Smart Parking Application

Outline

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- System Implementations .

- System Main Components .

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- Conclusions and Recommendations .

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Introduction

□ The goal of parking system project is to reserve parking spot for a car/vehicle before it arrives .

□ One of the most problems that the driver faces is finding a free parking spot , so many driver stopping their cars at the edges of the street .
Therefor, we choose this project
to prevent the frustration of
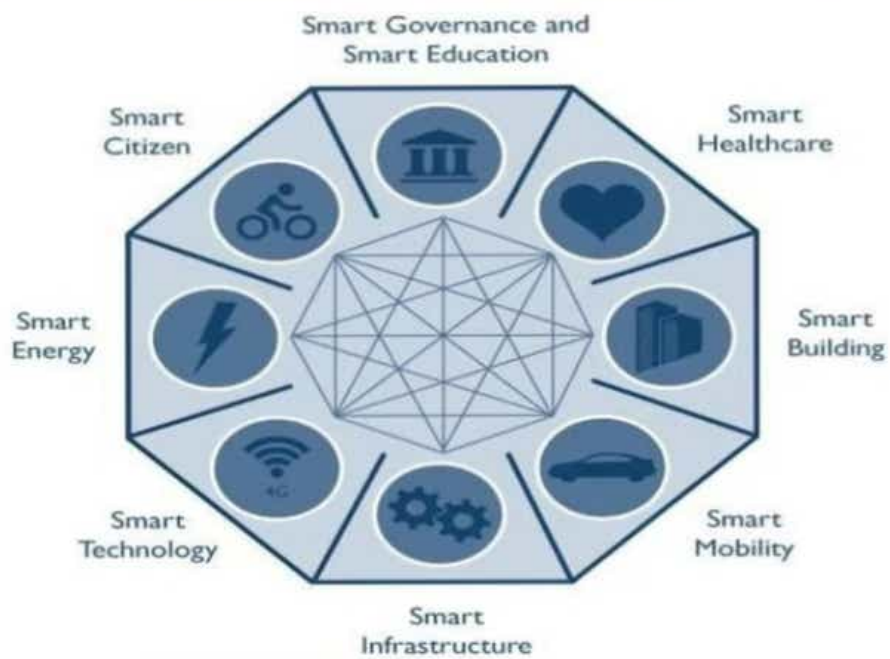finding a parking spot and they
can reserve a spot when they stay
at home.

System Motivations

- Save time .

- Reduce fuel consumption .

- User friendly system .

- Controllable system .

- Become more important in the urban crisis .
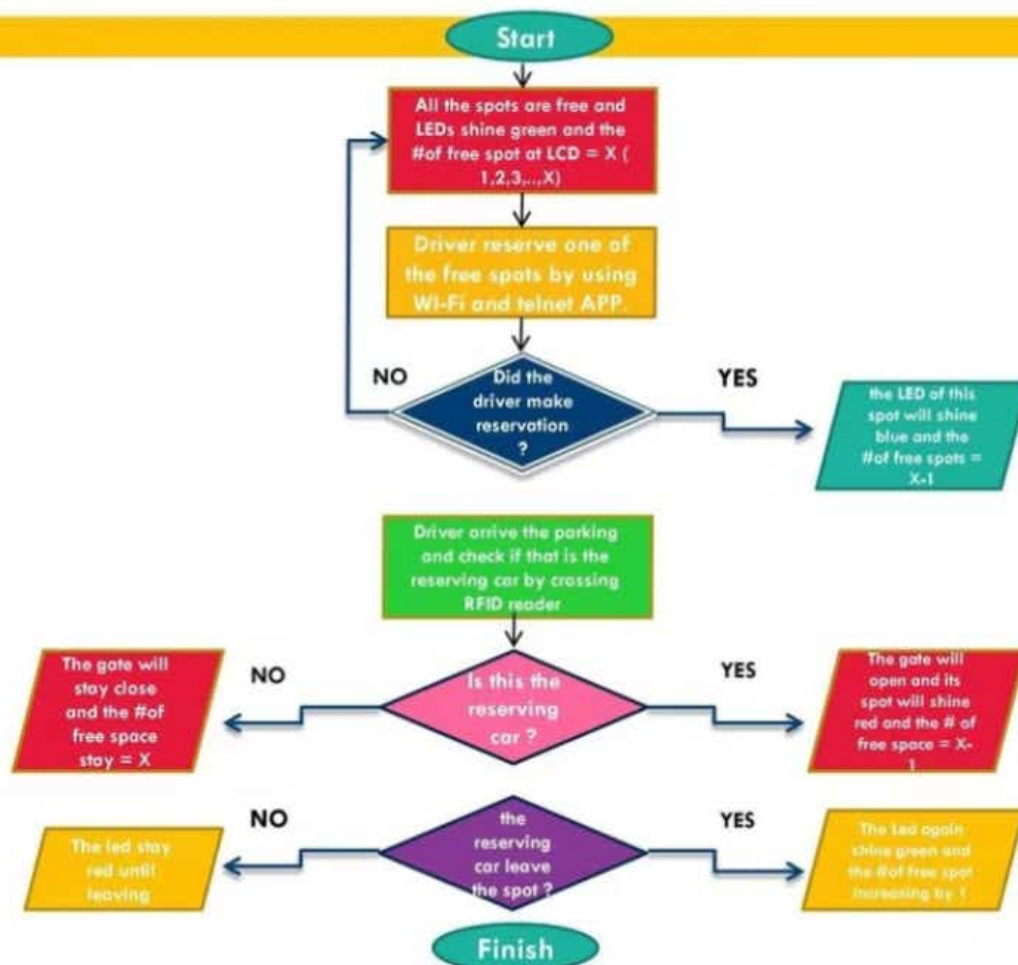
- Make a smart city and climbed for the best .

