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Obstacle bypass robot

Description:

An obstacle bypass robot is an intelligent device programmed to identify and avoid obstacles in its path. This type of robot uses sensors or technologies such as sonar or lidar to detect objects in its environment. When it detects an obstacle, the robot initiates an appropriate maneuver to avoid it, allowing it to continue moving in a safe and efficient manner. This ability to navigate autonomously in complex spaces makes the obstacle bypass robot useful in various fields, including mobile robotics, industrial automation or even in the context of assistant robots to avoid collisions in domestic environments.

Operating principle:

The principle of operation of an obstacle bypass robot is based on the use of sensors to detect the presence of obstacles and control algorithms to avoid or overcome these obstacles. Here is a more detailed description of the principle of operation:

1. **Obstacle detection:** The robot is equipped with specialized sensors, such as ultrasonic, infrared or lidar sensors, which analyze the environment. These sensors measure distance and identify nearby objects.

2. **Information processing:** Data collected by sensors is processed by a microcontroller or on-board computer. Programmed algorithms analyze the information to identify the presence and positioning of obstacles in relation to the robot.

3. **Decision making:** Based on the information processed, algorithms make decisions on how the robot should react to detected obstacles. These decisions may include stopping, changing direction or adjusting speed to avoid collisions.

4. **Motor Control: Control** algorithms send commands to robot motors to implement decisions made. For example, if an obstacle is detected ahead, the robot can stop an engine and make adjustments to avoid collision.

5. **Autonomous navigation:** While moving, the robot continues to monitor the environment and make real-time decisions to avoid obstacles and meet its goals without constant human intervention.

By integrating these elements, an obstacle bypass robot becomes able to move autonomously in a dynamic environment, adapting to changes around it and avoiding potential hazards or obstacles in its path.

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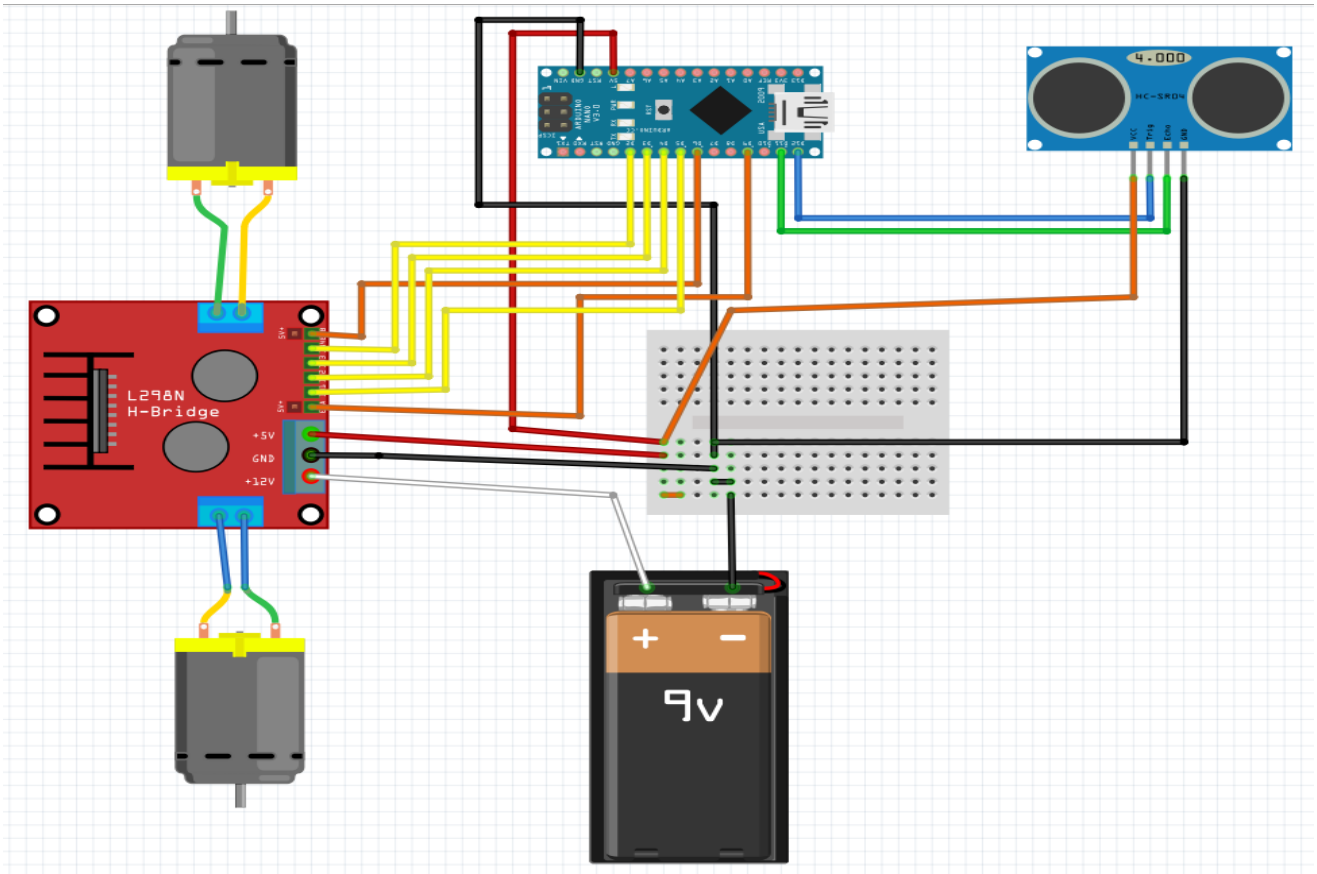
Project scheme:



