Components Used

Arduino Uno

The Arduino Uno is a popular microcontroller board based on the ATmega328P chip. It provides a flexible and easy-to-use platform for building various electronics projects. Key features of the Arduino Uno include:

- **Microcontroller:** ATmega328P with 32KB flash memory, 2KB SRAM, and 1KB EEPROM.
- **Digital I/O Pins:** 14 (of which 6 provide PWM output).
- **Analog Input Pins:** 6.
- **Clock Speed:** 16 MHz.
- **Voltage Regulator:** Allows operation with a wide range of voltages (7-12V recommended).
- **USB Interface:** For programming and serial communication with a computer.

The Arduino Uno serves as the brain of the line-following robot, controlling sensor readings, motor speed adjustments, and overall behavior.

SmartElex RLS-06 Analog & Digital Line Sensor Array

The SmartElex RLS-06 is a line sensor array equipped with both analog and digital outputs. It is specifically designed for line-following robots and other similar applications. Key features include:

- **Infrared Sensors:** The sensor array consists of six infrared (IR) sensors arranged in a line.
- **Analog Output:** Each sensor provides analog output, allowing for precise measurement of reflectivity.
- **Digital Output:** Additionally, each sensor has a digital output, simplifying line detection by providing a binary signal indicating whether the sensor is detecting a line or not.
- **Versatile Mounting:** The sensors are typically mounted close to the ground, enabling them to accurately detect contrasting lines on surfaces.
- **Compatibility:** Compatible with microcontrollers like Arduino, making it easy to integrate into projects.

The SmartElex RLS-06 sensor array plays a crucial role in the line-following robot, providing feedback about the robot's position relative to the line.

H-Bridge Motor Driver

The H-Bridge motor driver is an electronic circuit that enables bidirectional control of DC motors. It is widely used in robotics and automation projects. Key features include:

- **Bidirectional Control:** Allows the motor to rotate in both forward and reverse directions.
- **Pulse Width Modulation (PWM) Support:** PWM signals can control the motor speed by varying the duty cycle of the input signal.
- **Overcurrent Protection:** Some H-Bridge motor drivers include overcurrent protection to prevent damage to the motors and driver circuitry.
- **High Efficiency:** H-Bridge motor drivers are designed for high efficiency, minimizing power losses during motor operation.

In the line-following robot, the H-Bridge motor driver controls the speed and direction of the motors based on signals received from the Arduino Uno. It enables precise movement control necessary for following the line accurately.