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Smart Auto-parking Garage

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**Introduction**

The Smart Auto Parking Garage system is an advanced parking solution designed to address common parking challenges in urban environments, such as space constraints, inefficiency, and vehicle emissions. By leveraging cutting-edge technologies such as automation, sensors, cameras, and automated guided vehicles (AGVs), along with a comprehensive software system, this project aims to streamline parking processes, mitigate accident risks, and significantly improve overall parking efficiency.

The project further seeks to enhance user experience with features enabling real-time parking information, remote slot booking, and payment capabilities. The scope of the Smart Auto Parking Garage system extends to diverse settings including city parking garages, shopping malls, airports, and office buildings. This project encompasses not only the technical development but also financial feasibility studies, implementation strategies, and evaluation of the system's impacts on environment, traffic flow, and user experience. Ultimately, this innovative system represents a step towards more efficient, space-conscious, and user-friendly parking solutions.

**Smart auto parking system**

**Components:**

The system comprises several components that works simultaneously to provide an efficient parking solutions. These include sensors, camera , LCD and motors.

**Sensors:**

IR Proximity sensor FC-51 infrared obstacle

Infrared Flame sensor

MQ2 Gas sensor

Ultrasonic HC-SR04

**Camera:**

TTGO-Camera

**Display:**

LCD 2x16 green screen 1602

**Digital output:**

buzzer

**Goals And Benefits**

**Enhancing efficiency:**

The system improves parking efficiency through various means. It reduces time spent searching for spots by utilizing automation and advanced technology, enabling drivers to quickly find available spaces. Additionally, it maximizes parking capacity by eliminating driving lanes and implementing a more compact arrangement.

**Maximizing space utilization:**

The Smart Auto Parking Garage system employs techniques like doing away with driving lanes, allowing for a more effective parking arrangement, to maximize area utilization. Additionally, by precisely measuring and allocating space based on car size, the system optimizes the distribution of parking spaces. This guarantees that the available space is utilized to the fullest extent possible, boosting the parking garage's overall capacity.

**User Experience:**

Safety features that prioritize client health and can detected when any problem happen

**Procedures**

**Milestone1 (idea):**

1. Doing a research about the project idea
2. Deciding which are the suitable components
3. Buying them

**Milestone2 (hardware):**

1. Implementing the entrance idea on breadboard using the proximity sensor and servo motor
2. Implementing the parking slots on breadboard using the ultrasonic and led bulbs
3. Implementing on breadboard the safety features using the gas sensor, flame sensor and the buzzer

**Milestone3 (software arduino):**

1. Coding the proximity sensor on the Arduino to detect all moving objects nearby
2. Coding the servo motor to open when an object moves by the first proximity sensor and closes after passing by the second proximity sensor
3. Coding the buzzer to alarm when gas or flame are detected by the flame and gas sensors
4. Coding the ultrasonic to detect nearby objects
5. Coding the LED blubs to lights when any nearby object is detected by the ultrasonic
6. Coding the camera using homeassistant

**Milestone 4(design):**

1. deciding the material and the dimensions of the maquette
2. designing the garage layout using photoshop
3. integrating the hardware with the design project
4. testing the whole project

**budget**

**Direct expenses**

|  |  |  |
| --- | --- | --- |
| Phases | description | $ |
| 1 | Hardware(components) | 1590 |
| 2 | Software(Arduino) | 650 |
| 3 | design | 325 |

**Indirect expenses**

Working Rooms**🡺**860

Broken tv🡺4000

Food🡺650

Transportation🡺530

**Summary**

The Smart Auto Parking Garage system is a state-of-the-art parking solution that addresses common urban parking challenges. By integrating automation, sensors, cameras, automated guided vehicles (AGVs), and advanced software systems, it transforms the parking experience. This system optimizes efficiency by reducing the time spent searching for parking spaces and maximizing the utilization of available space.. The Smart Auto Parking Garage system represents a significant advancement in parking technology, offering a more efficient, space-conscious, and user-centric solution for urban parking needs.