

# EMPTY PARKING SLOT DETECTION



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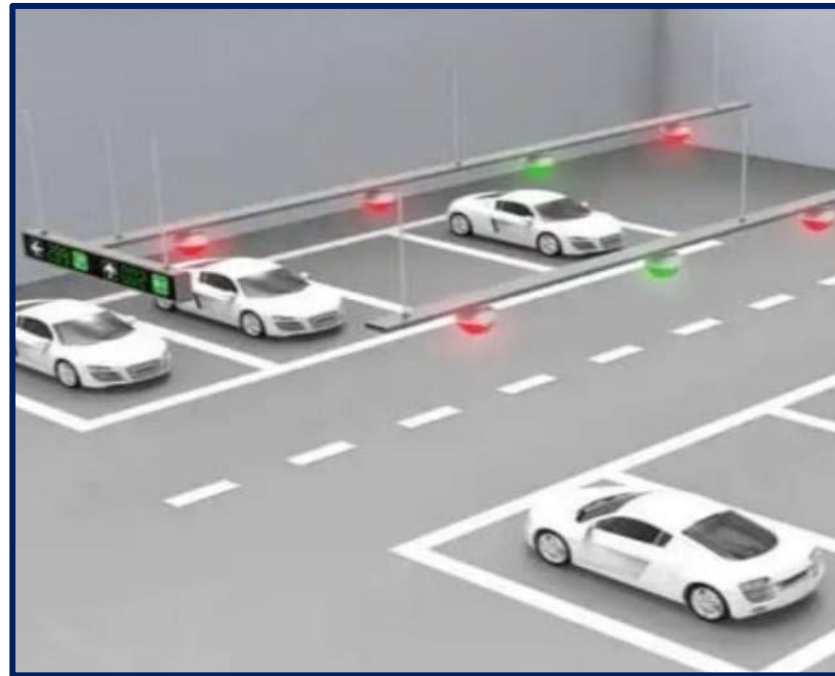
# ABSTRACT

After years of technological advances, parking is still a problem for many people. It is a **time-consuming task** that we all have to face on a *day-by-day basis* and it is also a problem for cities, that's how **traffic increases**.

This project is aimed at detecting empty parking slots with the help of ultrasonic sensor. Empty slot is accompanied by a glowing light. The numbers of the empty slots can be displayed at the entrance of that particular parking floor. The security guards have an app displaying the same to further assist in finding parking space.

# OBJECTIVE

Here based on parking lot monitoring, each parking spot is equipped with a sensor to detect the presence/absence of vehicles.



