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PARKTRONIC SYSTEM BASED ON ARDUINO UNO BOARD[6]

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Abstract: *The parktronic system is made to help drivers to park in reverse or for signal if there is something behind them. It only works when the car is on reverse. It's really useful because can warn you if there is object behind you. It prevents accidents. I made a parktronic system with the help of Arduino board. I used us-020 ultrasonic sensor, ld-bzpn-2312 for sound signal and 2 LEDs (green and red). I made and tested the system in laboratory and it works..*

Keywords: *Parktronic, Arduino, Smart parking system*

Introduction

In the last few years Iraqi government is applying electronic services in order to provide a good and fast services to the citizens (Mohammed, Kadhim, Fuad and Jaber, 2014). The mobile application plays important role in public sector services (Anad, Kadhim, Mohammed and Albo baqer, 2018). It can also apply to the private sector such as- smart parking. The improvement of the current economic circumstances has helped many people to live luxuriously. Undoubtedly, having a vehicle is one of these luxuries (Yang, Portilla and Riesgo, 2012). The increase in the number of vehicles led to a shortage of parking places and severe traffic jams. Thus, this study addresses this problem by suggesting a way of booking a parking place through smart mobile applications. The drivers can space not find parking lot easily, thus, drivers park everywhere (Kianpisheh et al., 2012). The problem of not having enough parking places is a common problem in Iraq, even before this high increase in population. The idea of regulating the use of public parking places is based on the philosophy that they are (Kianpisheh et al., 2012), Smart parking system (SPS) architecture with the ultrasonic detector (Grodi, Rawat, & Rios-Gutierrez, 2016).

One of the electronic systems found in every modern car is the parking assistant, better known as the "parktronic". This is extremely useful parking assist and reverse movement system, giving you information about the environment that is not visible to us. The system has numerous advantages, especially in an urban environment. It can save you a lot of problems.

The parkronics are usually part of the factory or optional equipment of most modern cars, but there are others with many features and extras on the market.

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Types of parktronic systems:

Parkronic systems work on a relatively simple principle, relying on sensors that are located in the rear or front bumper (or both) and transmit signals to the surroundings around you. It is "visualized" on a display located in a comfortable position for the driver. Some models also have a camera that is most often placed on the rear-view mirror.

Parktronic systems differ in their sensors, which can be infrared, ultrasonic or electromagnetic. Infrared sensors are more desirable because they are influenced by external factors.

The ultrasonic sensors are the most common. The sensor functions as a transmitter and receiver at the same time. It emits a "beam" at a distance of up to 1.5 meters. When an object appears, the beam is reflected and returns to the sensor that sends information to the control block that calculates the exact distance to the object. Depending on the distance, some parktronic systems only output an acoustic signal whose intensity increases as the subject approaches.

Electromagnetic parktronic systems are a good solution if you do not want to hoist your bumpers (mounted behind the bumper). In this type, the correct installation is very important to avoid interference. They can count distances up to 5 cm.

The minimum response distance may vary from 25 to 10 cm and the maximum 50 to 40 depending on the model of the system and the maximum is not adjustable or its not recommended. Some parktronics support auto-on feature when quickly approaching an object, Mahir Hassan Kadhim, (2018).

I used ultrasonic sensor because it can transmit and receive information in the same time and it emits beam which can reflect any object behind them and I used sound signal too to inform the driver when he is close enough.

Exposition:

Attempt to make a parktronic system and used elements:

- Arduino Uno plate with ATMEGA328P-PU processor;
- Ultrasonic sensor US-020;
- Sound signaling LD-BZPN-2312;
- 1 green LED;
- 1 LED-red;

