fixed in the door setter. In the OUTER PANEL (Female part) the receiver were fixed in opposite of the door setter.

Then the serial connection of the IR sensor is connected to the microcontroller in the circuit board which is placed in the glass driver, the microcontroller is an electronic device, it contains the program as per our requirement. Then the date has been stored in registers, after the action was took placed that has been stored. Then that connection was lead to the relay driver is like a switch type device as like as on / off mode. And a connection to the hydraulic piston, when the object is placed in the door gap the receiver sends the data to the microcontroller and that data stored automatically relay driver will be on so the hydraulic piston will comes out and stop the closing door.

II. COMPONENTS USED

- IR SENSORS
- MICROCONTOLLER
- REGISTOR
- POWER SUPPLY
- RELAY DRIVER
- HYDRALIC PISTON

III. IRSENSORS

A noncontact infrared sensor is a device that measures the energy radiated from an object, without touching it. This allows for quick and safe measurement of the temperature of objects that are moving, extremely hot, or difficult to reach. Sensors can be added to a process in a fixed fashion or can be used as handheld devices for quick, on the fly measurements.

Measurements of high temperatures (greater than 1300°C) present no problems. In similar cases, contact thermometers cannot be used, or have a limited life.

There is no interference - no energy is lost from the target. For example, in the case of a poor heat conductor such as plastic or wood, measurements are extremely accurate with no distortion of measured values, as compared to measurements with contact thermometers.

There is no risk of contamination and no mechanical effect on the surface of the object; thus wear-free. Lacquered surfaces, for example, are not scratched and soft surfaces can also be measured.

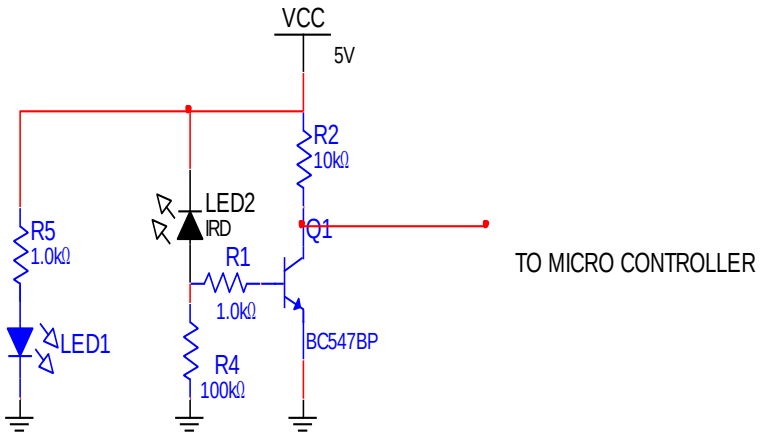
Infrared (IR) radiation is electromagnetic radiation whose wavelength is longer than that of visible light (400-700 nm), but shorter than that of terahertz radiation (3-300 µm) and microwaves (~30,000 µm). Infrared radiation spans roughly three orders of magnitude (750 nm and 1000 µm).

Direct sunlight has a luminous efficacy of about 93 lumens per watt of radiant flux, which includes infrared (47% share of the spectrum), visible (46%), and ultra-violet (only 6%) light. Bright sunlight provides luminance of approximately 100,000 candela per square meter at the Earth's surface.

Sensor response division scheme Plot of atmospheric transmittance in part of the infrared region.

A third scheme divides up the band based on the response of various detectors:[7]

