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PROJECT: SMART PARKING

Project Submission Part 2: Innovation

Parking (yes, parking) has never been more important to the world than it is today. 20 years ago, one would have considered it improbable that parking would be vital to accomplishing weighty goals like fighting climate change or achieving political equality.

But with the capabilities that are increasingly being made available through smart parking innovations, it's looking more likely that smart parking may help save the world.

Research indicates that more than 1 million barrels of oil is consumed every day in the search for parking spaces. More than 44% of drivers find parking a stressful experience and the average driver spends 4 days every year looking for spaces to park.

All of this adds up to unnecessary congestion on roads and depletion of valuable real estate to construct more parking spaces. It also does nothing to stall the inexorable march towards global warming.

However, as we'll show in this article, recent innovations in smart parking may be changing that narrative. We may not know it yet, but parking may yet save the world. Here are 10 smart parking innovations to look out for in 2020.

Module 3:

Getting started with ESP32 and Wokwi Platform:

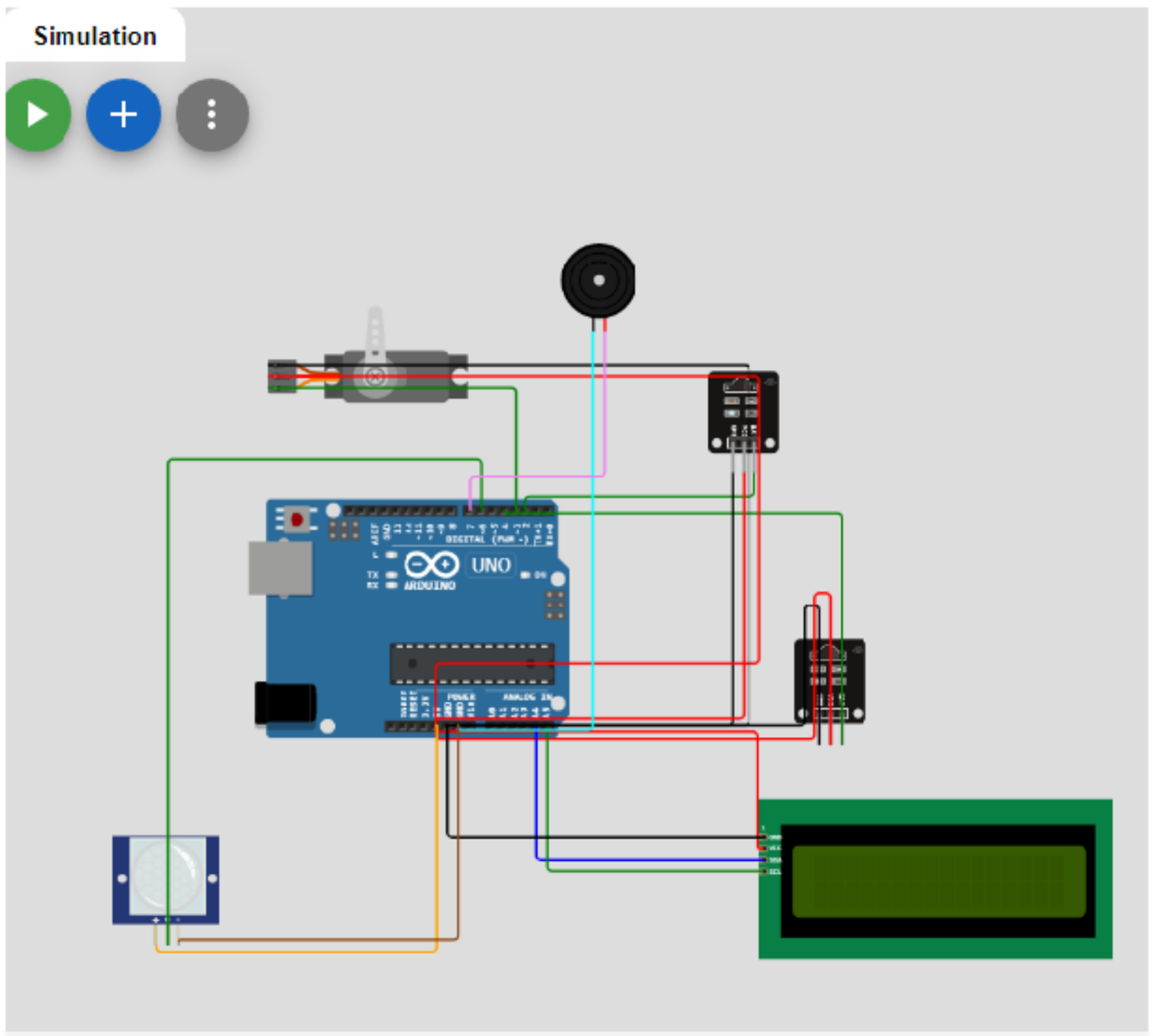


diagram.json libraries.txt Library Manager

```
clude <Wire.h>
clude <LiquidCrystal_I2C.h>
uidCrystal_I2C lcd(0x27, 16, 2);  // Change the HEX address

clude <Servo.h>
vo myservo1;

 IR1 = 2;
 IR2 = 4;
