
# Educational Rover

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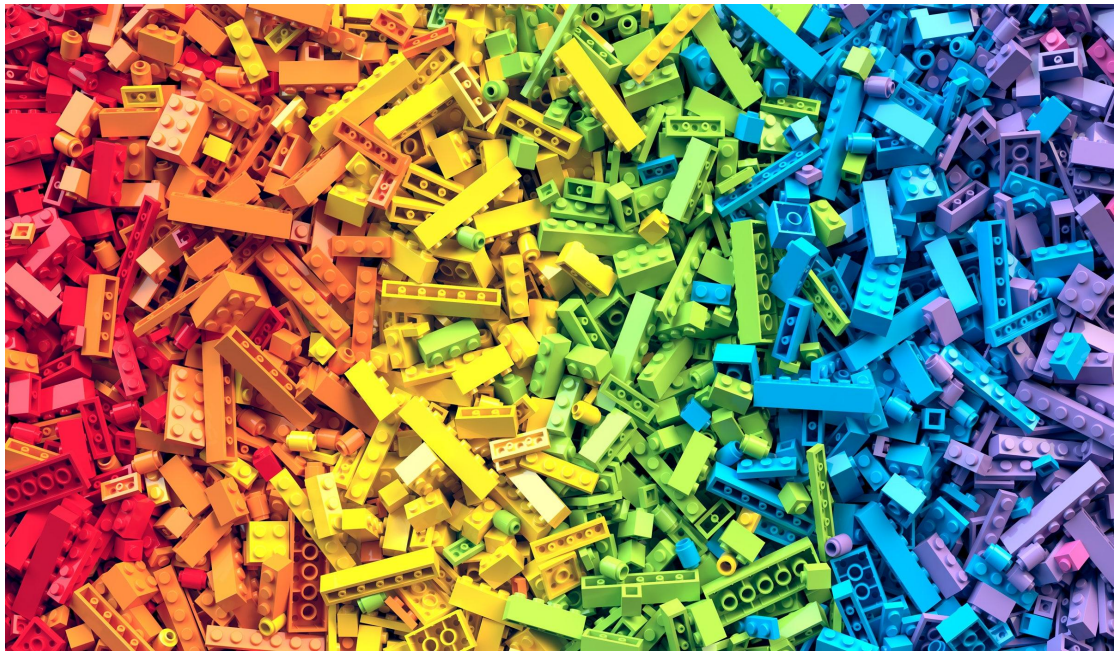
# LEGO Commercial: Inspire Imagination and Keep Building

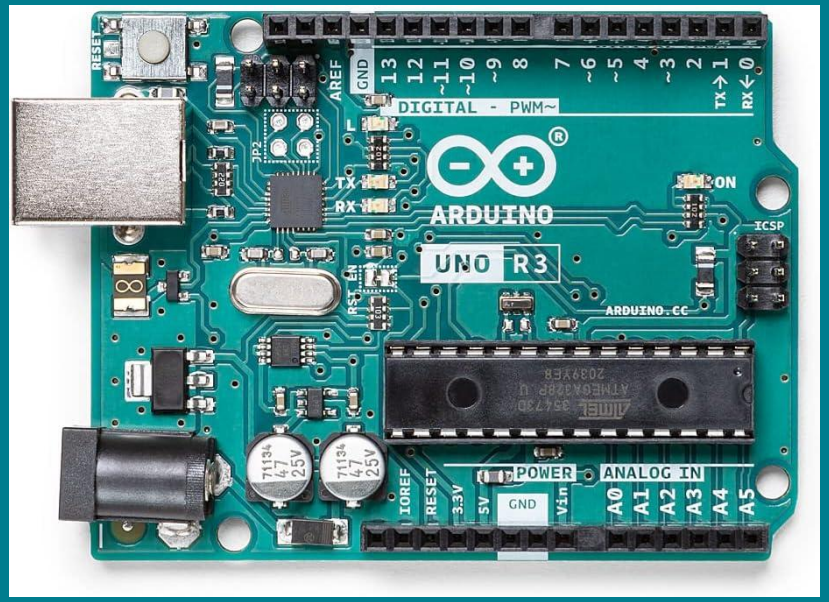
https://youtu.be/BfhV3Q4LJPM?si=gRivB4GkBcNRs2j6