System Motivations

SMART CITY CONCEPTS

Smart Governance and
Smart Education

Smart
Citizen

Smart
Healthcare

Smart
Energy

Smart
Building

Smart
Technology

Smart
Mobility

Smart
Infrastructure

Source: Frost & Sullivan

System Methodology and Flow-Chart

System Implementations

System Main Components

Arduino MEGA

The Arduino Mega is a microcontroller board . It has 54 digital input/output pins , 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection , and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started .

In our project I we used Arduino UNO but it doesn't have enough pins , but Arduino MEGA does .
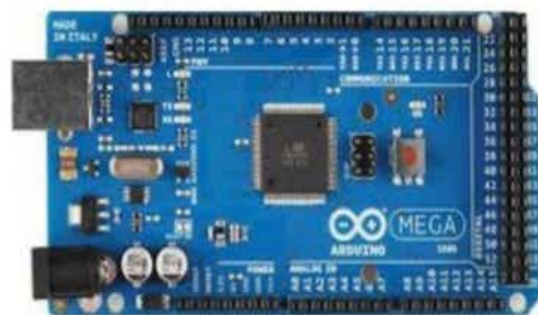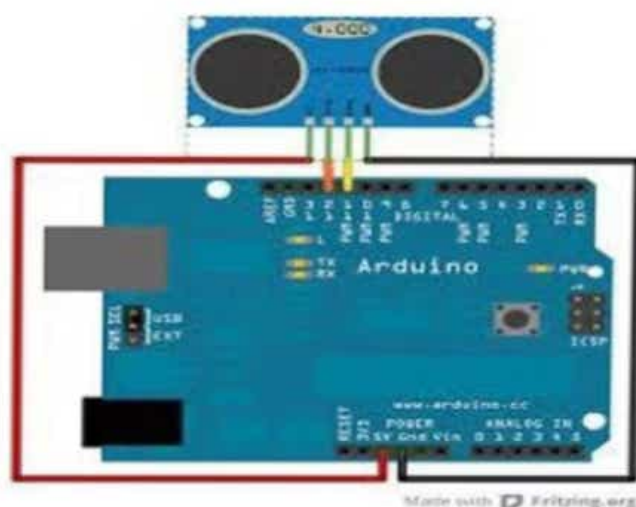
System Main Components

