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TITLE: SMART CAR PARKING SYSTEM

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Outline :

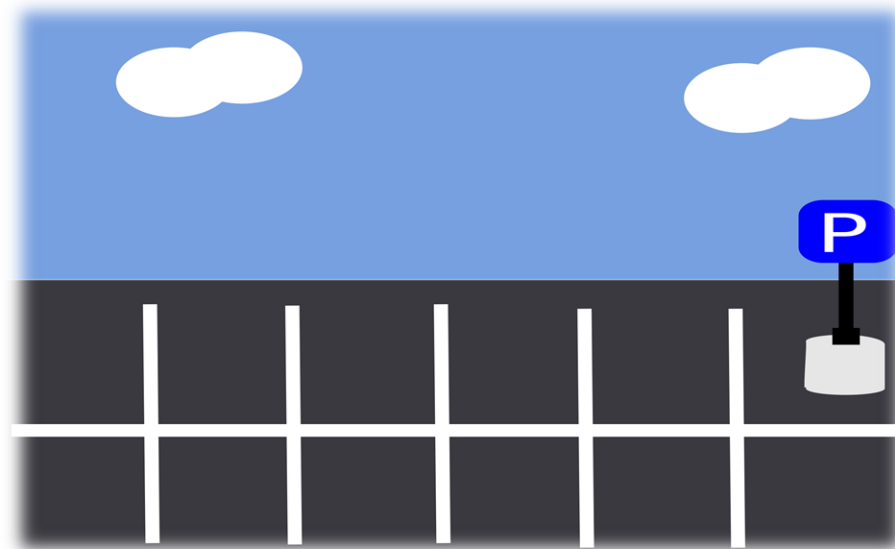
- What is **smart Parking System**.
- System Unit.
- Main features.
- Problems
- Future Work
- Conclusion.

What is smart Parking System

❖ **Smart parking system** is an integrated system to organize cars in public parks.

The system will be used for every slot in park.

The motivation of this project is to help drivers. And make the payment way easier.

