SMART CAR PARKING SYSTEM IOT102 PROJECT

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I. Introduction

The Smart Parking is an IoT product with many benefits:

- Simplify searching for parking
- Speeding up the parking process
- Reducing traffic
- Reducing pollution

With the increase of the urban population, the growing number of car owners creates a high demand for parking spaces. So in the future, the Smart Parking System can be innovated in order to:

- Fulfill drivers' needs
- Providing better control for user
- Optimize space and time
- Foresee the flow of vehicles by analyzing parking routines.

A. System models and block diagram

Block diagram

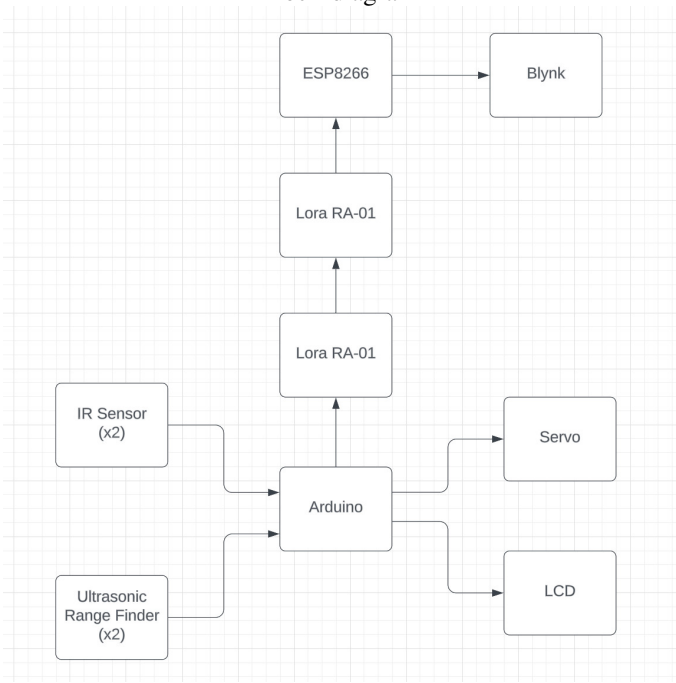


Table 1

Arduino	LoRa1-RECEIVE	Distance Sensor 1	Distance Sensor 2	WHITE BOARD
D0			ECHO	
D1			TriG	
D6		ECHO		
D7		TRiG		
D8	DIO0			
D9	RST			
D10	NSS			
D11	MOSI			
D12	MISO			
D13	SCK			
3.3V	3.3V			
5V		VCC	VCC	
GND	GND	GND	GND	GND

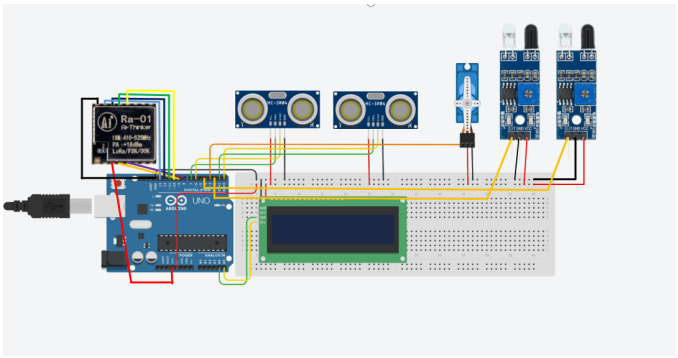
Arduino	Flame Sensor 1	Flame Sensor 2	Servo Motor	WHITE BOARD
D2	OUT			
D3			PWM	
D4		OUT		
5V	VCC	VCC	5V	
GND	GND	GND	GND	GND

Table 2

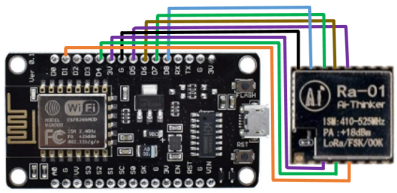
Arduino	LCD
A4	SDA
A5	SCL
5V	VCC
GND	GND