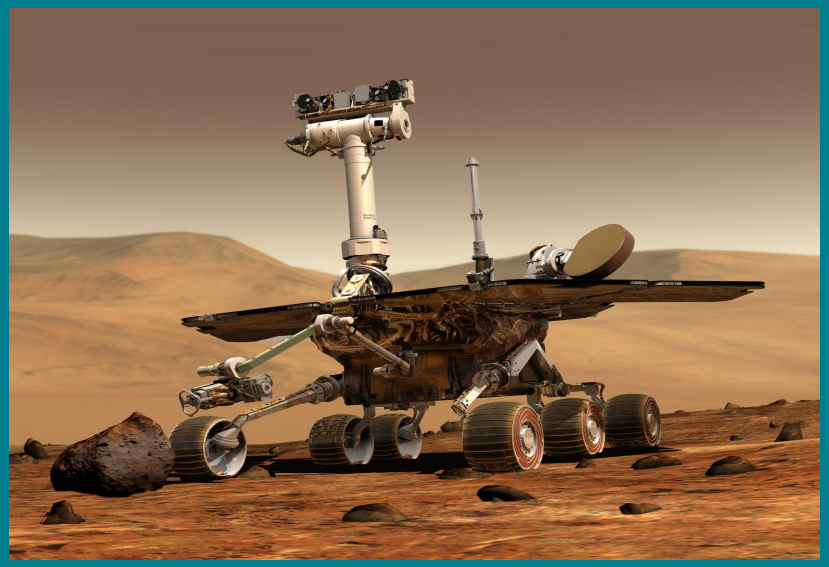


# The Role Of LEGO in Children Development

## Develops key skills for STEAM fields

- Sparks interest in STEAM fields
- Develops Spatial Reasoning
- Can help to build build confidence across gender in STEAM