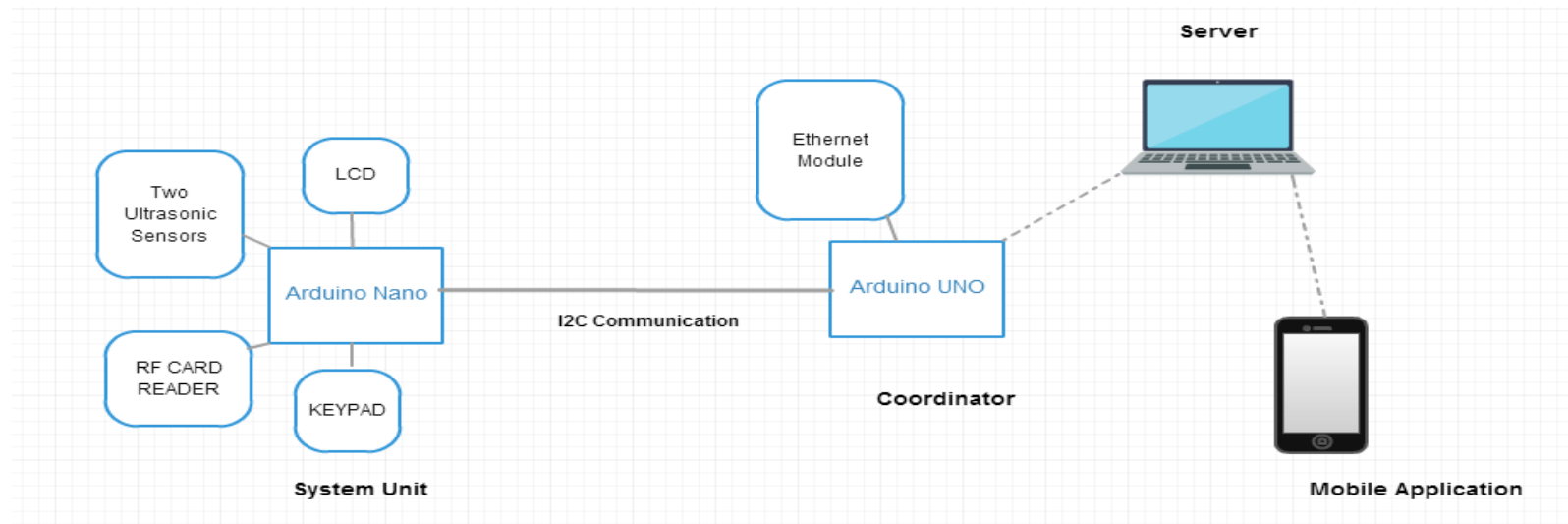


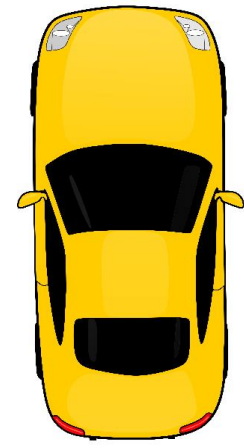
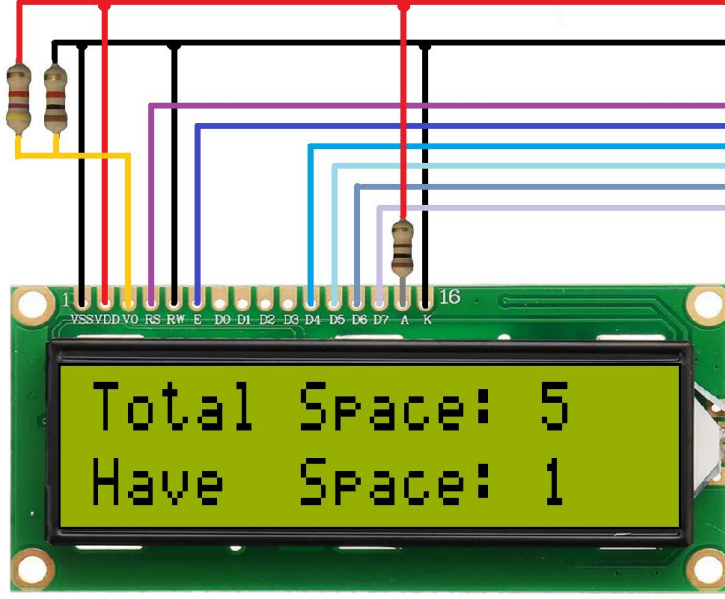
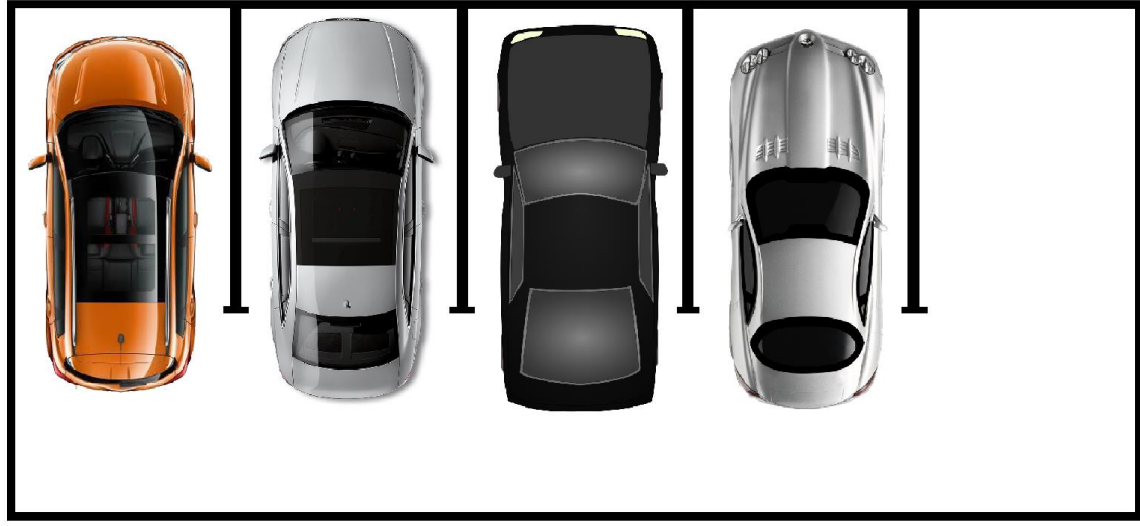
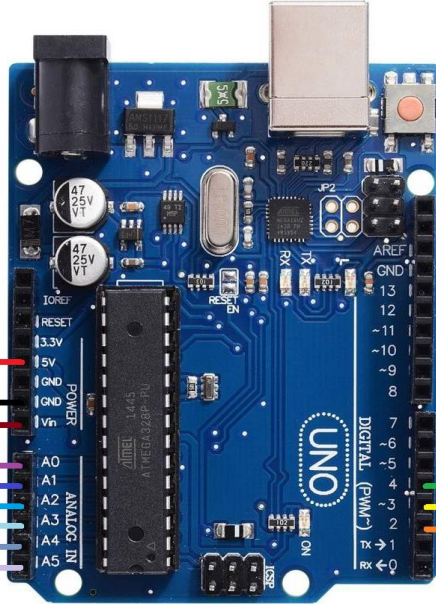
What is smart Parking System