LoRa2-TRANSMIT	Esp8266
DIO0	D1
RST	D4
3.3V	3
GND	GND
SCK	D5
MISO	D6
MOSI	D7
NSS	D8

Arduino connects to LoRa



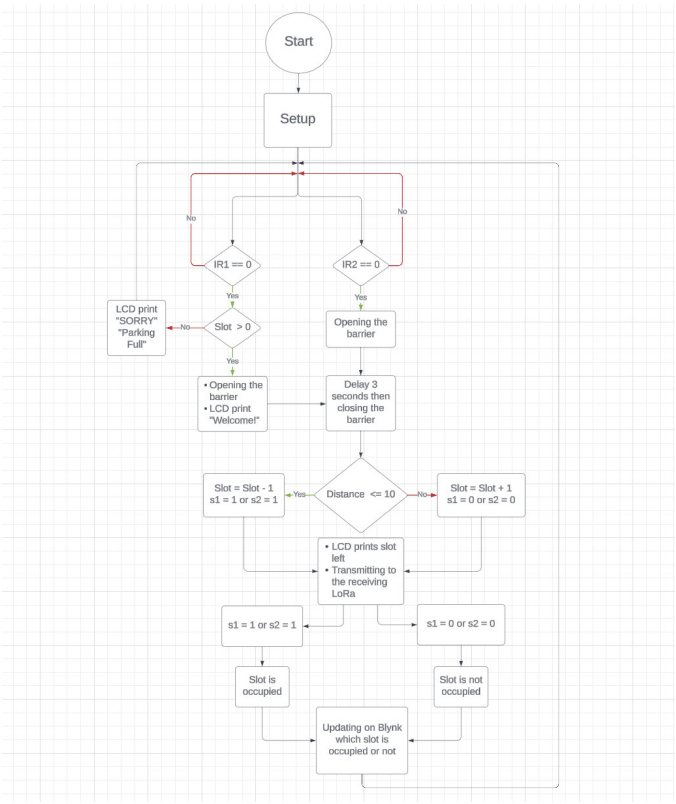
ESP8266 connects to LoRa



Components

Components/devices	ID/remarks	Quantity
Arduino Uno R3	ATmega328P based	1
NodeMCU	ESP8266 - CH340	1
IR Sensor	IR sensor	2
Liquid–crystal display (LCD)	16 × 2 LCD	1
I2C	Module I2C LCD	1
Module Lora	Module Lora RF433 SX1278 Ra-01	2
Servo motor	Servo Motor SG90 (180 degrees)	1
Ultrasonic Range Finder	Ultrasonic Range Finder SRF05	2

B. Programming Flowchart



II. Results

IR Sensors will detect the car that came to the barrier. Servo Motor receives the commands to open/close barrier by IR Sensors ‘s values through Arduino. The LCD will display information (Greeting and Available Slots). Arduino - LoRa (sender) transmits the states of slots to LoRa - ESP8266 (Free/Occupied).

Blynk web continuously updates the status of these slots.ta transmission and display, enhancing the overall user experience.

III. Details

- Providing better control for consumers, businesses, and law enforcement representatives Smart parking solutions promote safety by notifying drivers when they are about to leave a vehicle in a no-parking area.

Traffic law reinforcement structures will be able to create an efficient framework of parking violation monitoring since connected systems will offer relevant data on how the areas with the highest violation density, the peak timing for parking violations, and real-time alerts for when a driver parked a vehicle in a non-designated spot.

- Optimizing space and time in a tight and busy urban environment As smart parking systems make finding an available spot more manageable, there will be less search traffic in the street. As a result, the traffic jam problem can be mitigated, allowing city residents to save potentially productive time.

IoT-based parking facility management tools will help business owners make the most out of the space available. For

instance, a parking management system automatically adjusts the meter fares based on the current occupancy of the facility. Also, automated meter renewal tools will help parking facilities generate more revenue and attract new visitors.

- Foresee the flow of vehicles by analyzing parking routines in malls, business stores, airports Connected parking management software is a missing variable in the decision-making process that brings additional clarity and insight to parking optimization. By collecting real-time driver data every day of the year, smart platforms can determine complex seasonal patterns and trends.

IV. Conclusion

Thanks to a wide range of behavioral and environmental insights, parking facility managers will have a big-picture view of how the flow of vehicles changes throughout the year, what are the causes for growing parking demand in given time frames and optimize the use of parking spots accordingly.