A ROBOT CAR FOR CHILDREN THAT AVOIDS OBSTACLES USING AN ULTRASONIC SENSOR

Tumanbayeva Bibixon Izzatulla qizi

Intern Lecturer, Department of Logistics**,** NamSTU,

Annotatsiya. Arduino platasi yordamida ultrasonic sensori, DC motor hamda servo motorlar orqali to'siqlarni aniqlab, o'zi yo'l topuvchi robot mashina dasturi ishlab chiqilgan. Ushbu dastur turli xil real sharoitlarda nazorat va xavfsizlikni kuchaytirish uchun samarali va foydalanuvchilarga qulay yechim taklif etadi.

Annotation. Using an Arduino board, a robotic machine program was developed that detects obstacles and finds its way through an ultrasonic sensor, DC motor, and servo motors. This software offers an effective and user-friendly solution to enhance control and security in a variety of real-world environments.

Аннотация. С использованием платы Arduino была разработана программа роботизированной машины, которая обнаруживает препятствия и находит путь через ультразвуковой датчик, двигатель постоянного тока и серводвигатели. Это программное обеспечение предлагает эффективное и удобное решение для повышения контроля и безопасности в различных реальных средах.

Kalit so'zlar: Ultrasonic sensori, Arduino platasi, Servomotor, robot, to'siqlarni aniqlash.

Keywords: Ultrasonic sensor, Arduino board, Servomotor, robot, obstacle detection.

Ключевые слова: ультразвуковой датчик, плата Arduino, серводвигатель, робот, обнаружение препятствий.

By assembling a chilren's robot car—integrating sensors, connecting them to an Arduino board, and developing code—users can create a multifunctional toy robot car for children that autonomously avoids obstacles. The existing children's robot car system is capable of detecting and avoiding obstacles. Arduino-based robot cars offer

advantages for applications such as surveillance, industrial automation, search and rescue missions, and home automation tasks.

Today, remote-controlled cars offer children several developmental benefits including improved coordination, increased creativity, and strengthened family bonds. Such toys help children enhance focus, imagination, collaborative work with friends and relatives, and the ability to independently solve problems.
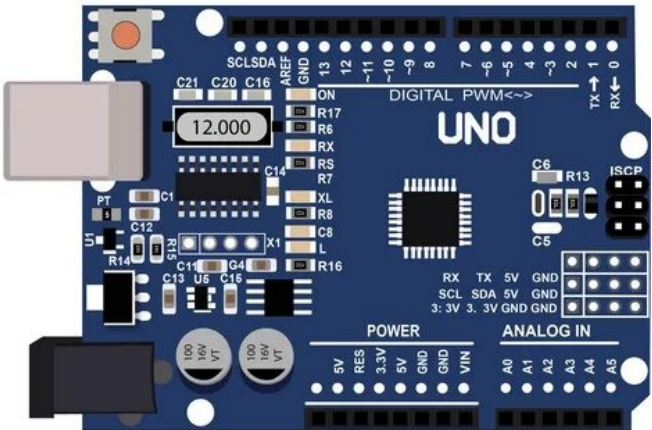
Figure 1. Arduino Uno Board

Arduino Uno is a popular microcontroller board based on the ATmega328P chip (Figure 1). It is a simple and user-friendly platform for electronics and programming projects. Arduino Uno is widely used for prototyping, education, and interactive projects. It features 14 digital I/O pins and 6 analog input pins, all of which can be configured as inputs or outputs through software (using pinMode(), digitalWrite(), and digitalRead() functions). These pins operate at 5V and can supply or receive up to 20 mA, with internal pull-up resistors of 20-50K ohms (disabled by default). To avoid permanent damage, the current on any I/O pin should not exceed 40 mA. It has 6 analog input pins labeled A0 to A5.
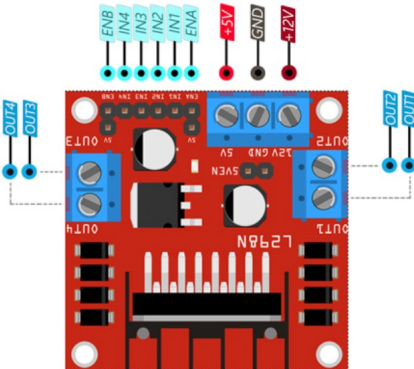
Figure 2. L298N Motor Driver

The motor driver shield is an electronic board used to control the speed and direction of DC motors via the Arduino microcontroller (Figure 2). It uses H-bridge circuits for variable speed and bidirectional control. Motor driver shields offer features such as ease of use, current sensing, and overcurrent protection. These shields are commonly used in robotics and automation projects for precise motor control.