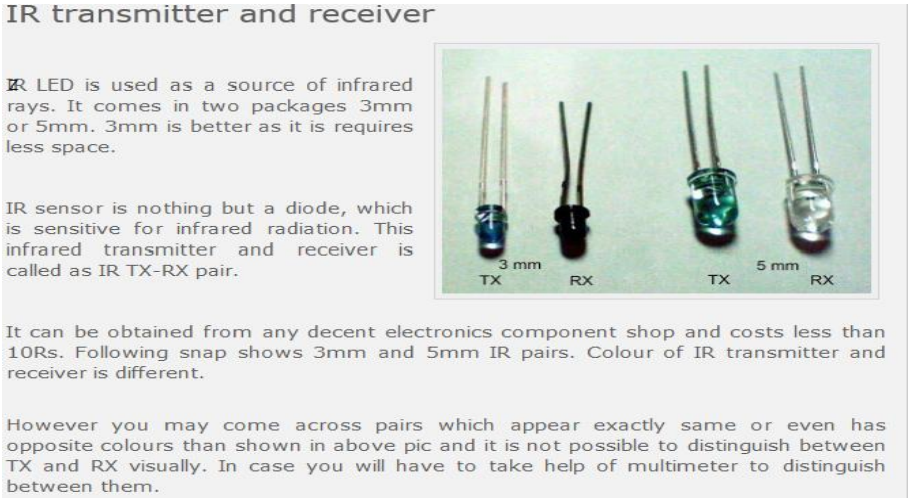
* Near infrared: from 0.7 to 1.0 micrometers (from the approximate end of the response of the human eye to that of silicon)
* Short-wave infrared: 1.0 to 3 micrometers (from the cut off of silicon to that of the MWIR atmospheric window. InGaAs covers to about 1.8 micrometers; the less sensitive lead salts cover this region
* Mid-wave infrared: 3 to 5 micrometers (defined by the atmospheric window and covered by Indium antimonide [InSb] and HgCdTe and partially by lead selenide [PbSe])

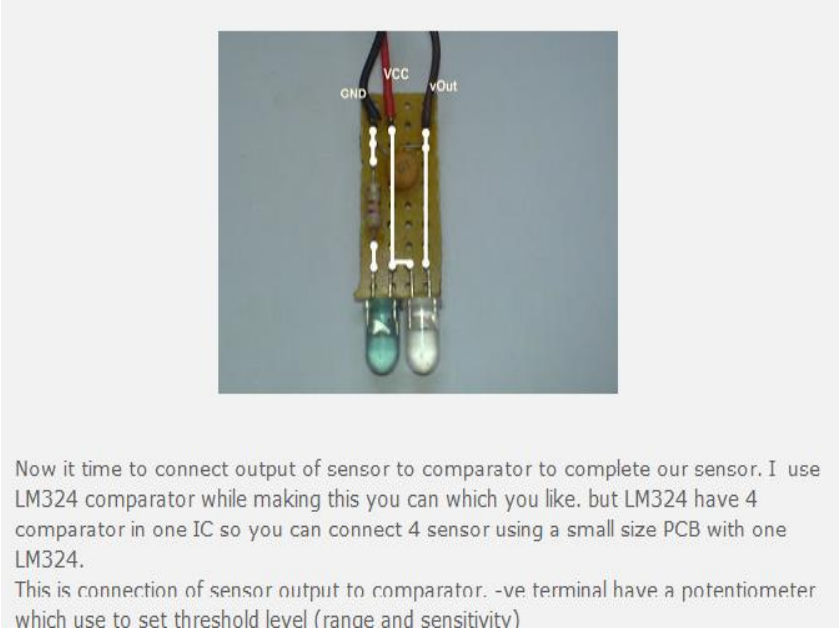


(IR CIRCUIT)

* Long-wave infrared: 8 to 12, or 7 to 14 micrometers: the atmospheric window (Covered by HgCdTe and microbolometers)
* Very-long wave infrared (VLWIR): 12 to about 30 micrometers, covered by doped silicon.

These divisions are justified by the different human response to this radiation: near infrared is the region closest in wavelength to the radiation detectable by the human eye, mid and far infrared are progressively further from the visible regime. Other definitions follow different physical mechanisms (emission peaks, vs. bands, water absorption) and the newest follow technical reasons (The common silicon detectors are sensitive to about 1,050 nm, while InGaAs' sensitivity starts around 950 nm and ends between 1,700 and 2,600 nm, depending on the specific configuration). Unfortunately, international standards for these specifications are not currently available.
The boundary between visible and infrared light is not precisely defined. The human eye is markedly less sensitive to light above 700 nm wavelength, so shorter frequencies make insignificant contributions to scenes illuminated by common light sources. But particularly intense light (e.g., from lasers, or from bright daylight with the visible light removed by colored gels) can be detected up to approximately 780 nm, and will be perceived as red light. The onset of infrared is defined (according to different standards) at various values typically between 700 nm and 800 nm.