Ultrasonic Sensor

Ultrasonic sensors are devices that use electrical–mechanical energy transformation to measure distance from the sensor to the target object .
In our project we use it to detect the presence of a car in the spot to change the color of LEDs in deferent cases .
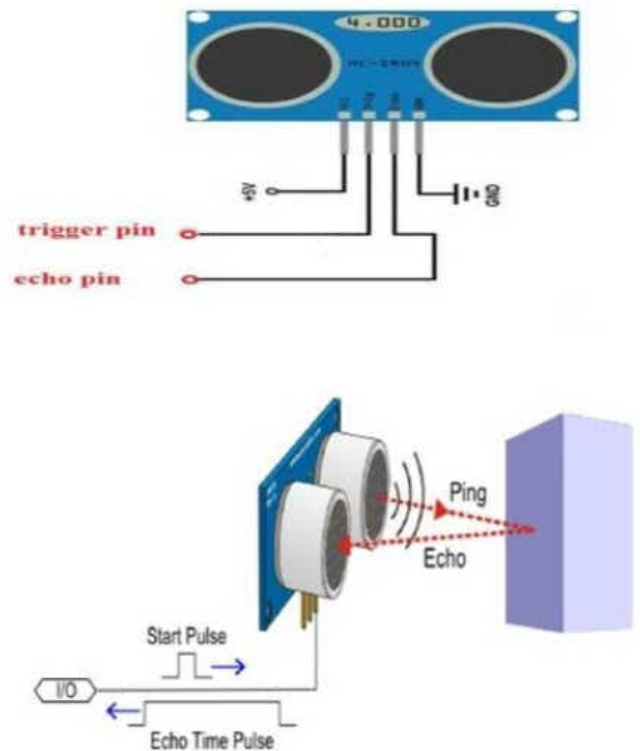
System Main Components
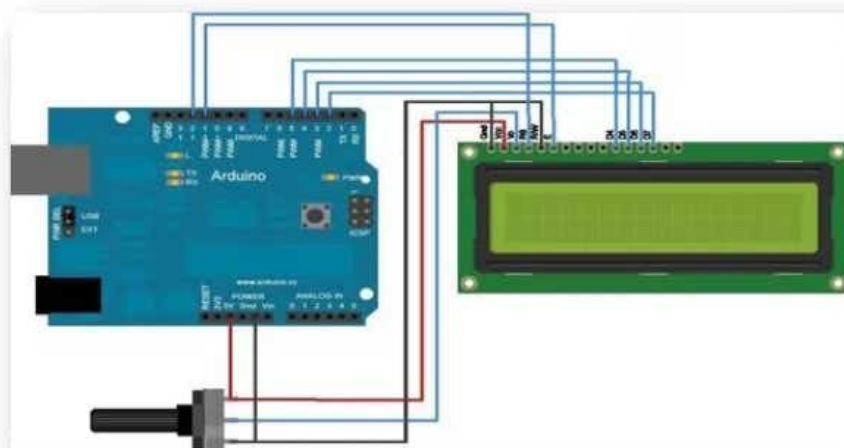
Interfacing Ultrasonic With Arduino

System Main Components

LCD (Liquid Crystal Display)

in our project we used LCD to show the # of free spot and their location in the parking .

System Main Components

Interfacing LCD With Arduino

System Main Components

RFID Reader (Radio Frequency Identification)

RFID system consists of 2 parts. A Reader, and one or more transponders , also known as Tags.
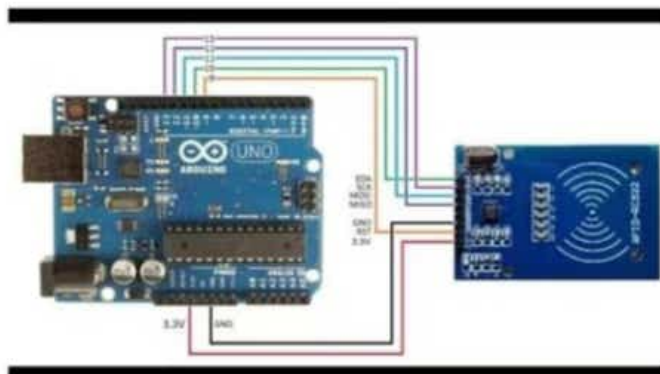
RFID systems evolved from barcode labels as a means to automatically identify and track products and people .

In our project we use an RFID reader at the entrance of the parking and RFID tags under the cars to identify the reserving car and making the gate open for it .

