

ARDUINO ROVER

FOR SPACE APPLICATION

An Arduino Rover is a small mobile robot controlled by an Arduino microcontroller. The rover can be controlled autonomously or remotely and is often used for traversing terrain.

Main Components:

- Arduino Uno
- Motor Driver
- TT Gearmotor x4
- Li Ion Battery Pack
- Ultrasonic Distance Sensor
- Chassis
- Servo

How it works:

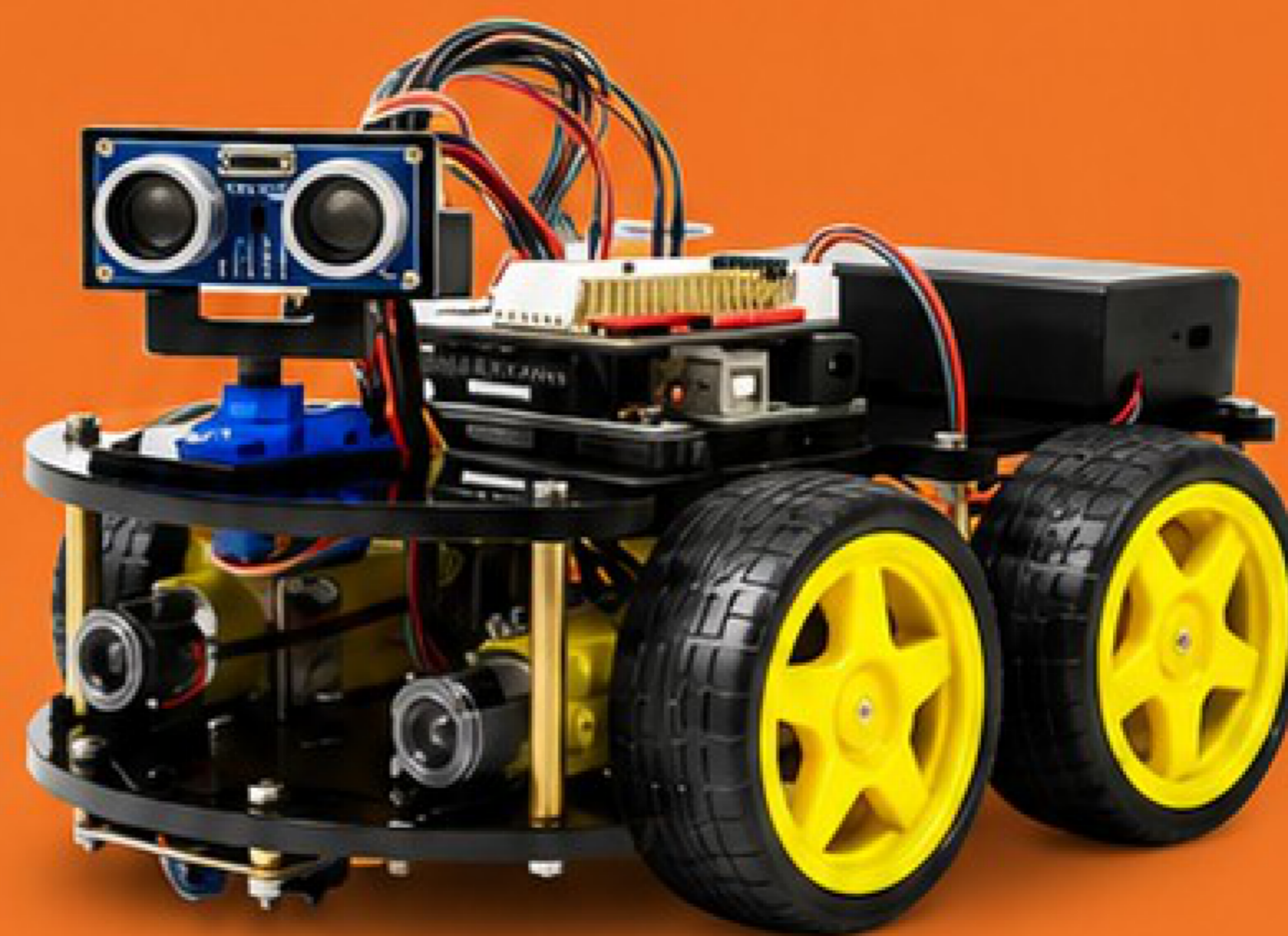
1. sensors collect information about the environment
2. Arduino processes sensor data
3. Arduino sends commands to the motor driver
4. Motor driver powers motors to move the rover
5. Rover can avoid obstacles or follow programmed routes

Key Features

- Autonomous obstacle detection using an ultrasonic sensor
- Real time decision-making based on distance readings
- Automatic reversing and turning when an obstacle is detected
- Simple, efficient control using an Arduino microcontroller

Advantages

- Uses simple ultrasonic sensing to avoid obstacles effectively
- Responds quickly because it only processes small amounts of data
- Low cost and easy to build using Arduino components
- Works well in tight or unsafe environments where humans can't go
- Demonstrates real autonomous navigation principles used in industry and space robotics