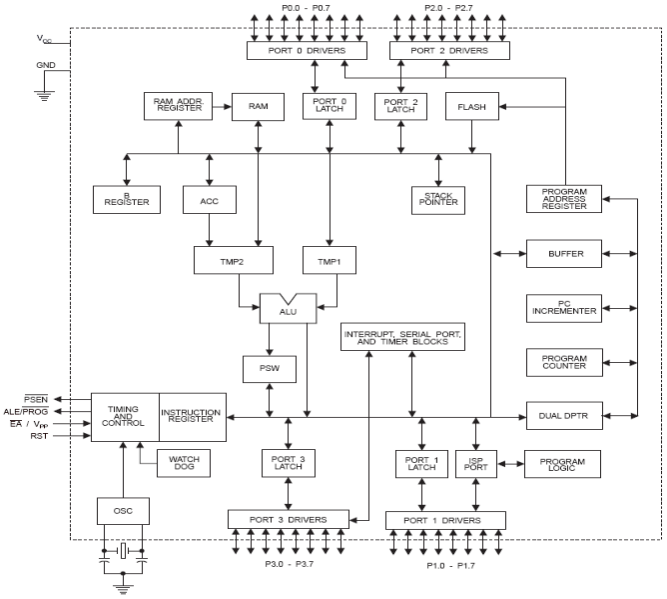


IV. MICRO CONTROLLER

A microcontroller (sometimes abbreviated µC, uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM.

Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications.

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems.



(**Architecture of AT89S52)**

V. REGISTERS

Registers are normally measured by the number of bits they can hold, for example, an "8-bit register" or a "32-bit register".

A map of the on-chip memory area called the Special Function Register (SFR). Note that not all of the addresses are occupied, and unoccupied addresses may not be implemented on the chip. Read accesses to these addresses will in general return random data, and write accesses will have an indeterminate effect. User software should not write 1s to these unlisted locations, since they may be used in future products to invoke new features. In that case, the reset or inactive values of the new bits will always be 0

Control and status bits are contained in registers T2CON Table 2) and T2MOD for Timer 2. The register pair (RCAP2H, RCAP2L) are the Capture/Reload registers for Timer 2 in 16-bit capture mode or 16-bit auto-reload mode.

The individual interrupt enable bits are in the IE register. Two priorities can be set for each of the six interrupt sources in the IP register.

To facilitate accessing both internal and external data memory, two banks of 16-bit Data Pointer Registers are provided: DP0 at SFR address locations 82H-83H and DP1 at 84H-85H. Bit DPS = 0 in SFR AUXR1 selects DP0 and DPS = 1 selects DP1. The user should always initialize the DPS bit to the appropriate value before accessing the respective Data Pointer Register.

The Power Off Flag (POF) is located at bit 4 (PCON.4) in the PCON SFR. POF is set to "1" during power up. It can be set and rest under software control and is not affected by reset.

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.

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.

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.

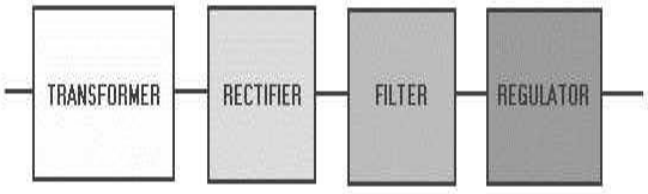
The WDT is intended as a recovery method in situations where the CPU may be subjected to software upsets. The WDT consists of a 13-bit counter and the Watchdog Timer Reset (WDTRST) SFR. The WDT is defaulted to disable from exiting reset. To enable the WDT, a user must write 01EH and 0E1H in sequence 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 overflows, it will drive an output RESET HIGH pulse at the RST pin.

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 13-bit counter overflows when it reaches 8191 (1FFFH), 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 8191 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 96xTOSC, 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.