# Proposal: Rover Educational Kit

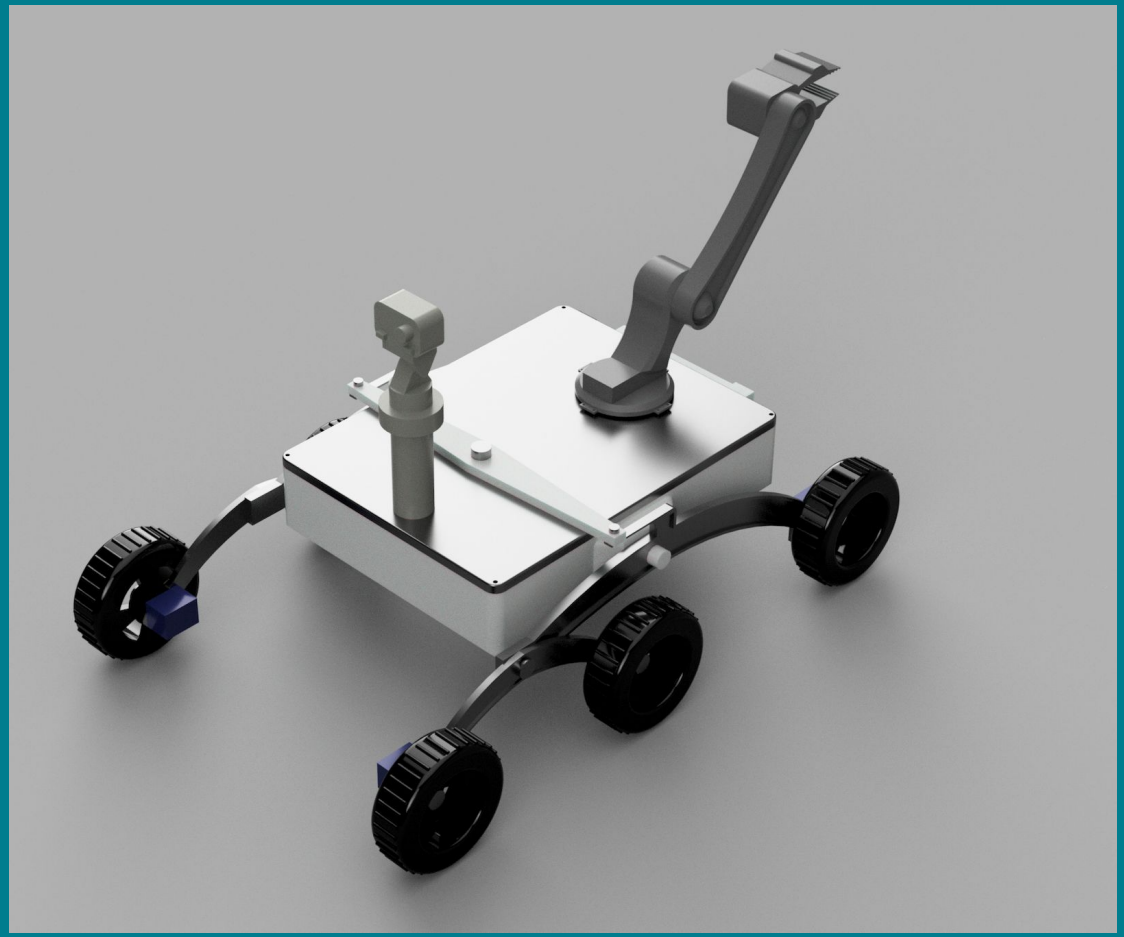
## Arduino-based Rover kit

Develops programming and rover operation principle skills

- Includes instructions on Arduino coding
- Has modular design
- Has multiple operation methods