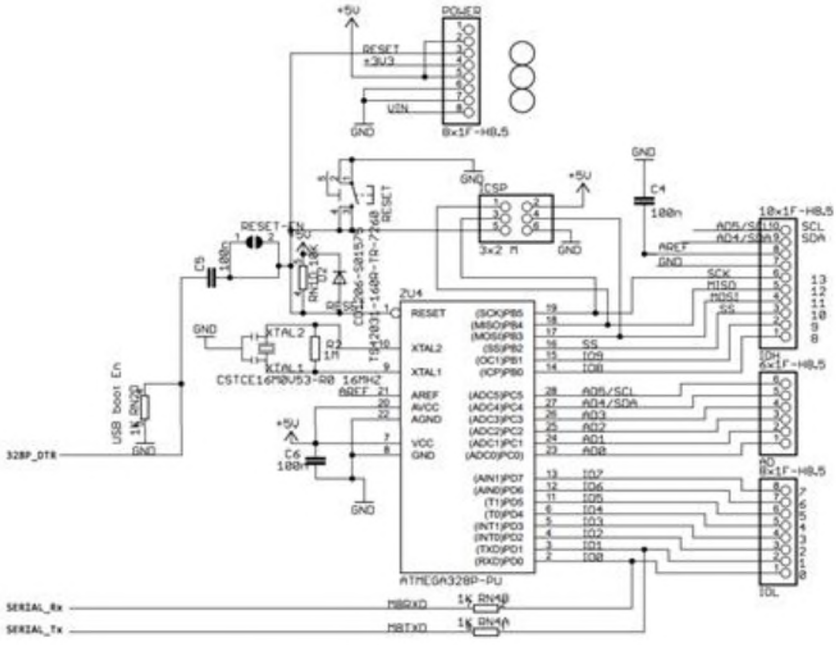

Fig.1. Arduino Uno scheme

Explanation:

Arduino Uno is a microcontroller board based on an 8 bit ATmega328P microcontroller (we can see scheme of the processor in fig.3 and 4). Together with the processor it contains other components such as crystal oscillator, serial communicator, voltage regulator and others that support the operation of the microcontroller. Arduino Uno has 14 digital input / output pins, 6 analog input pins, USB connection, power socket, ICSP and reset button.

The 14 digital input / output pins can be used as input or output using pinMode , digitalRead and digitalWrite functions. Each pin works at 5V and can provide or receive a maximum of 40 mA, has a resistor of 20-50 KOhms. Some of these 14 pins have a specific function. The picture and scheme of Arduino board are in fig.1 and firg. 2.

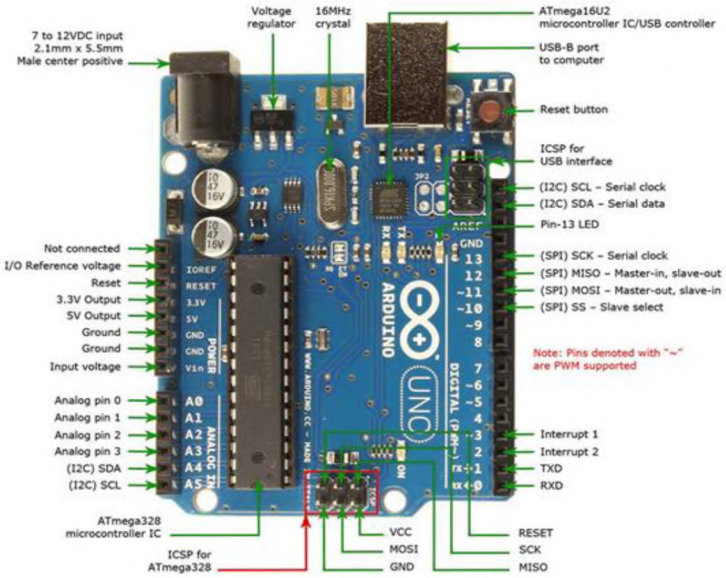

Fig.2. Arduino Uno picture

Software:

IDE (integrated development environment) is necessary to program the board. Once installed, the board connects to the computer via a USB cable. Once connected, the correct board and port to which it is connected is selected.