Components used:

- Ultrasonic sensor module
- Breadboard 170 points
- DC Motor 3V-6V with 1:48 reducer
- L298N Double H-bridge (dual H-bridge) DC/stepper motor
- GroundStudio Jade Nano+
- Acrylic chassis for ARCO
- Wheel robots + rubber 65mm diameter
- Dupont Yarn Mother-Father 20cm
- Servo Motor

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Field of use:

An obstacle bypass robot has a wide spectrum of application areas due to its capabilities to navigate autonomously and avoid obstacles. Here is a more detailed description of the application areas:

1. **Mobile robotics:**
    - Autonomous cleaning robots for homes or commercial spaces.
    - Autonomous delivery systems for warehouses, factories or even on city streets.
2. **Industrial automation:**
    - Material transport and handling systems in factories and warehouses.
    - Use in production lines to avoid collisions and optimize workflow.
3. **Smart farming:**
    - Use in agriculture for autonomous monitoring and management of agricultural fields.
    - Autonomous harvesting systems that avoid obstacles in their path.
4. **Personal assistant robots:**
    - Assistive devices for persons with reduced mobility.
    - Autonomous transport robots to bring objects or medicines to a specific location.
5. **Exploration and research:**
    - Autonomous exploration robots used in underwater research or hazardous environments.
    - Autonomous probing of planetary surfaces or other extraterrestrial environments.
6. **Security and surveillance:**
    - Autonomous patrol systems for perimeter security.
    - Use in surveillance of areas of interest to identify and report suspicious activities.
7. **Education and research:**
    - Learning platforms to familiarize students with the basic concepts of robotics.
    - Use in research projects for the development and testing of autonomous navigation algorithms.
8. **Space industry:**
    - Use in space exploration to navigate and avoid obstacles in unfamiliar environments.
    - Autonomous space robots for maintenance and exploration of other planets or satellites.
9. **Events and entertainment:**
    - Entertainment robots that interact with the audience in an autonomous way.
    - Interactive presentation systems at events and exhibitions.

By encompassing these application areas, the obstacle bypass robot brings significant benefits in diverse contexts, facilitating human activities and optimizing processes in a wide range of industries and applications.

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Advantages:

The use of an obstacle bypass robot brings a number of advantages in various contexts, highlighted by functionalities such as autonomy on the go and the ability to avoid obstacles. Here's a more detailed breakdown of the benefits:

1. **Autonomy and Efficiency:**
   - **Human Intervention Reduction:** The robot can operate without the need for constant human intervention, leading to increased autonomy in carrying out specific tasks.
   - **Operational Efficiency:** The ability to avoid obstacles in real time contributes to task efficiency, eliminating wasted time in collisions or constant recalibrations.
2. **Safety and Accident Prevention:**
   - **Collision Avoidance:** The obstacle bypass robot minimizes the risk of colliding with objects or other entities, helping to prevent accidents and property damage.
   - **Enhanced Security:** In areas such as security and surveillance, the autonomous robot helps maintain a safe environment by avoiding dangerous situations.
3. **Flexibility and Adaptability:**
   - **Navigation in Varied Environments:** The ability to adapt to different environments, including closed or open spaces, makes the robot suitable for various applications and industries.
   - **Improved maneuverability:** By quickly adjusting the route according to detected obstacles, the robot can maneuver effectively in complex spaces.
4. **Resource Saving:**
   - **Energy Optimization:** Avoiding collisions and inefficient routes helps save energy and extend robot life.
   - **Reduce Maintenance Costs:** Minimizing wear and damage from collisions can reduce maintenance costs in the long run.
5. **Miscellaneous applications:**
   - **Application Versatility:** The obstacle bypass robot can adapt to a wide range of applications, from industries to consumer services, making it a versatile solution.
   - **Innovation in Various Industries:** Through its contribution to different fields, the robot brings a touch of innovation and efficiency to a wide range of industries and sectors.
6. **Interaction and Communication:**
   - **Assistant Robots:** In applications such as personal assistance or events, the autonomous robot can interact with humans, providing information or help in an engaging way.
   - **Non-verbal communication:** Through its movements and reactions to the environment, the robot can communicate non-verbally and can be used for educational or entertainment purposes.

Through these advantages, the obstacle bypass robot becomes a valuable tool for optimizing processes in a variety of environments and situations, contributing to safety, efficiency and innovation in various application areas.