 SmokeDetectorPin = 6;  // Digital pin for the smoke detector
 BuzzerPin = 7;         // Digital pin for the buzzer

 Slot = 4;  // Enter Total number of parking Slots

l flag1 = false;
l flag2 = false;

igned long lastLcdUpdate = 0;  // Variable to track the time of the las
igned long lcdUpdateInterval = 1000;  // Update the LCD every 1000 mill

d setup() {
cd.begin(16, 2);  // Initialize LCD with 16 columns and 2 rows
cd.backlight();
inMode(IR1, INPUT);
inMode(IR2, INPUT);
inMode(SmokeDetectorPin, INPUT);
inMode(BuzzerPin, OUTPUT);

yservo1.attach(3);
yservo1.write(100);
```

The Sonoff devices uses the ESP8266 MC, which is basically the predecessor of the ESP32. But yes, the ESP32 is robust enough to be used in industrial applications

Look for ESP32 by Espressif Systems. Click on that entry, and then choose Install.

After installing, restart your Arduino IDE and navigate to Tools > Board to ensure you have ESP32 boards available. Now select your board in the Tools > Board menu (in our case, it's the DOIT ESP32 DEVKIT V1).:

ESP32 proves to be a versatile and beginner-friendly microcontroller well-suited for IoT projects. It is capable of working with different IoT platforms and standards and works well with the two IoT platforms we selected for our experiments

The Arduino IDE works great for small applications. However, for advanced projects with more than 200 lines of code, multiple files, and other advanced features like auto completion and error checking, VS Code with the PlatformIO IDE extension is the best alternative.

Module 4:

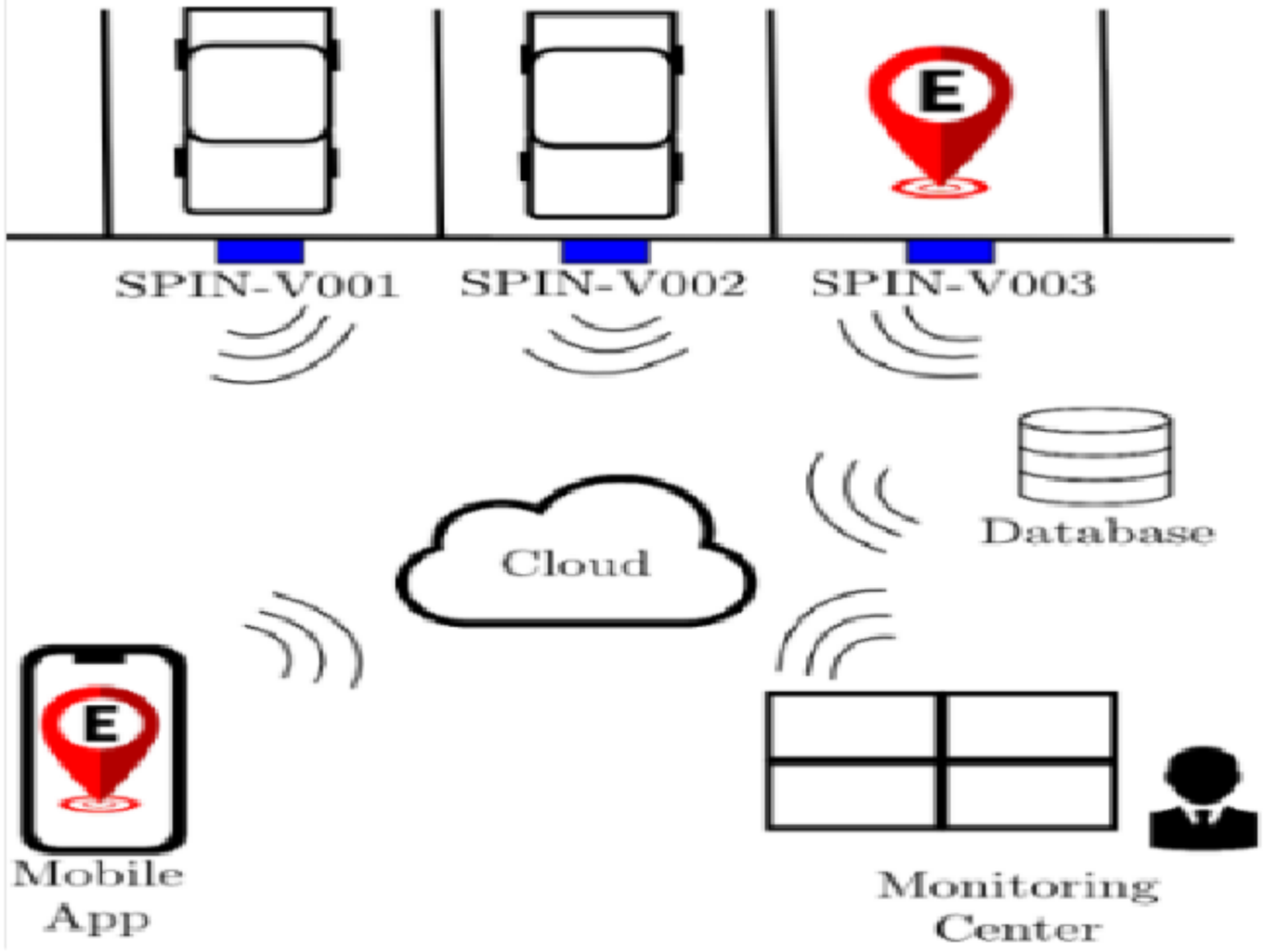
IoT Communication Technologies:

An IoT-based parking system is a centralized management that enables drivers to search for and reserve a parking spot remotely through their smartphones. It offers a convenient arrangement for drivers to park their cars when they are looking to avoid potential traffic congestion

Technologies such as machine vision, multi-agent systems are suitable for open parking lots to acquire parking occupancy information and GPS can be used to provide navigational directions.

Nwave IoT Based Smart Parking System:

The Nwave parking management software and smart sensors power your wireless car parking monitoring system providing all of the necessary tools to operate with minimal effort and no programming skills required.



However, the most widely adopted types of smart parking IoT systems include:

- ***cameras.***
- ***overhead radars/lidars.***
- ***ground sensors.***

Module 5:

<u>IoT protocols:</u>

A parking system also requires protocols to ensure IoT devices' and sensors' connectivity in the parking lot. These can be MQTT, LoRaWAN, Zigbee protocol for wireless IoT networks, or else. Such a system also requires video transmission protocols if it uses video surveillance.

IoT is used in smart parking system?

An IoT-based parking system is a centralized management that enables drivers to search for and reserve a parking spot remotely through their smartphones. It offers a convenient arrangement for drivers to park their cars when they are looking to avoid potential traffic congestion.

An IoT-based smart parking system is a decent solution for businesses and consumers, providing real-time data on parking space availability, pricing, payments, and more. It can positively impact the environment and traffic. Moreover, IoT solutions ensure efficient parking reservation and management.