*Figure 1. Parking lots with sensor detection*

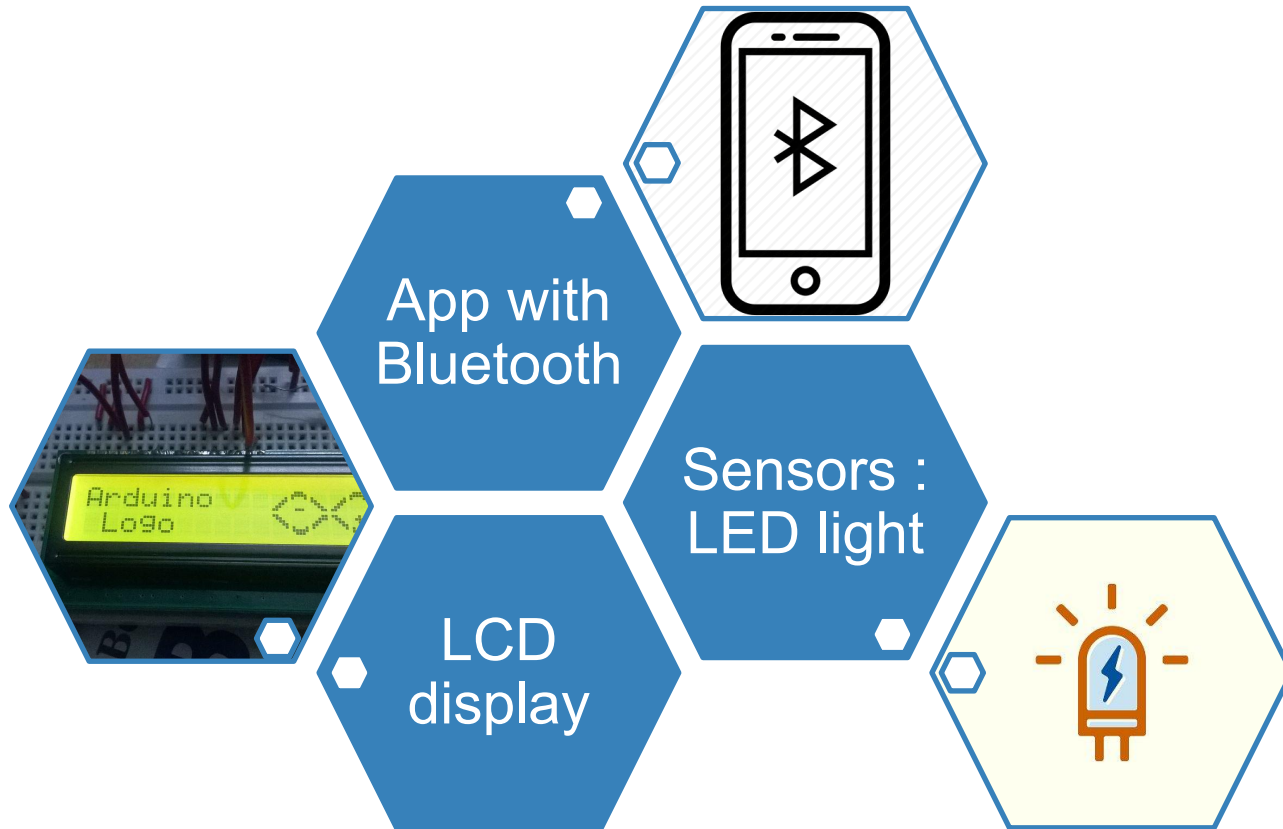
# EXISTING SYSTEM

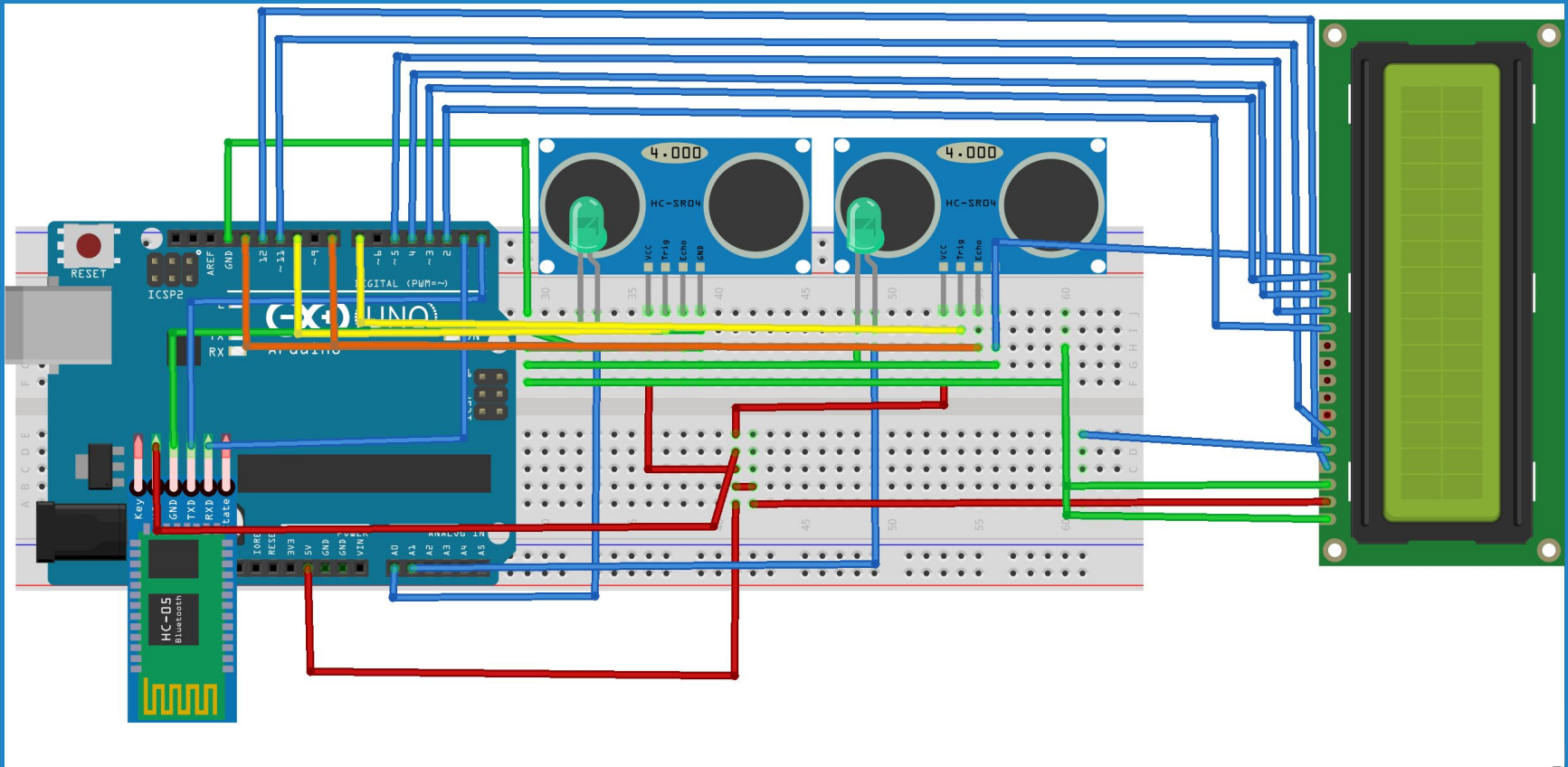
- ✓ Various guards are appointed on each floor to guide the customers to an empty slot for parking.
- ✓ In case that particular floor is filled guards are at the gate to guide the customers to the next floor.
- ✓ In other cases, empty slots will be indicated with square box.

# PROPOSED SYSTEM

- ✓ Let us imagine a row with two slots to park the car.
- ✓ The slots without car is indicated, with green coloured light which is nothing but to detect empty slots and with cars are indicated with absence of lights.
- ✓ Also, we are providing an app which displays the slots that are **empty** and **booked**.
- ✓ The person is able to view the empty slot numbers at the entrance and park accordingly.

# SCOPE





# CIRCUIT DESIGN





# SYSTEM DESIGN

# TECHNOLOGIES

## Hardware Components

- ✓ Arduino
- ✓ Bluetooth Module
- ✓ Ultrasonic Sensors -2
- ✓ LED-2
- ✓ LCD Display
- ✓ Bread Board
- ✓ Connecting Wires

## Software Requirements

- ✓ Arduino Platform IDE (1.8.5)
- ✓ Language: C like
- ✓ Park Assistor App
- ✓ Platform for app: MIT App Inventor