Figure 3. SG-90 and MG90S Servo Motors

Servo motors, like the SG90 and MG90S models (Figure 3), are precise actuators that allow control over angle, speed, and acceleration and operate in closed-loop systems. A servo motor typically includes three wires: the brown wire for +5V power supply, the red wire for GND (ground), and the yellow wire for receiving PWM (Pulse Width Modulation) signals.

To drive the robot car, four DC motors and four wheels are required (Figure 4).

a   b   c

**Figure 4. a) DC Motor b) Wheels c) Ultrasonic Sensor**

The ultrasonic sensor is used to detect obstacles in front of the robot car. It emits ultrasonic waves via the transmitter (Trigger) and receives the reflected waves

via the receiver (Echo). The sensor sends the time delay between emission and reception to the Arduino to calculate the distance.

Ultrasonic sensors are commonly used in light vehicles to monitor surroundings and measure distances to obstacles—often used in parking assistance systems. They can also be installed along roads to detect the location and speed of moving vehicles(Figure 4).

Jumper wires are used to establish electrical connections between components. To power the children's robot car, a 9V or 6V rechargeable battery can be used. The wheels help balance the robot car.

Arduino IDE (Integrated Development Environment) is a software platform designed to simplify the process of writing code, compiling it, and uploading it to Arduino boards. It includes a built-in serial monitor that enables developers to debug and monitor Arduino projects in real time. The Arduino IDE supports a wide range of boards from basic Uno to advanced models like Nano, Mega, and Due. It is compatible with multiple operating systems including Windows, Mac OS X, and
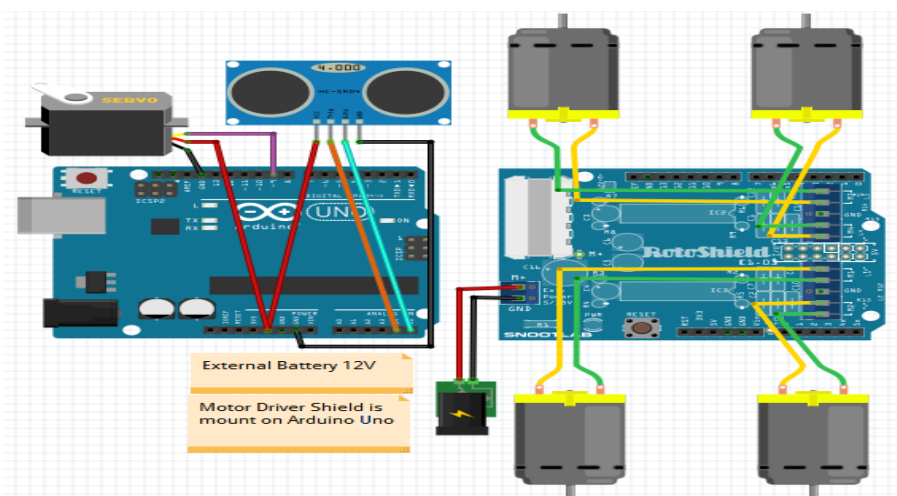
Linux.

Figure 5. Arduino Connection Diagram

Conclusion

Using Arduino to create an obstacle-avoiding children's robot car is a fun and practical initiative with various applications. By combining components such as DC motors, ultrasonic sensors, and motor drivers with Arduino code, it's possible to build a self-driving toy robot car for children that can detect and avoid obstacles.

Developing this project provides an interactive opportunity for learning concepts in electronics, robotics, and coding. In essence, a children's toy robot car powered by Arduino fosters skills in robotics, programming, and problem-solving. Its real-world applications span across safety, surveillance, and search operations.

References

1. O'g'li M. A. A. et al. ULTRASONIC SENSORIDAN FOYDALANIB AVTOMOBIL TO 'QNASHUVLARINING OLDINI OLISH USULINI ISHLAB CHIQISH //Строительство и образование. – 2023. – Т. 4. – №. 5-6. – С. 223-226.

2. Normirzaev, A. R., and B. Tumanboeva. "Transportda intelektual tizimlarni qo 'llash." *Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali* 2.7 (2022): 150-157.

3. Нормирзаев, Р. Х. А., М. А. Тўхтабоев, and Б. Туманбоева. "Электротранспортни яратишга қаратилган изланишлар."." *Energetika sohasini rivojlantirishda muqobil energiya manbalarining roli'' mavzusida vazirlik miqyosidagi ilmiy-amaliy konferensiya ishtirokchilarining ilmiy ma'' ruza materiallari kiritilgan. NamMQI* (2022): 28-29.

4. Tumanbaeva, B. "Va^ v B., To'xtaboev M. Mini etektromobil uchun yangi turdagi elektryuritmani ishlab chiqish." *Fan va innovatsiya* (2022): 134136.