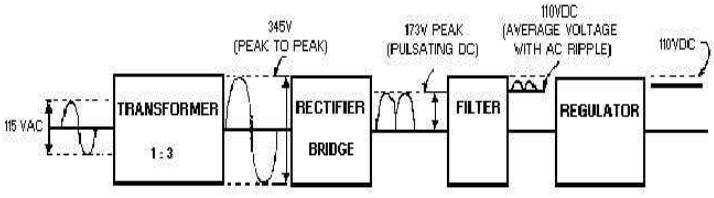
The UART in the AT89S52 operates the same way as the UART in the AT89C51 and AT89C52. From the home page, select 'Products', then '8051-Architecture Flash Microcontroller', then 'Product Overview'.

VI. POWER SUPPLY

A **power supply** (sometimes known as a **power supply unit** or **PSU**) is a device or system that supplies electrical or other types of energy to an output load or group of loads. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.



A



B

As illustrated in view B of figure, the first section is the TRANSFORMER.

The transformer steps up or steps down the input line voltage and isolates the power supply from the power line.

The RECTIFIER section converts the alternating current input signal to a pulsating direct current. However, as you proceed in this chapter you will learn that pulsating dc is not desirable. For this reason a FILTER section is used to convert pulsating dc to a purer, more desirable form of dc voltage.

Figure B.—Block diagram of a basic power supply. The final section, the REGULATOR, does just what the name implies. It maintains the output of the power supply at a constant level in spite of large changes in load current or input line voltages. Now that you know what each section does, let's trace an ac signal through the power supply. At this point you need to see how this signal is altered within each section of the power supply. Later on in the chapter you will see how these changes take place. In view B of figure 4-1, an input signal of 115 volts ac is applied to the primary of the transformer. The transformer is a step-up transformer with a turns ratio of 1:3. You can calculate the output for this transformer by multiplying the input voltage by the ratio of turns in the primary to the ratio of turns in the secondary; therefore, 115 volts ac ´3 = 345 volts ac (peak-to-peak) at the output. Because each diode in the rectifier section conducts for 180 degrees of the 360-degree input, the output of the rectifier will be one-half, or approximately 173 volts of pulsating dc. The filter section, a network of resistors, capacitors, or inductors, controls the rise and fall time of the varying signal; consequently, the signal remains at a more constant dc level. You will see the filter process more clearly in the discussion of the actual filter circuits. The output of the filter is a signal of 110 volts dc, with ac ripple riding on the dc. The reason for the lower voltage (average voltage) will be explained later in this chapter. The regulator maintains its output at a constant 110-volt dc level, which is used by the electronic equipment (more commonly called the load).

VII. RELAY DRIVER

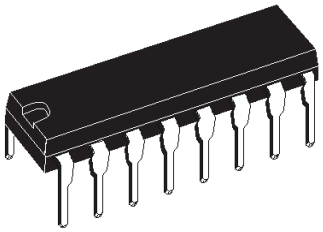
RELAY FEATURES

- SEVEN DARLINGTONS PER PACKAGE
- OUTPUT CURRENT 500mA PER DRIVER(600mA PEAK)
- OUTPUT VOLTAGE 50V INTEGRATED SUPPRESSION DIODES FOR
- INDUCTIVE LOADS OUTPUTS CAN BE PARALLELED FOR
- HIGHER CURRENT
- TTL/CMOS/PMOS/DTL COMPATIBLE INPUTS INPUTS PINNED OPPOSITE OUTPUTS TO
- SIMPLIFY LAYOUT.