# DIAGRAMMATIC REPRESENTATIONS (UML)

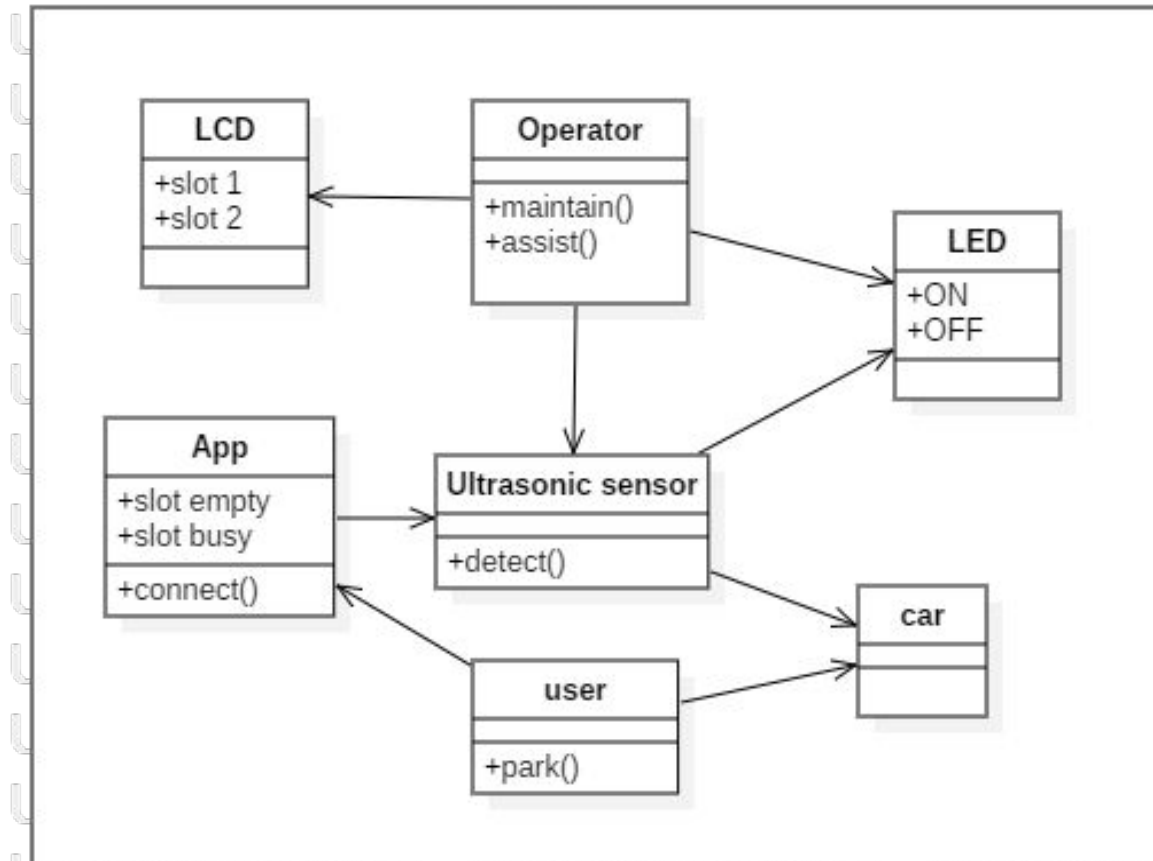
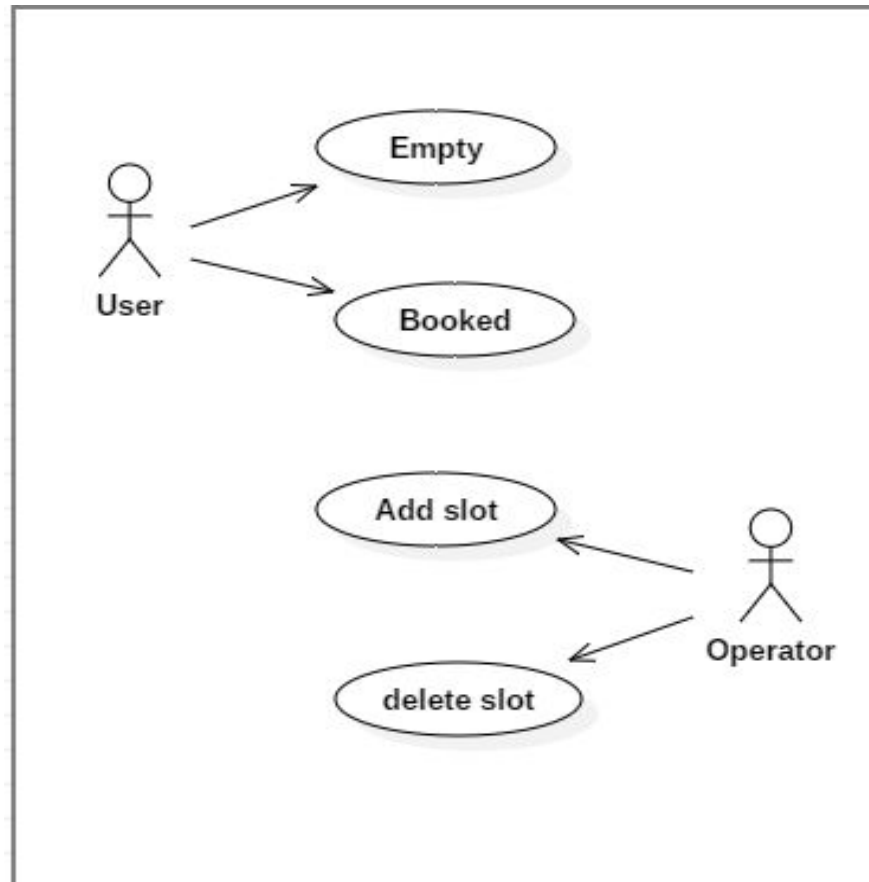
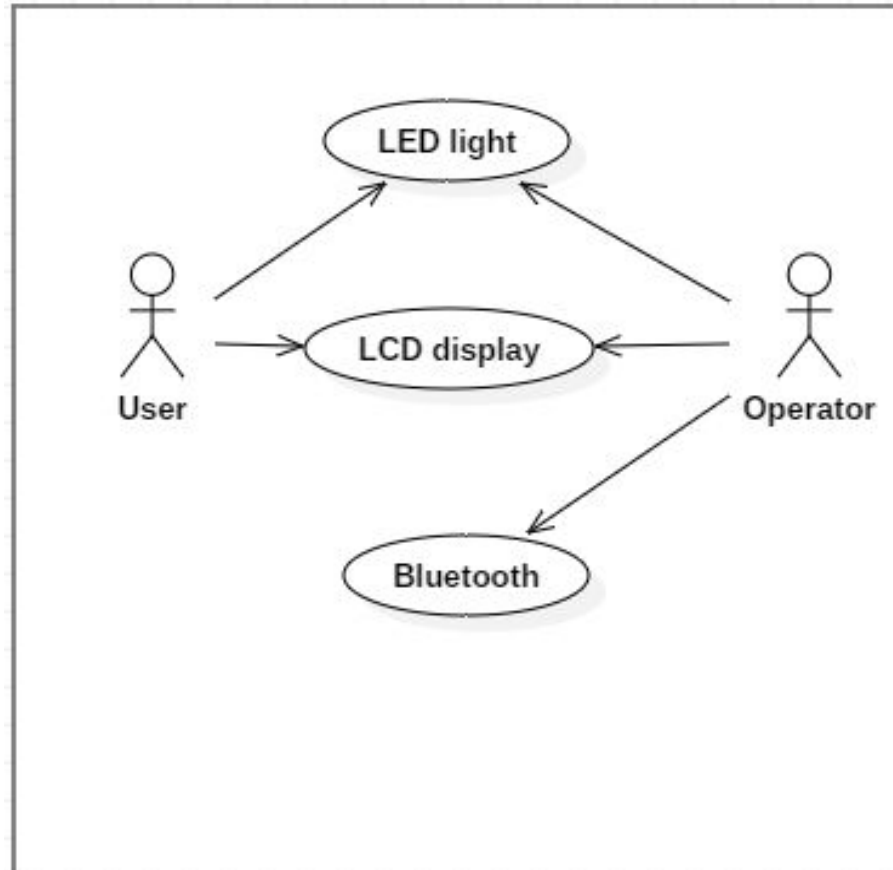