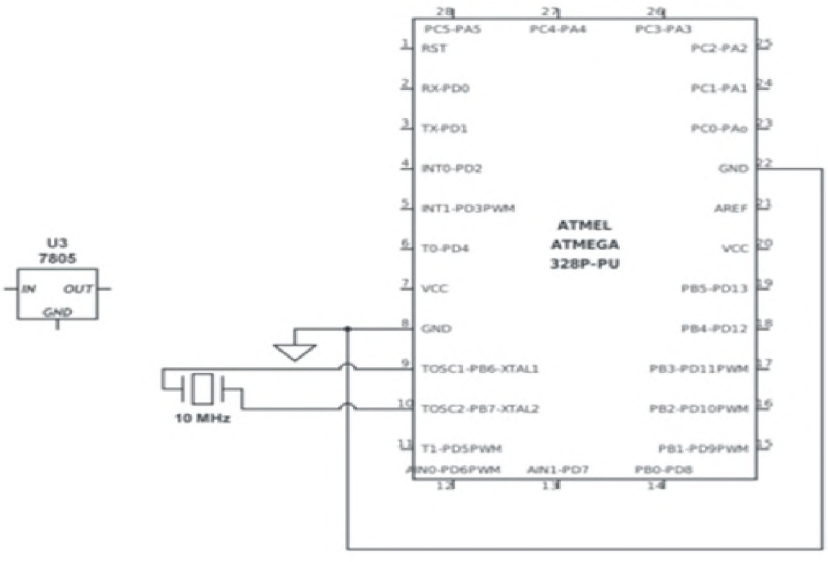

Fig.3. ATmega 328P-PU schematic

US-020 ultrasonic sensor:

Uses a sonar to distinguish the distance between objects. Offers excellent range accuracy and robust readings. Its effect is not affected by sunlight or black material like sharp rangefinders. We can see what the ultrasonic sensor looks and how its connected to the board in fig.4.

Ultrasonic Unit US-020 provides 2cm to 700cm contactless distance. Accuracy of distance up to 3mm. The module includes an ultrasonic transmitter, a receiver and a control circuit.

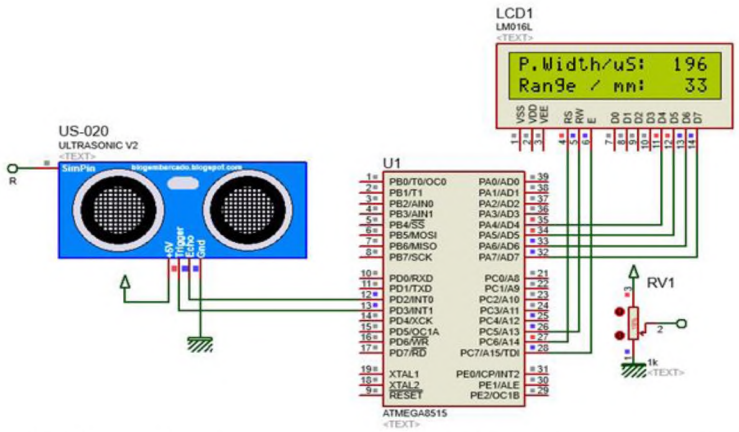

Fig. 4. Ultrasonic sensor connected to microprocessor and LCD

LD-BZPN-2312 Sound Signal:

- Operating current (mA) 5
- Tolerance (Hz) + -500
- Diameter (mm) 30
- Height (mm) 23
- Raster between fittings. cf. (mm) 5
- Rezon. honor. (kHz) 28
- Capacity (nF) 4
- Measure. honor. C (Hz) 24
- Sound level 120
- Operating temperature (C) 80 dB (d = 0.3 m)
- Fixing -20 ... 60
- Self Adhesive x

The picture of the module is in fig.5.

Fig.5. LD-BZPN-2312 sound module picture

Conclusions

Parktronics are used in cars to prevent bumping into objects when driving in reverse. The advantages of the ultrasound sensors are cheap elements and they can detect obstacle even if they are not moving. Disadvantages are the user have to drill a hole into his bumper, the cannot detect any obstacle towards the side of the car, sometimes miss small objects.

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REFERENCES

Anad, M. M., Kadhim, M. H,. Mohammed M. A. & Albo baqer, K., (2018), *Follow-up Management System via Using Mobile Application (Follow App) in Public Sector*, Journal of Engineering and Applied Sciences, 13(1), pp. 2420-2423.

Kianpisheh, A. et al., (2012), '*Smart Parking System (SPS) architecture using ultrasonic detector'*, International Journal of Software Engineering and its Applications, 6(3), pp. 51–58.

Yang, J., Portilla, J., & Riesgo, T. (2012, October). *Smart parking service based on Wireless Sensor Networks*. In IECON 2012-38th Annual Conference on IEEE Industrial Electronics Society, pp. 6029- 6034.

Grodi, R., Rawat, D. B., & Rios-Gutierrez, F, (2016), *Smart parking: Parking occupancy monitoring and visualization system for smart cities*. In SoutheastCon, 2016, pp. 1-5.

Mahir Hassan Kadhim, (2018), *Arduino Smart Parking Manage System based on Ultrasonic Internet of Things (IoT) Technologies,* October 2018International Journal of Engineering and Technology VOL 7, NO 3.20, pp.494-501.