System Main Components

Interfacing RFID With Arduino
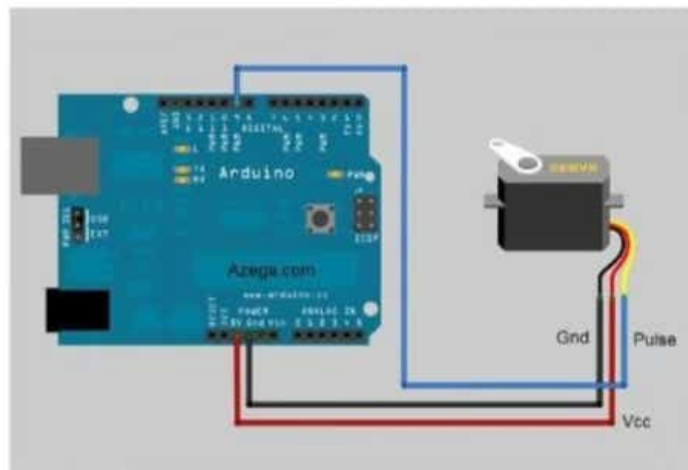
System Main Components

Servo Motor

Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. In our project we used a servo motor to control opening and closing the gate at the entrance of the parking .

System Main Components

Interfacing Servo Motor With Arduino

System Main Components

ESP8266 Serial Wi-Fi Module

ESP8266 ESP-01 Serial WIFI Transceiver Module is a cheap and easy way to connect any small microcontroller platform, like Arduino, wirelessly to Internet .

In our project we use it to make private network so we reserve a spot (for terminals we have internet in our city street) .
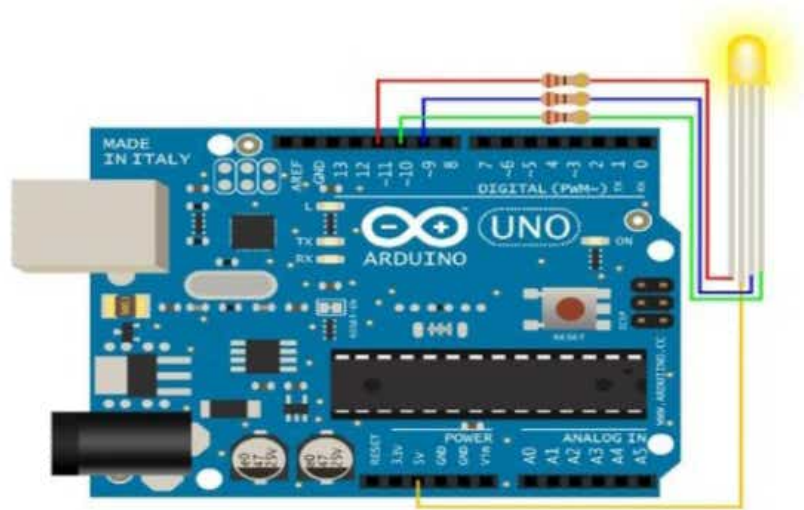
System Main Components

RGB – LEDs (Red , Green , Blue)

These units have four pins - Cathode is the longest pin. One for each color and a common cathode. Use this one LED for three status indicators or pulse width modulate all three and get mixed colors . We use it in our project to indicate the state of spot , if the spot is free the LED is green , if it is reserved the LED is blue , and if it is full the LED is red .

COMMON ANODE RGB LED
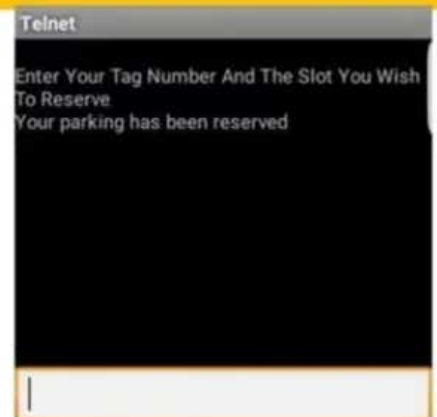
System Main Components

Interfacing RGB LED with Arduino

System Main Components

Telnet Application

Is an application layer protocol used on the internet or local area networks .

System Discussion and SWOT Analysis

Strengths — S
- Saves time and energy
- Easy to implement
- Free and easy access to the App
- Manage the parking system

Weaknesses — W
- single point of failure
- Jamming R.F frequency interference
- Parking at the center of ultrasonic sensor

Opportunities — O
- Can be implemented in any parking system (university, offices, etc.
- Save in nature (reduce pollution)

Threats — T
- To be acceptable by the driver culture
- There are similar application developed in world wide .

Conclusions and Recommendations

- Reliable, well functioning system model for smart parking system.
- This system Built to identify the main problem
- Propose a solution
- Start the implementations of design .

Future Work

- Expanding the system .

- Draw the way of cars in the ground of the parking to make the presses of entering the reserving cars to the spots more ease .

- Add more features as SMS notifications or remote communication .

- Add more features to the Telnet program to help the drivers more and more .