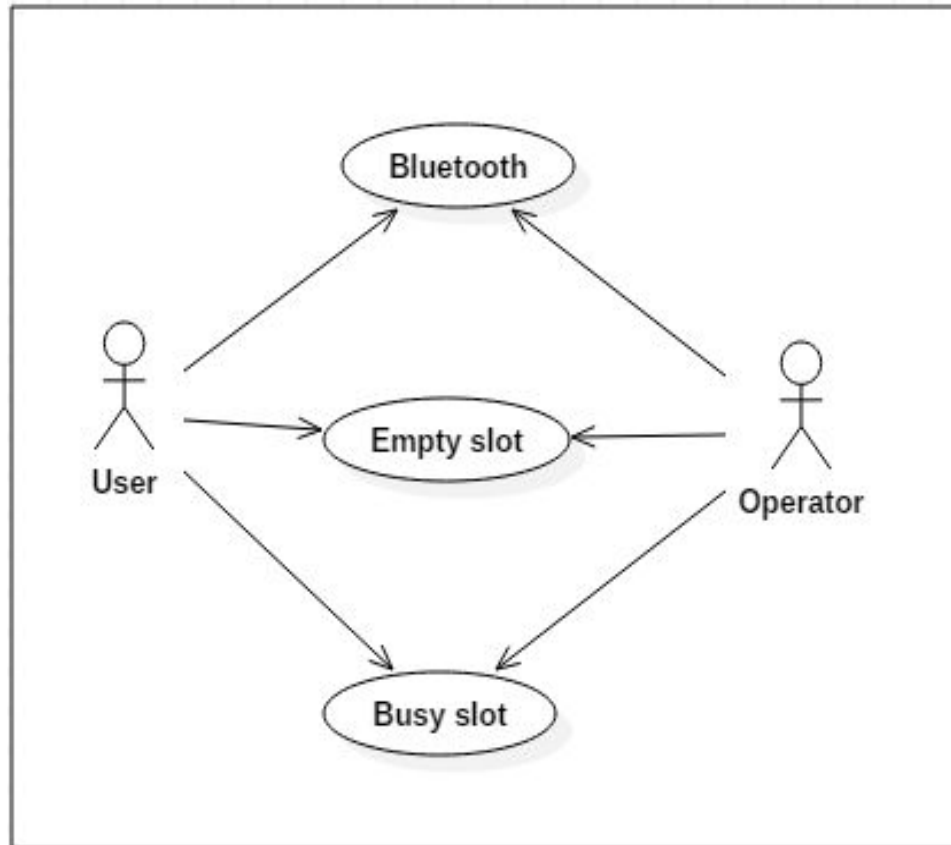
Figure 2. Class Diagram



*Figure 3. Use Case: Slot*



*Figure 4. Use Case: Arduino Components*



*Figure 5. Use Case: Bluetooth*

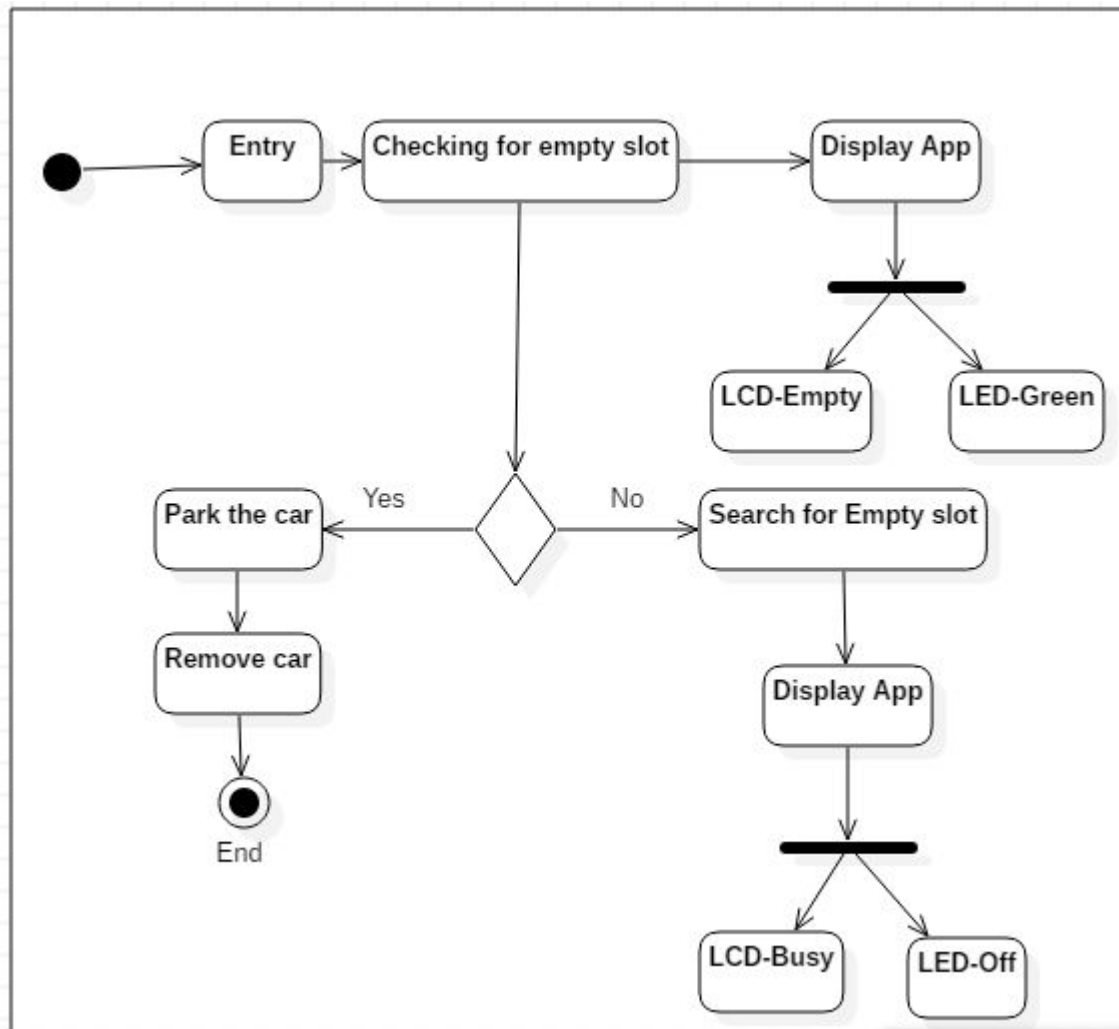


