GNANAMANI COLLEGE OF TECHNOLOGY(Pachal,Namakkal.)

DEPARTMENT OF BIO MEDICAL ENGINEERING

(Third Year)

Title: **Smart parking**

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SMART PARKING

PROBLEM :

Difficulty in Accurate parking Space Detection-One common challenge in smart parkingSystems is accurately detecting whether a parking space is occupied or vacind in accutare detection can lead to confusion and insufficiency

KEYWORDS:

1)Internet of things

2)Smart city

3) Messaging protocols

4)Standerdization

5)Introperability

6)Protuct life cycle management

INTRODUCTION:

＊. An IOT based parking system is a vechile parking management system to is the search for the vacant parking spot in a parking lot through a smart phone.

*. The system utilizes various sensors and microcontrollers with internet capability for decting parked vechiles and to uptate the data in real time on internet .

DESIGN OF SMART PARKING:

. As Mentioned above the proposed smart parking lot circuit will be equipped

    With several sensors

*. Inexpensive microcontrollers and wifi module using which a car/any vechile won car check if there is a vacant space in a parking lot using his /her phone or tabelet or even on computer.

DATA FUSION:

Compain data from multiple sensor to increase accuracy for example,you can use both infrared and ultra sonicsensors in tandem by cross referencing their

Data can reduce false readings .

MACHINE LEARNING:

.Implement machine learning algorithms to analog sensor data

*.Machine learning can help in fine tuning occupancy detection by accounting for various factors like sesor noise lighting conditions and environmentalChanges.

REAL TIME UPDATES:

*. Connect   the sensor data to a central system or a mobile app that provides

Realtime updates to users

*.Indicating available parking space this ensures that drivers are directed to the nearest vacant spot

MAINTENANCE AND CALIBRATION:

*.Regularly maintain and calibration the sensors to ensure their accuracy over time . this includes checking for sensor malfunctions or obstructions

*.By addressing the accuracy of parking space detection through IOT Sensors

And data processing.you can improve the efficiency and user experience of your

SMART PARKING PROJECT.

SOFTWARE :

Software used for arduino based smart parking system project is arduino IDE

ARDUINO IDE:

This is the primary software for programming Arduino boards you can downloade it from the official arduino web site.

PHASE-2

INNOVATION

1. **IoT Connectivity:**

  - Utilize IoT modules (such as ESP8266 or ESP32) with Arduino to connect the system to the internet.

  - Enable bidirectional communication, allowing the system to send data to the cloud and receive commands or updates.

2. **Soil Moisture Sensing:**

  - Implement soil moisture sensors in key locations to measure the moisture content of the soil.

  - Use capacitive soil moisture sensors for accurate readings, and calibrate them to specific soil types.

3. **Data Transmission:**

  - Establish a secure connection to an IoT platform (like ThingSpeak, Blynk, or AWS IoT) to transmit real-time data.

  - Ensure data encryption for privacy and security.

4. **Cloud-Based Analytics:**

   - Implement cloud-based analytics to process and analyze the collected data.

   - Utilize machine learning algorithms to predict future soil moisture levels based on historical data, weather forecasts, and other relevant parameters.

5. **Mobile Application:**

   - Develop a user-friendly mobile app for farmers or users to monitor and control the system remotely.

   - Include features such as real-time soil moisture levels, historical data graphs, and the ability to adjust irrigation settings.

6. **Automated Irrigation Control:**

   - Implement an automated irrigation system that adjusts water flow based on real-time sensor data.

   - Include features like scheduling, threshold alerts, and emergency shutdown in case of sensor malfunctions or extreme conditions.

7. **Energy Efficiency:**

   - Design the system to be energy-efficient by using low-power components and optimizing the communication protocols.

8. **Scalability:**

   - Ensure that the system is scalable, allowing users to expand the coverage area or add more sensors as needed.

9. **Weather Integration:**

   - Integrate weather APIs to incorporate forecast data into the decision-making process.

   - Adjust irrigation schedules based on upcoming weather conditions to avoid unnecessary watering during or after rainfall.

10. **Community and Data Sharing:**

   - Allow for community-based data sharing where users can contribute anonymized data for broader analysis.

   - Promote a collaborative approach to water management, especially in regions facing water scarcity

PHASE-3

DEVELOPMENT-1

1. **Hardware Setup**:

   - Install sensors (e.g., ultrasonic, infrared, or magnetic) in parking spaces to detect vehicle presence.

   - Deploy cameras for visual monitoring and license plate recognition.

   - Set up a microcontroller or IoT device (e.g., Raspberry Pi, Arduino, or specialized hardware) to connect and manage the sensors and cameras.

2. **Connectivity**:

   - Establish a reliable internet connection, either through Wi-Fi, cellular, or a dedicated network for your IoT devices.

   - Ensure proper security measures for data transmission.

3. **Data Collection**:

   - Collect data from the sensors and cameras, such as occupancy status and license plate information.

   - Send this data to a central server or cloud platform for processing and analysis.

4. **Data Processing and Storage**:

   - Process the incoming data to determine parking space occupancy.

   - Store historical data for trend analysis and reporting.

5. **User Interface**:

   - Develop a user-friendly mobile app or web interface for users to check parking availability, reserve spots, and pay for parking.

6. **Notifications**:

   - Implement real-time notifications for users, such as alerts when a parking spot becomes available or when a reservation is about to expire.

7. **Payment Integration**:

   - Integrate payment gateways for users to pay for parking using various methods, such as credit cards, mobile wallets, or prepaid accounts.

8. **Security**:

   - Implement security measures to protect the IoT devices and data, including encryption, access control, and device authentication.

9. **Analytics**:

   - Use data analytics to gather insights on parking space utilization and optimize parking management.

10. **Maintenance and Monitoring**:

   - Set up monitoring tools to track the health and status of IoT devices.

   - Regularly maintain and calibrate sensors and cameras to ensure accuracy.

11. **Scalability**:

   - Design the system to be scalable, allowing for easy expansion to more parking spaces or locations.

12. **Regulatory Compliance**:

   - Ensure compliance with local regulations and privacy laws, especially regarding data collection and user privacy.

13. **Testing and Deployment**:

   - Thoroughly test the system in a controlled environment before deploying it in a real-world setting.

14. **Feedback and Improvement**:

   - Continuously gather user feedback to improve the system's features and performance.

15. **Integration with Smart City Initiatives**:

   - Explore opportunities to integrate your smart parking system with broader smart city initiatives, like traffic management and sustainability efforts.