

Smart Parking System

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❖ Project Description:

Smart Parking is a parking strategy that combines technology and human innovation in an effort to use as few resources as possible such as time and space to achieve faster , easier and denser parking of vehicles for the majority of time.

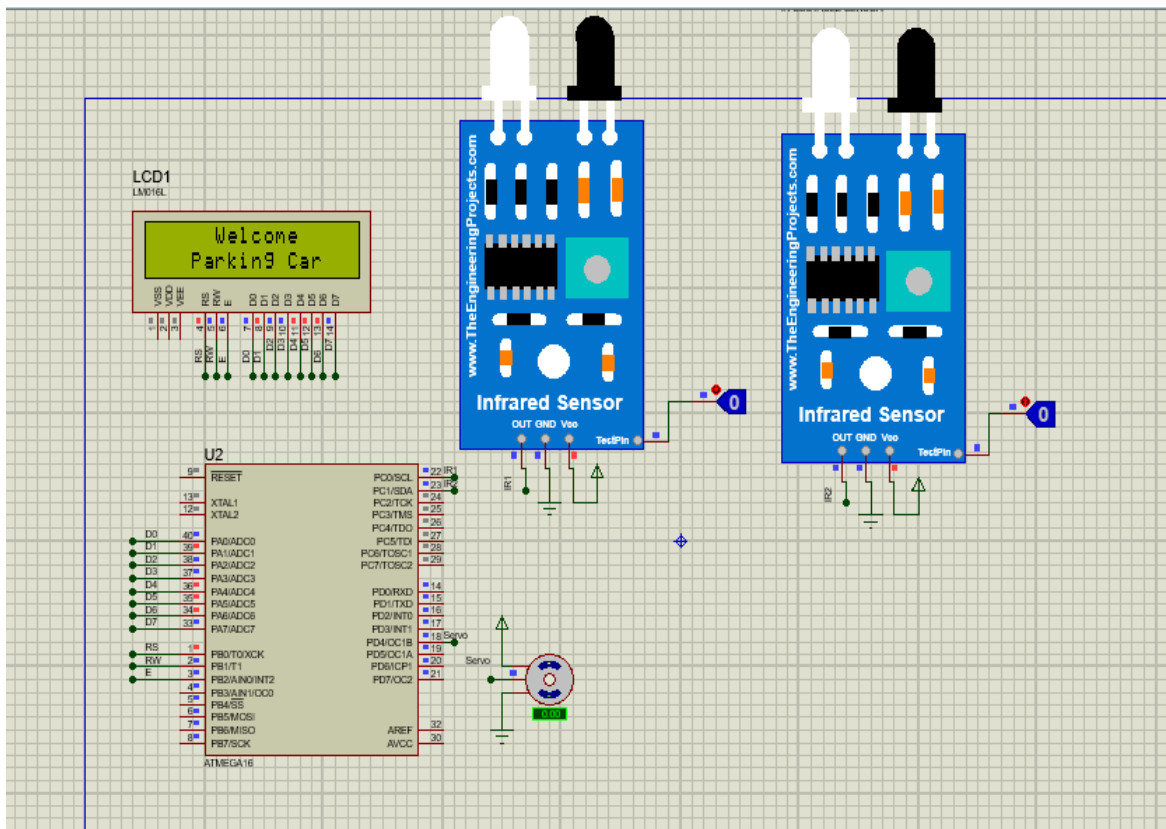
❖ Applications:

Where can Smart Parking solutions be used?

Smart Parking can be utilized in :

- private parking lots hospitals
- hotels
- shopping malls
- public parking garages
- offices, etc.
- to make the parking hassle free and time consuming.