The ULN2001A, ULN2002A, ULN2003 and ULN2004A are high voltage, high current darlington arrays each containing seven open collector darlington pairs with common emitters. Each channel rated at 500mA and can withstand peak currents of 600mA. Suppression diodes are included for inductive load driving and the inputs are pinned opposite the outputs to simplify board layout. The four versions interface to all common logic families

ULN2001A	General Purpose, DTL, TTL, PMOS, CMOS
ULN2002A	14-25V PMOS
ULN2003A	5V TTL, CMOS
ULN2004A	6–15V CMOS, PMOS

These versatile devices are useful for driving a wide range of loads including solenoids, relays DC motors, LED displays filament lamps, thermal printheads and high power buffers. The ULN2001A/2002A/2003A and 2004A are supplied in 16 pin plastic DIP packages with a copper leadframe to reduce thermal resistance. They are available also in small outline package (SO-16) as ULN2001D/2002D/2003D/2004D

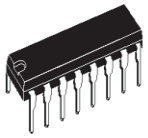


DIP16

ORDERING NUMBERS: ULN2001A/2A/3A/4A

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050

OUTLINE AND MECHANICAL DATA



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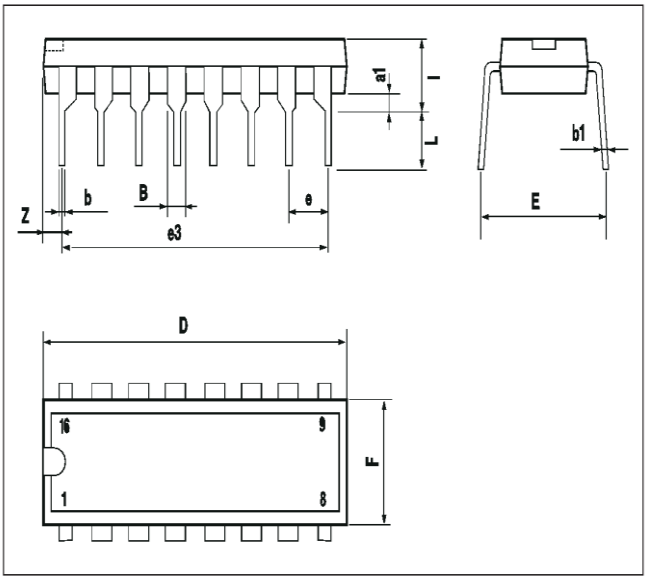


VIII. HYDRAULIC PISTON

A Hydraulic cylinder (also called a linear hydraulic motor) is a mechanical actuator that is used to give a unidirectional force through a unidirectional stroke. It has many applications, notably in engineering vehicles, industrial application, civil applications.

Hydraulic cylinders get their power from pressurized hydraulic fluid, which is typically oil. The hydraulic cylinder consists of a cylinder barrel, in which a piston connected to a piston rod moves back and

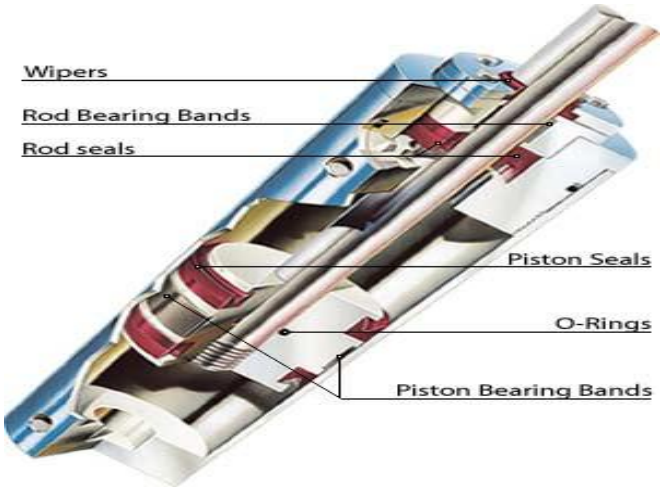
forth. The barrel is closed on one end by the cylinder bottom (also called the cap) and the other end by the cylinder head (also called the gland) where the piston rod comes out of the cylinder. The piston has sliding rings and seals. The piston divides the inside of the cylinder into two chambers, the bottom chamber (cap end) and the piston rod side chamber (rod end / head end).

Flanges, trunnions, clevises, Lugs are common cylinder mounting options. The piston rod also has mounting attachments to connect the cylinder to the object or machine component that it is pushing / pulling.