Figure 6. Use Case: Activity Diagram



# RESULTS

**When both the  
slots are empty**

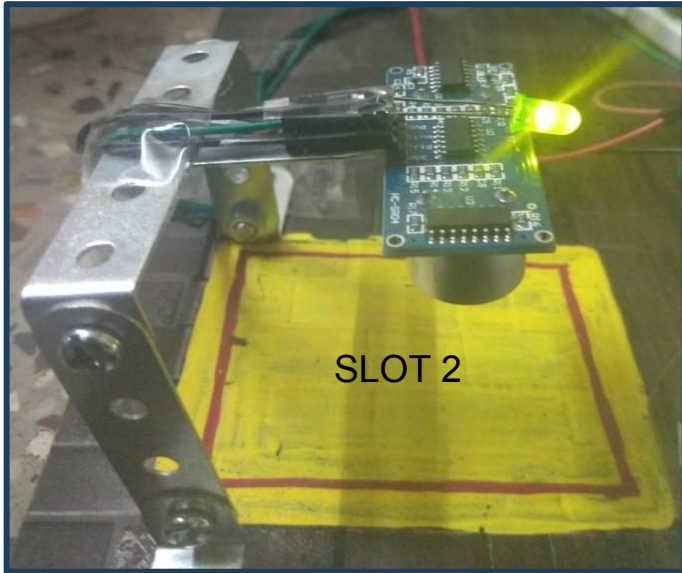


Figure 7. LED light on slot 2

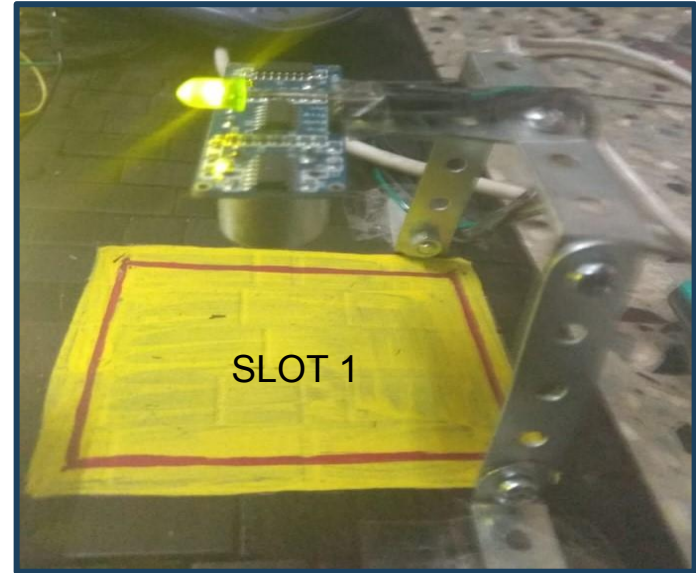
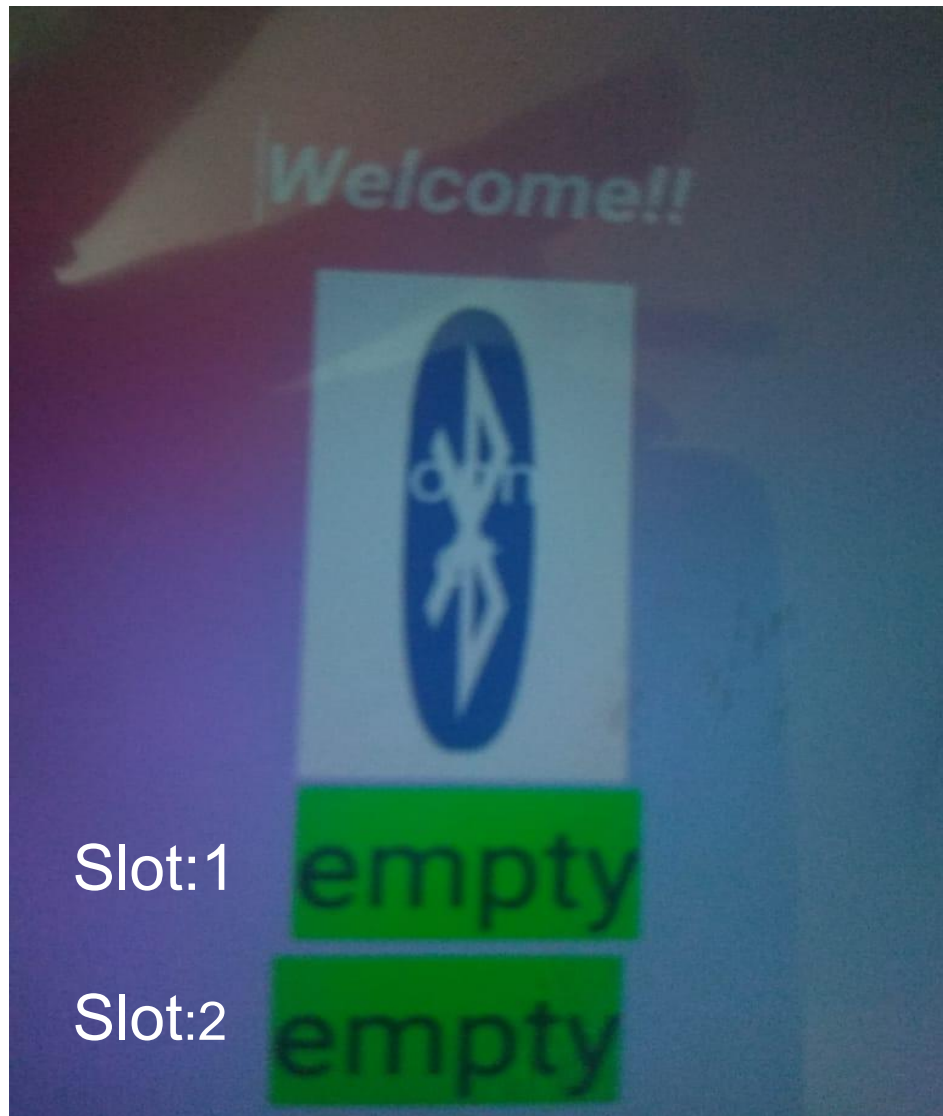