Our projects consist of two sides, the first one is the **main unit**, and this unit will be located in every spot in the parking lot.

These units will be connected with our second, **the coordinator**.

So every coordinator will control the information from and to the units connected with it.





System Unit

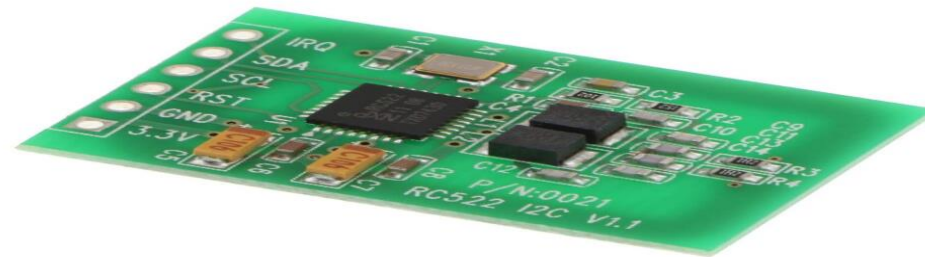
Every spot in the parking lot will contain the main unit.

Our unit consist of:

- ❖ Arduino Nano .
- ❖ IR sensors.
- ❖ Keypad.
- ❖ LCD.

System Unit

- ❖ The system will detect the existence of a car in the slot using sensors.
- ❖ The system will use **RF** reader for automatic payment.
- ❖ The system also will use a **display** and a **keypad** for the interaction with the user, like interaction for entering information about the time needed. Or interaction for payment if the user forget the card.



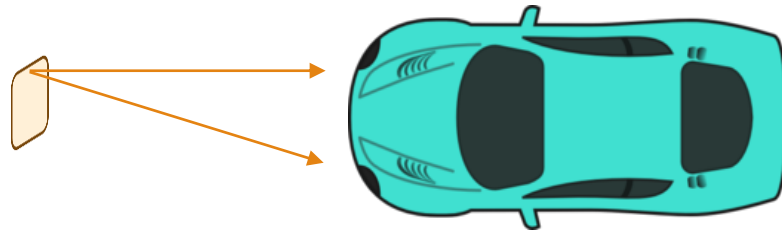
RF READER

Main features

- ❖ Car detection.
- ❖ Check In to the system using phone number or RF Card.
- ❖ Automatic payment using phone number or RF Card.
- ❖ Check Out using phone number and RF Card.

Car detection.

- ❖ The **detection** of a car is done by using the **IR sensor**. We use two **ultrasonic** sensor for detection.
- ❖ We have to take in mind that the system will not consider a moving body as a car, so one sensor will not be enough, we have to detect the existence of the car from different points and distances.



Car detection

- ❖ There are things we considered when using more than one IR sensor:
- ❖ Collision and interference between the IR sensor:
the reading of the two sensors at this way will not affect each other.
- ❖ Timing between multiple readings for the sensors.
- ❖ Since we can't read the two sensor at the same time, we read them one after another. The time between the two readings is very small less than one second, so if there's a car detected by one sensor then it will be detected by the other one.