A hydraulic cylinder is the actuator or "motor" side of this system. The "generator" side of the hydraulic system is the hydraulic pump which brings in a fixed or regulated flow of oil to the hydraulic cylinder, to move the piston. The piston pushes the oil in the other chamber back to the reservoir. If we assume that the oil enters from cap end, during extension stroke, and the oil pressure in the rod end / head end is approximately zero, the force F on the piston rod equals the pressure P in the cylinder times the piston area A:

F = P \cdot A

During retraction stroke if oil is pumped into the rod end / head end and the oil from the cap end flows back to the reservoir without pressure. The fluid pressure in the rod end is (Pull Force) / (piston area - piston rod area)



IX. AUTOMATIC DOOR CONTROL

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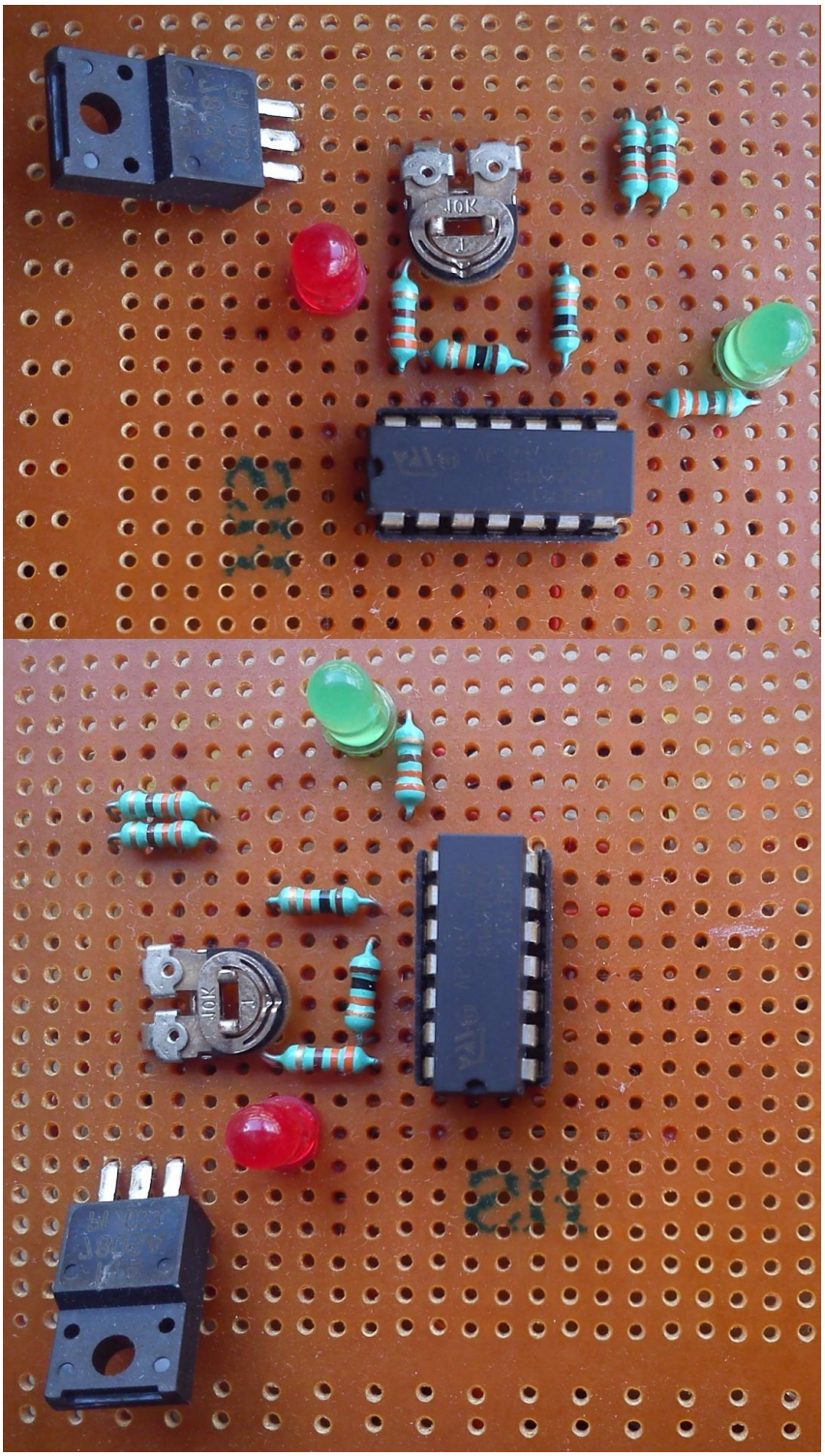