Figure 8. LED light on slot 1



Figure 9. LCD Display



*Figure 10. App Display*

# When Slot 1 is busy

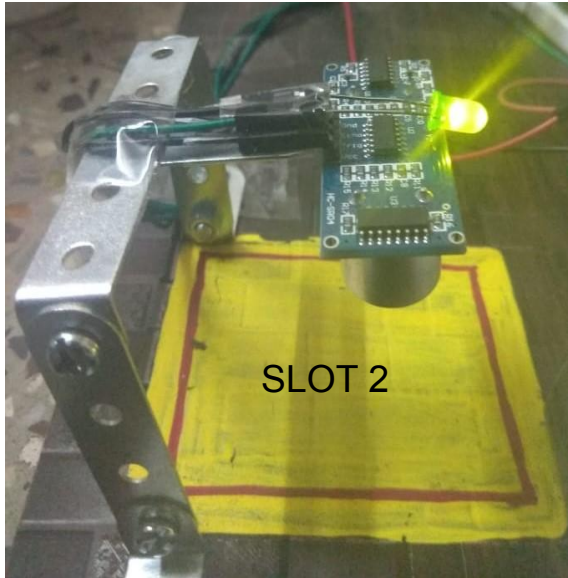


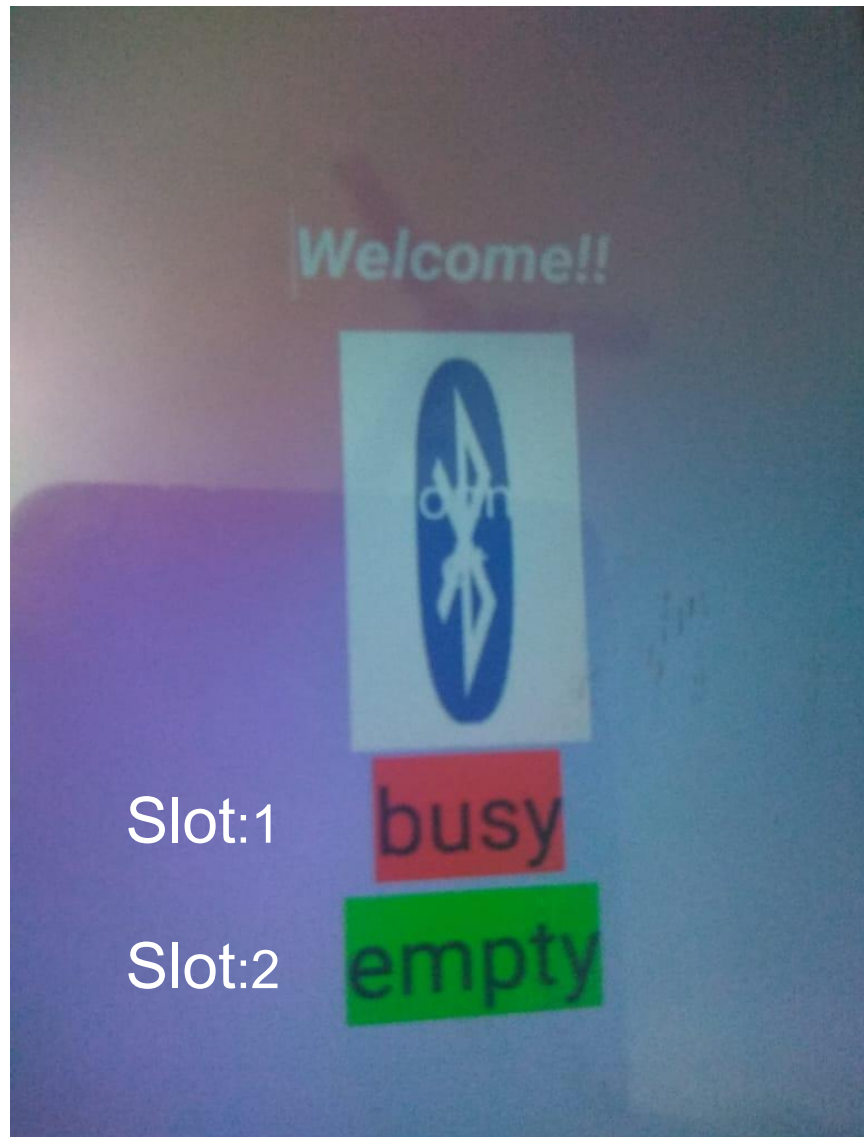
Figure 11. LED light on slot 2 (empty)



Figure 12. LED light off slot 1 (busy)



Figure 13. LCD Display



*Figure 14. App Display*

# When Slot 2 is busy



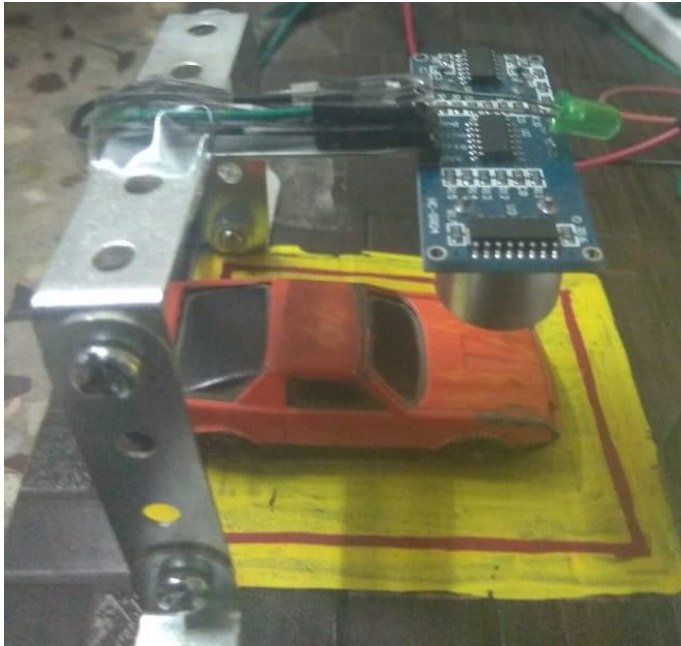


Figure 15. LED light off slot 2 (busy)

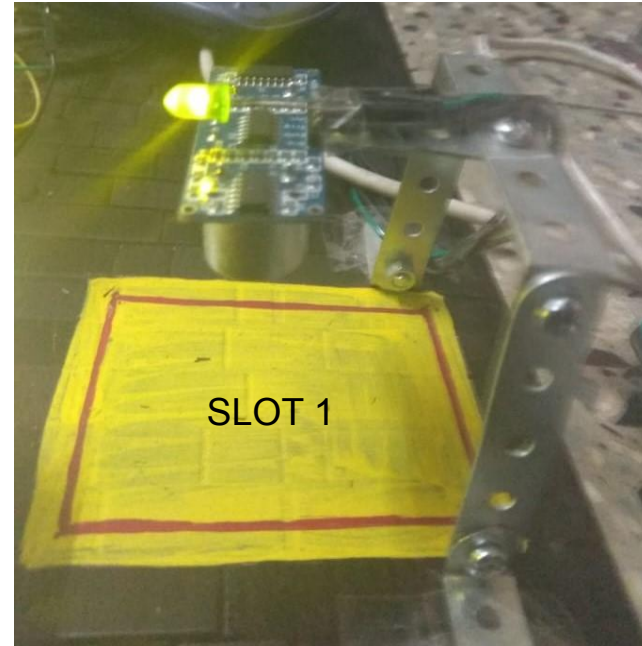


Figure 16. LED light on slot 1 (empty)