Flowchart

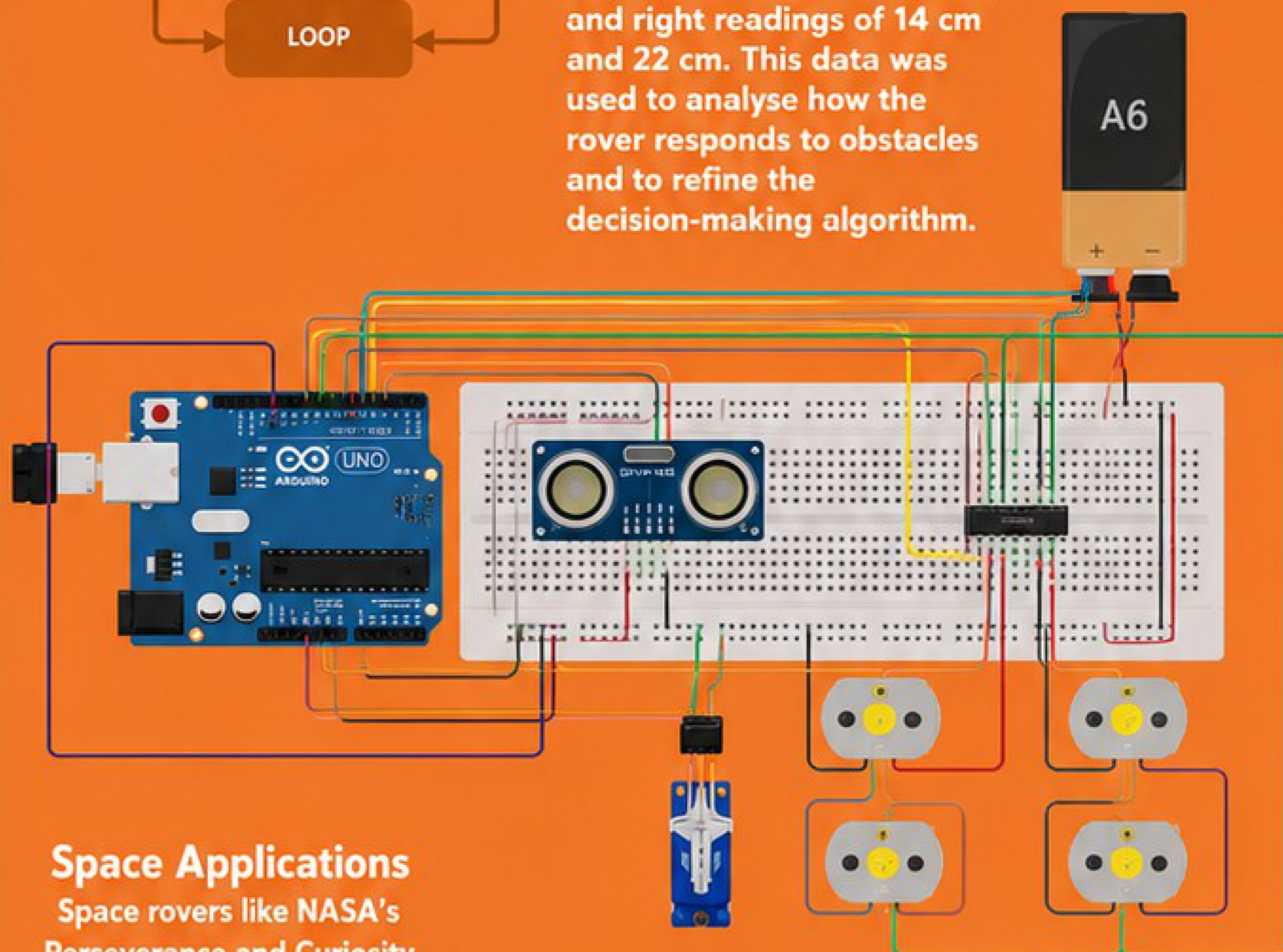


Objectives

- Build a rover that can navigate autonomously using sensor data
- Detect obstacles using an ultrasonic sensor and avoid collisions
- Implement simple decision-making based on distance readings
- Control two DC motors using a motor driver for movement and turning
- Test how sample data affects the rover's behaviour in real environments

Sample Data

The sample data collected consisted of ultrasonic distance readings taken at three angles: front (0°), left (90°), and right (180°). For example, one sample set included front readings of 42 cm, 39 cm, 18 cm, 12 cm, and 9 cm, with corresponding left readings of 27 cm and 31 cm, and right readings of 14 cm and 22 cm. This data was used to analyse how the rover responds to obstacles and to refine the decision-making algorithm.



Space Applications

Space rovers like NASA's Perseverance and Curiosity also rely on sample data. They take small sets of sensor readings — from cameras, lasers, or radar — and use them to navigate unknown terrain.

Skills demonstrated

programming in C++
electronics and circuit design
CAD
3D printing
problem solving and testing