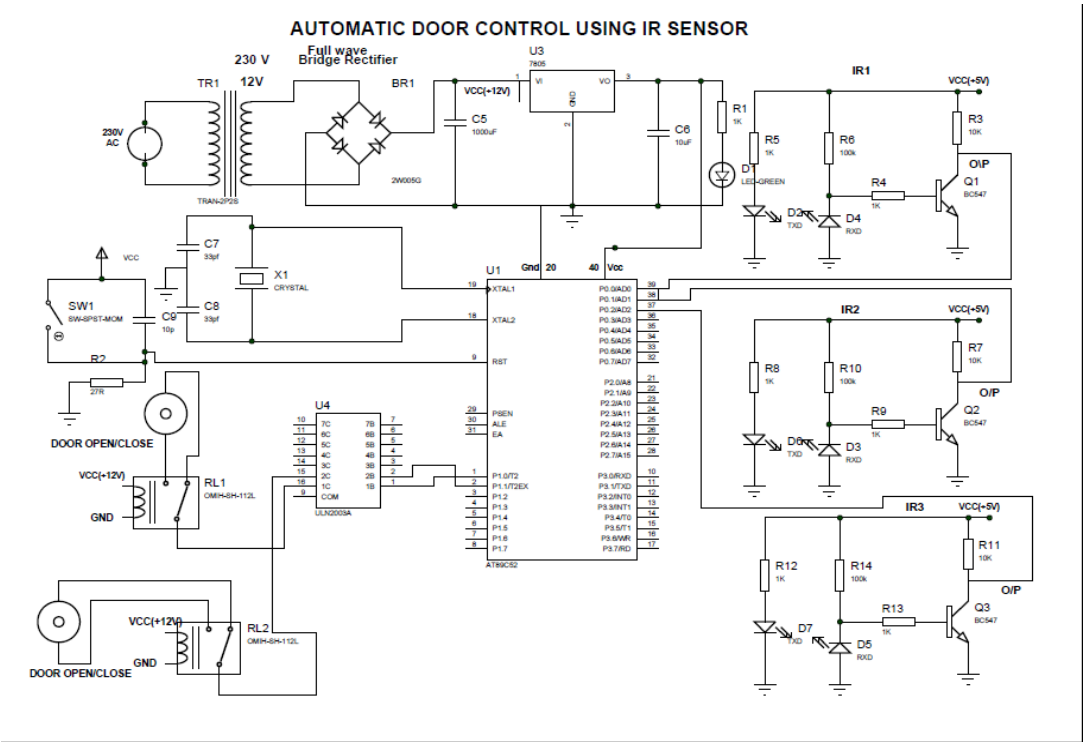


X. CIRCUIT DIAGRAM



COST ESTIMATION

S.NO	DESCRIPTION	QUANTITY.NO	AMOUNT
1	IR sensors (transmitter& receiver)	40 + 40	1500
2	Microcontroller	1	1000
3	Registers	1	800
4	Relay driver	1	1200
5	Hydraulic piston	1	4500
6	Control panel plate	1	1000
	TOTAL		10000

XI. CONCLUSION

In the Project, we produce a **HI SAFETY CAR** even from the minor injuries. It can avoid or reduce the unsuspected accident all .Ensure the customer safety from the door injuries, it can also adopt in any type of cars, and also it is not so costly compare to other safety equipment in car parts.

In future it may also put into the Research(RD) and we can reduce the cost wise and also improve in performance too.

SCOPE OF THE PROJECT

- Producing HI SAFETY CAR
- Ensure the customer safety
- Adoptable for any type of cars

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