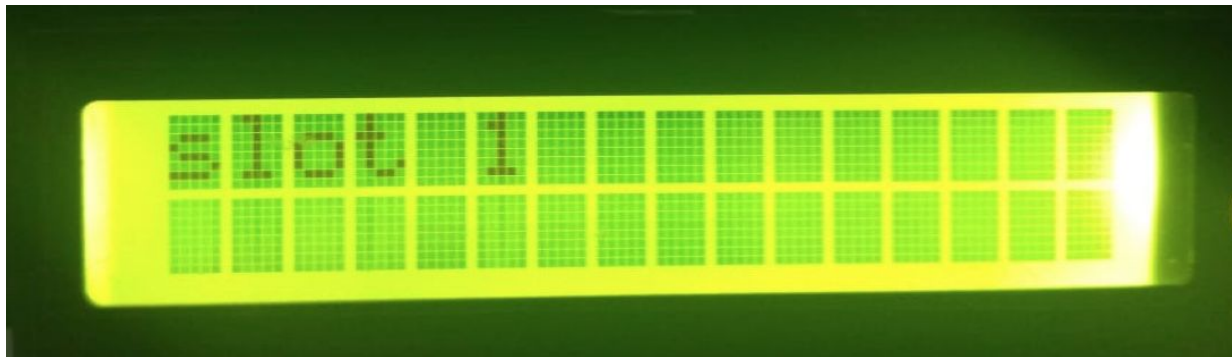
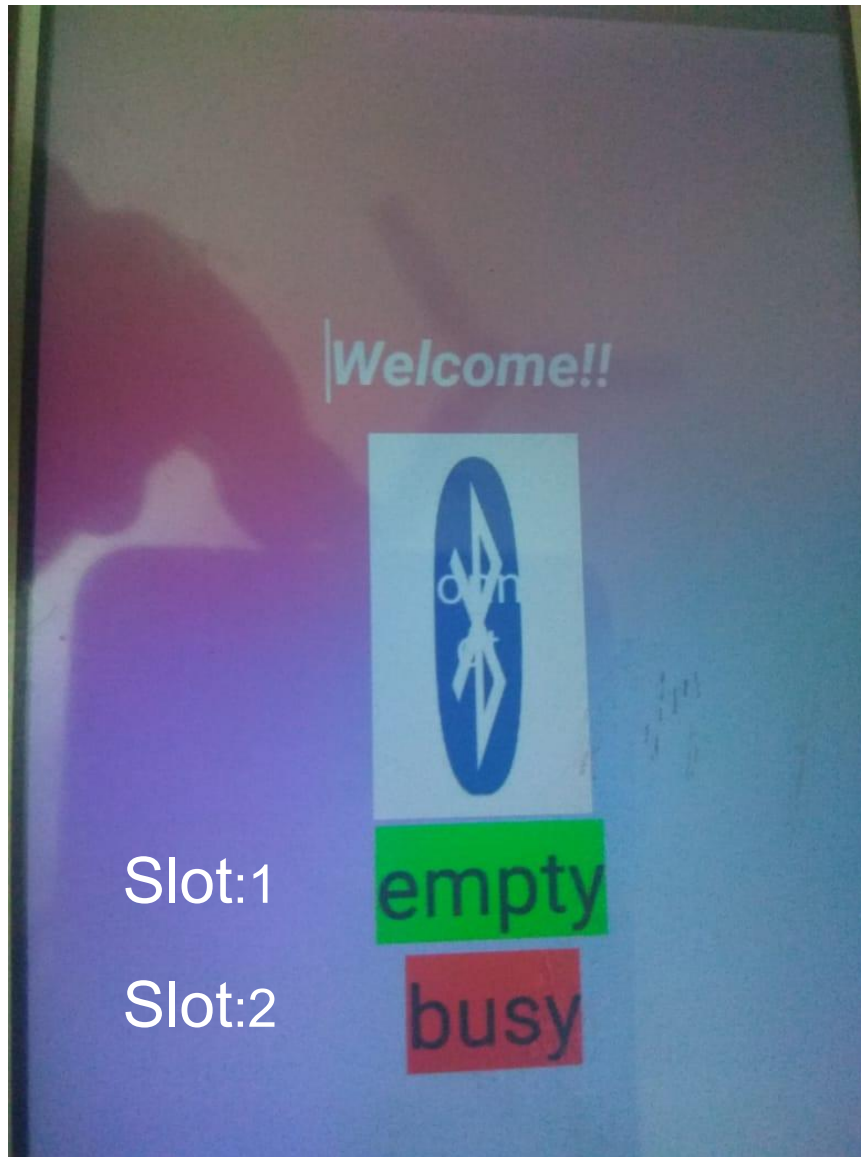
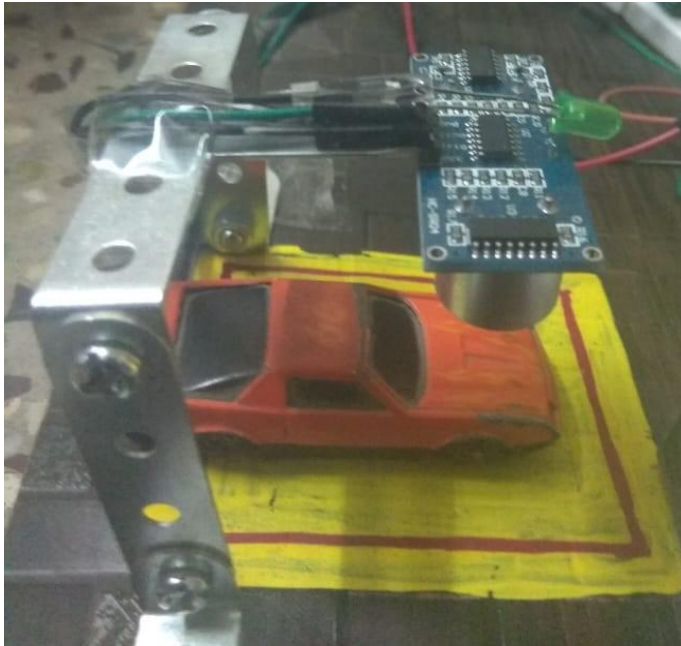