Schematic:



Explain How to Work

The parking contains a number of parking for cars. Sensor (1) gives an entry signal when entering any car, and the servo motor lifts the barrier up and enters the car. The number of parking decreases, and the new number appears on the LCD. after the car passes through the other sensor (sensor 2), the barrier goes down. And when a car leaves the parking, sensor(2) gives an exit signal, and the servo motor lifts the barrier up for the car to pass, empty space is recorded, and the new number appears on the LCD. but also the barrier does not go down until the car passes through the other sensor (sensor 1). When the Parking is full of cars, the LCD prints “ Sorry Parking Full” and the servo doesn’t lift the barrier up

❖ Components required in this project:

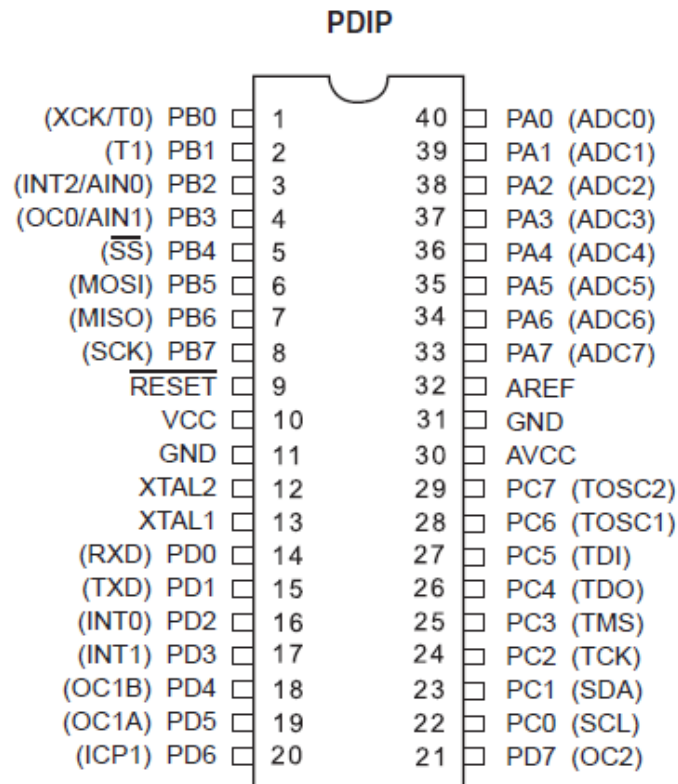
- 1) Atmega 16A (microcontroller).
 - 2) 16×2 LCD Display.
 - 3) Infrared Sensor (IR Sensor) x2.
 - 4) Servo Motor (SG90).
 - 5) Green-Red-Yellow-Blue LEDs.
 - 6) Breadboard and jump wires.
 - 7) Resistor 1KOhm-4.7KOhm.
 - 8) Resistor 330 Ohm ×6 .
 - 9) Power Supply 220V to 5 V.
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❖ Atmega 16A:

The ATmega16A is a low-power 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16A achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

- In our project working 8 MIPS at 8MHz

❖ Pinout Diagram:



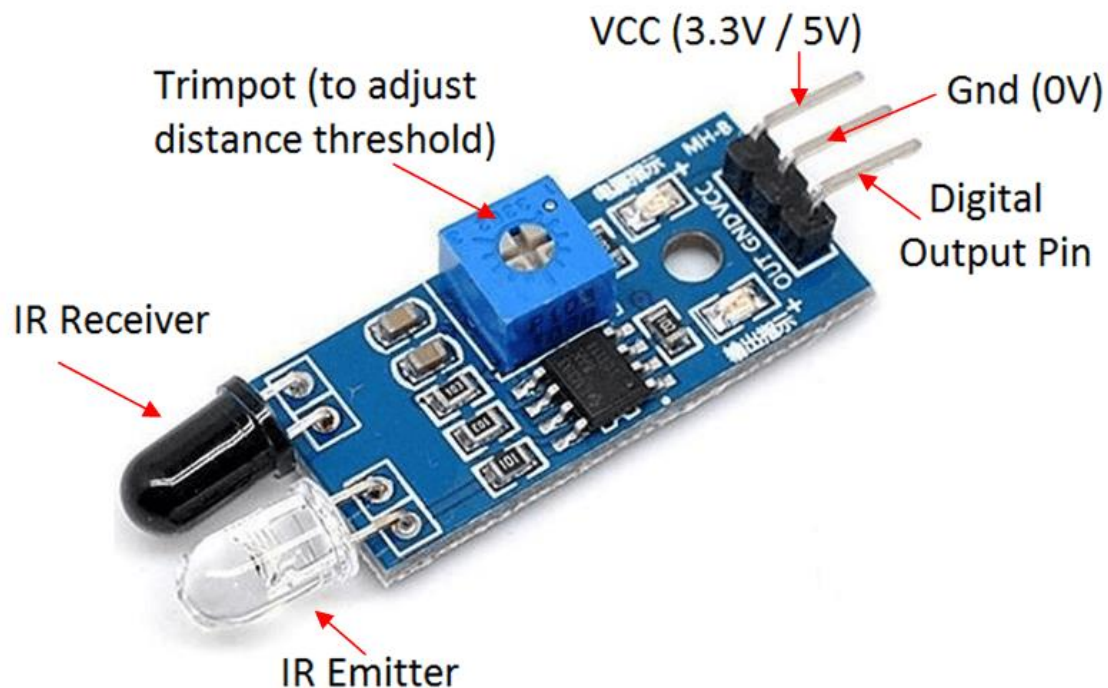
1) Infrared (IR) Sensor:

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment.

IR sensors have two parts:

- A light-emitting diode (LED).
- A receiver.

When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots).



2) Servo motor:

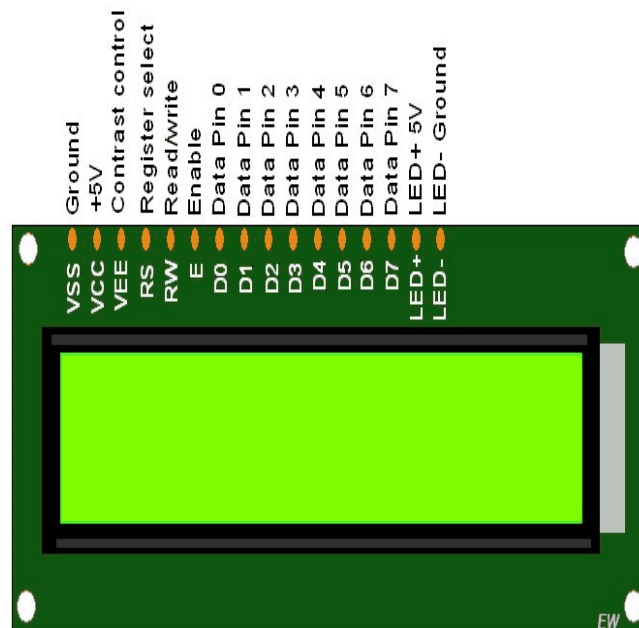
A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft , this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance , then you use a servo motor. It is just made up of a simple motor which runs through a servo mechanism. If motor is powered by a DC power supply then it is called DC servo motor , and if it is AC-powered motor then it is called AC servo motor. Apart from these major classifications, there are many other types of servo motors based on the type of gear arrangement and operating characteristics. A servo motor usually comes with a gear arrangement that allows us to get a very high torque servo motor in small and lightweight packages. Due to these features, they are being used in many applications like: toy car, RC helicopters and planes, Robotics, etc.



3) 16×2 LCD Display:

On the other hand, we will use a 16x2 LCD to show the distance , 16×2 LCD is a 32 digits display screen. This word comes from the liquid crystal and 16X2 represents its screen size. So, it will have 32 characters ($16 \times 2 = 32$) in total and each character will be made of 5×8 Pixel Dots

Pinout Diagram



The connection of the circuit:

1) 16×2 LCD Display

pins	LCD	Atmega16A
1	GND	GND
2	VCC	5 V
3	V0	Resistor 1K – 4.7K
4	RS	PB0
5	RW	PB1
6	E	PB2
7	D0	PA0
8	D1	PA1
9	D2	PA2
10	D3	PA3
11	D4	PA4
12	D5	PA5
13	D6	PA6
14	D7	PA7
15	BL LED	Resistor 100 - 5 V
16	BL LED	GND

2) IR1

pins	IR1	Atmega16A
1	OUT	PC0
2	GND	GND
3	VCC	5 V

3) IR2

pins	IR2	Atmega16A
1	OUT	PC1
2	GND	GND
3	VCC	5 V

4) Servo Motor

pins	IR2	Atmega16A
1	Servo	PD4
2	GND	GND
3	VCC	5 V