SMART PARKING USING IOT

Problem statement:

By using ultrasonic sensors be able to keep a record of the number of cars parked inside of a parking garage.

Consequently, once a car enters a parking garage followed by a parking space, a ping ultrasonic sensor will then be able to determine if a car is parked in the space or not.

This information would then be relayed to update the network.

sensors work on a principle of interpreting echoes from radio or sound waves, which are used to determine an objects characteristics.

Moreover, ultrasonic sensors generate high frequency sound waves, which are radiated in a given medium and then evaluated by the echo of the signal received back by the sensor.

Lastly the sensors are widely used to calculate the time interval between the sending and receiving of a signal, which can be used to determine the distance to an object.

"Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

The technology is limited by the shapes of surfaces and the density or consistency of the material. For example foam on the surface of a fluid in a tank could distort a reading."

Design thinking:

By placing a Ping Ultrasonic Range Finder detector one can determine if a parking space is available or not.

If the sensor is placed on a pole that points downwards toward the center of the parking spot, then data can collected of whether the spot is free or not.

In this application a proposed solution is to assume that if the ultrasonic sensor reads that there is an object within 3 feet forward of the sensor, then a car is assumed to be parked in the parking spot.

Alternatively if an object is not read within three feet of the parking spot, then the spot is assumed to be free.

Interfacing the ultrasonic sensor with the arduino microcontroller was used to determine whether a given parking space was occupied or not.

Therefore, if a given parking space is occupied as a car passes by then a red arrow is used to direct the car to a free location.

Thus, once a free space is found a green arrow appears and replaces the red arrow in the cars new proposed direction.

Project idea:

- **The arduino microcontroller was used to serially communicate with the ping ultrasonic sensor.**
- **Thus, if an object is less than 3 feet away then a low voltage is sent serially to the arduino software processing.**
- **The processing software is then used to draw a simulation of a car moving through a parking lot which is directed by a red arrow.**

- **Once a free parking spot is found the arrow turns green letting the driver know that a free spot was found.**
- **The driver is then able to conveniently park at their given destination.**