Figure 17. LCD Display



*Figure 18. App Display*

**When both slots are  
busy**



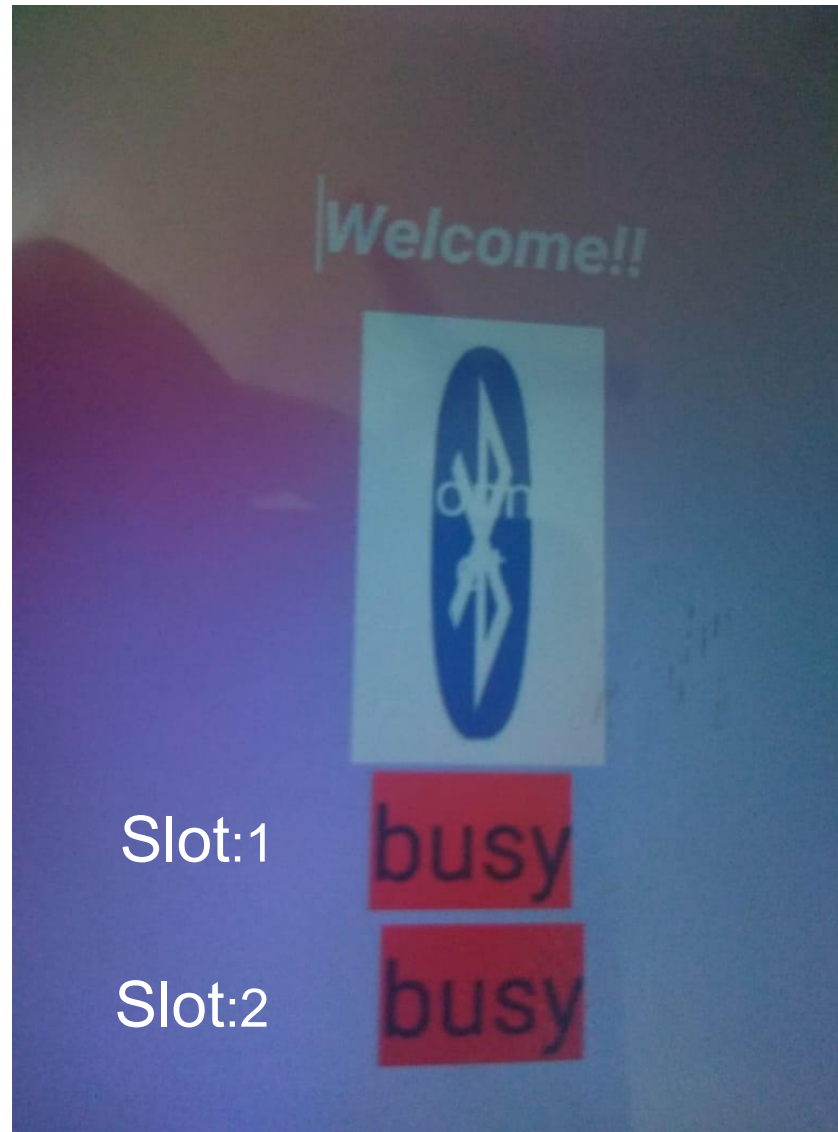
*Figure 19. LED light off slot 2 (busy)*



*Figure 20. LED light off slot 1 (busy)*



*Figure 21. LCD Display*



*Figure 22. App Display*

# TEST CASES

S.NO	TEST CASE	DESCRIPTION	INPUT	EXPECTED OUTPUT	ACTUAL OUTPUT	OUTCOME
1.	Both empty slots .	Stimulation when both slots empty.	-	Led-2-on Lcd-2-display App-2-empty	Led-2-on Lcd-2-display App-2-empty	success
2.	Only Slot-1 occupied.	One object placed in slot-1	object in slot-1	Led-1-off Led-2-on Lcd-2-display App-1-busy App-2-empty	Led-1-off Led-2-on Lcd-2-display App-1-busy App-2-empty	success
3.	Only Slot-2 Occupied.	One object placed in slot-2	object in slot-2	Led-2-off Led-1-on Lcd-1-display App-1-empty App-2-busy	Led-2-off Led-1-on Lcd-1-display App-1-empty App-2-busy	success

S.NO	TEST CASE	DESCRIPTION	INPUT	EXPECTED OUTPUT	ACTUAL OUTPUT	OUTCOME
4.	Both slots occupied.	Both the slots have objects in them.	Objects in slot-1 and slot-2.	LED-1-off LED-2-off LCD-empty App-1-busy App-2-busy	LED-1-off LED-2-off LCD-empty App-1-busy App-2-busy	success
5.	Bluetooth connectivity test.	Connecting App to HC-05 .	Click connect button and select HC-05 .	Connected	Connected	success



# LITERATURE SURVEY



Ultrasonic sensor is used to detect whether the slot is **occupied** or **empty**. Arduino is used to track the number of vehicles parked in the parking area.

Citation: M, Y., & M, M. (2017). Iot based vehicle parking place detection using arduino. International journal of engineering sciences & research technology, 6(5), 536-542. doi:10.5281/zenodo.375816.

- ✓ LEDs will turn ON as the system is connected to the supply. **Green** LED will turn OFF if the slot is with car. **Green** LED will turn ON if there is no car in the parking slot. Smartphone will be the end user of the system which is connected to the Espresso Lite through WIFI connection inside the Blynk app, whenever there is a car that parked in specific slot, **Red** LED will turn on to indicate the presence of car.

Citation: Abu, Mohd Azlan & Farhan Mohamad Jalil, Muhamad & Ramli, Aizat & Basarudin, Hafiz & Sulaiman, Mohamad Ismail & Suboh, Mohd Zubir & Romli, Fairuz. (2017). Smart parking systems by using espresso lite 2.0. 1-6. 10.1109/ICE2T.2017.8215970.

# CONCLUSION AND FUTURE ENHANCEMENTS

This makes the concept of parking very easy for users especially in places like airport where they are likely to be in hurry more than usual .It also have a huge future scope and several extensions like :

- ✓ RFID payment system.
- ✓ Pre-booking parking slots.
- ✓ Automatic gates for parking assistance.
- ✓ Vehicle detection using image processing.

Thanks!

**Any questions?**