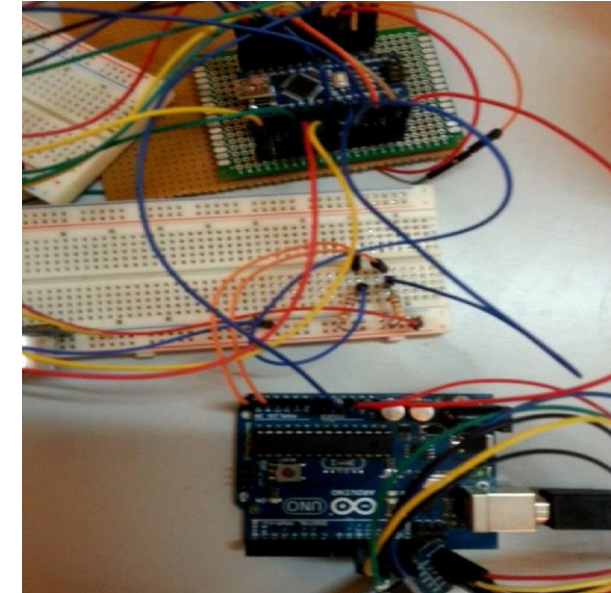
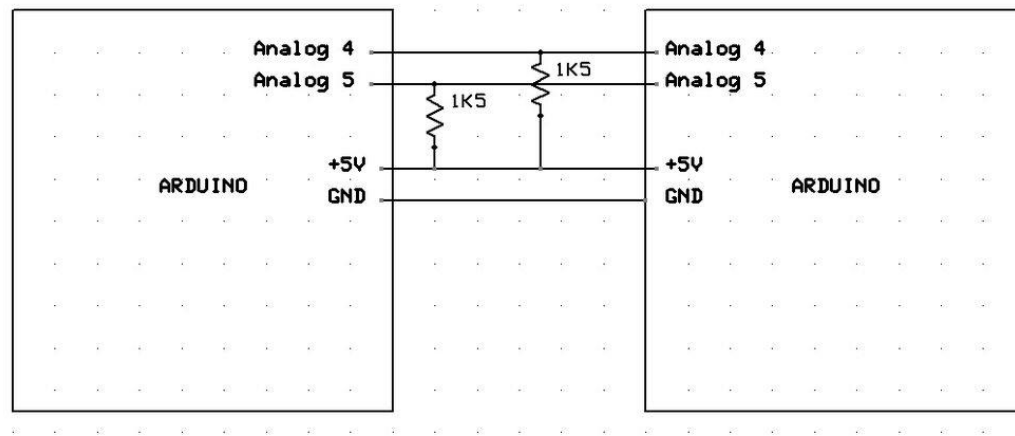
State of the System

There is three main states in the system after a car detected.

- ❖ The **check in** state, **payment** and **checkout** state.
- ❖ The user will use the keypad and LCD in every state. there's more than way that the user can choose, either by phone or by RF card reader or by entering the card number.

Communication between the Arduino's

- ❖ We use I2C to communicate. The coordinator will be the master, and the other units will be connected as a slave.(IOT)
- ❖ The coordinator will continuously request data from each unit.



The information sent will contain the state of the unit, the way that the unit will use in each state also the phone number or the RF number.

Problems

Communication between multiple Arduino's:

- ❖ There are a lot of ways to communicate between Arduino's like **UART**, **SPI** and **I2C**.
- ❖ In The **UART** only one device can send data to another.
- ❖ **SPI** and **I2C** use addressing. But **SPI** is more costly. Each slave you add, adds 1 **I/O** pin on the master. In the other hand, **I2C** just needs two lines. And you can add up to 127 slave to the master without extra hardware or running out of pins on the master.
- ❖ So our project is done by using **I2C**
- ❖ Using **I2C** we can connect the coordinator with much more units up to 127 without using extra hardware.

Future Work

1. We can add a **GPS** module to store the location for every unit.
2. Adding other **ultrasonic** sensor would be more efficient.
3. Also we can implement other ways for the payment. For example connect the payment with the bank account for the user.
4. And to make our project more useful in our countries, we could integrate our system with the ordinary way of payment.

Conclusion

What is **smart parking system**?

- ❖ Our **smart parking system project** is planned to be integrated with another software application to help drivers to find the empty spot in parking lot more easily with less time.
- ❖ Also our project implement most of the functionalities needed in a parking lot. for example, implement an automatic way for payment.

A top-down photograph of a workspace. A silver laptop with a black keyboard is partially visible. A brown paper envelope is open, and a white card with the words "Thank you" in black cursive script is placed on top of it. A black and silver ballpoint pen lies diagonally across the card and envelope. The entire scene is set on a light-colored wooden surface.

Thank you