# Modular construction

Just like LEGO



Modules

**Assemble prepared parts**

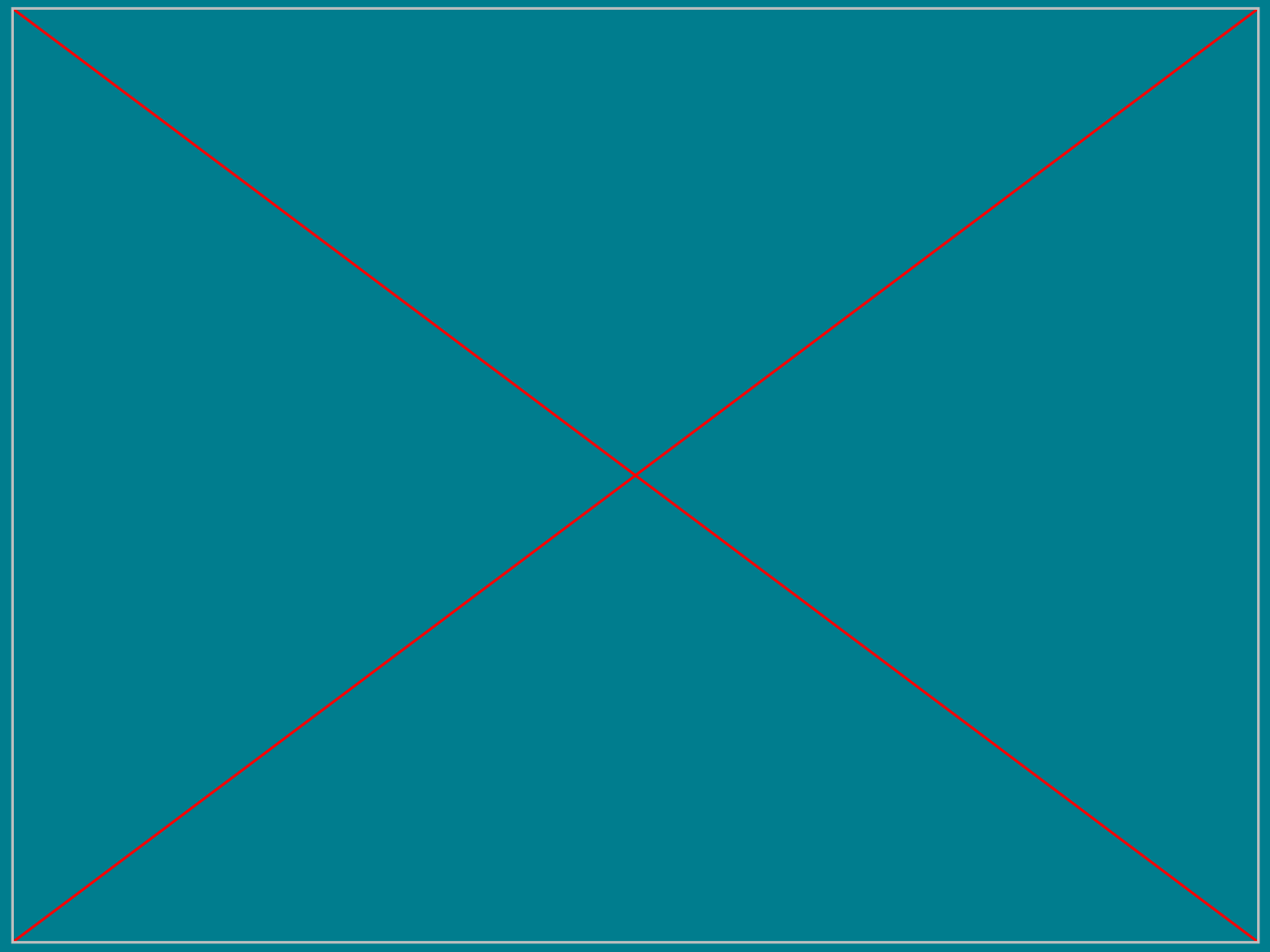
Quick assemble and disassemble

Quick to modify

**Use for experimentation**

# How Modules Work?

It’s practically a constructor



Attach and detach

Fasten and loosen

- Add if needed
- Remove if not needed

Transform with imagination

**Design or purchase new modules to get new builds**

# Module Example: Manipulator

Pick objects, low DOF count, easy to learn

Simple Manipulator

**Control via sensor or phone**

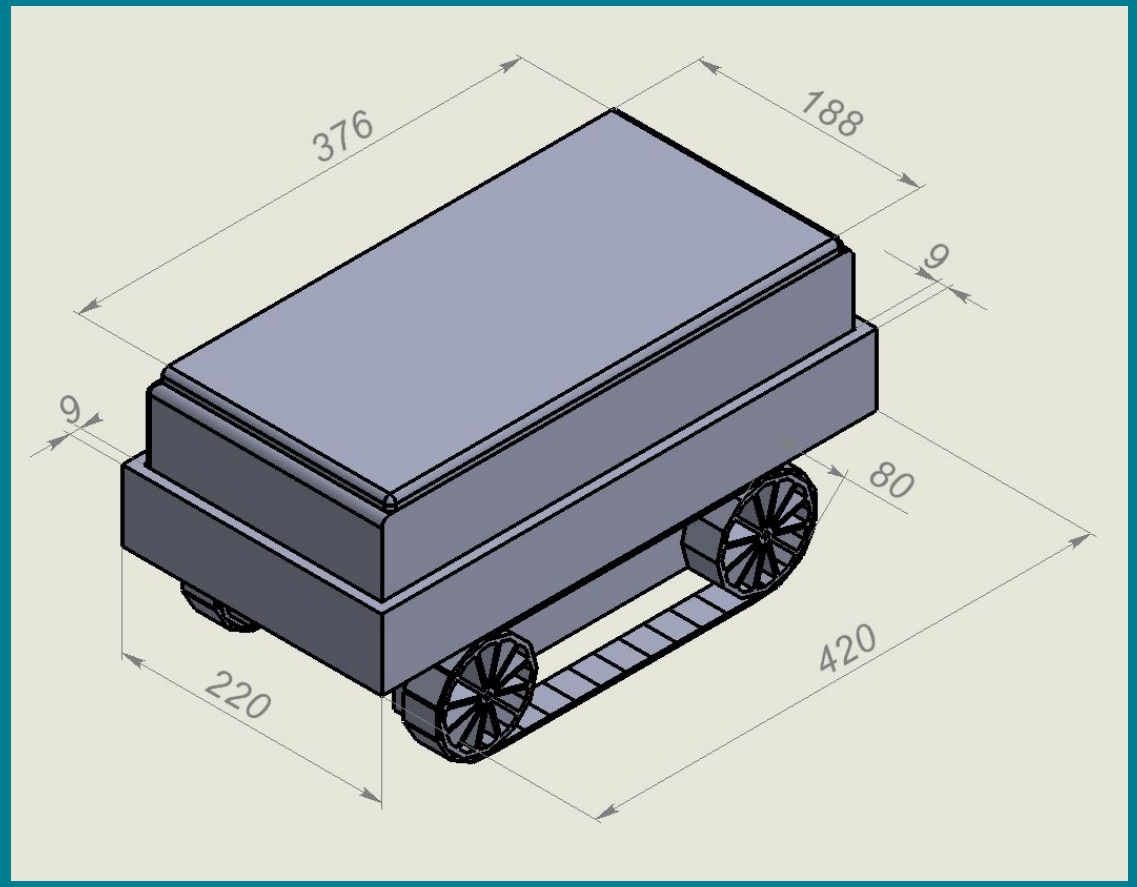
Can display how rovers pick soil samples

Attached on top

**Can be detached at any time**

# Module Example: Track Module

Like a new pair of shoes




Track Module

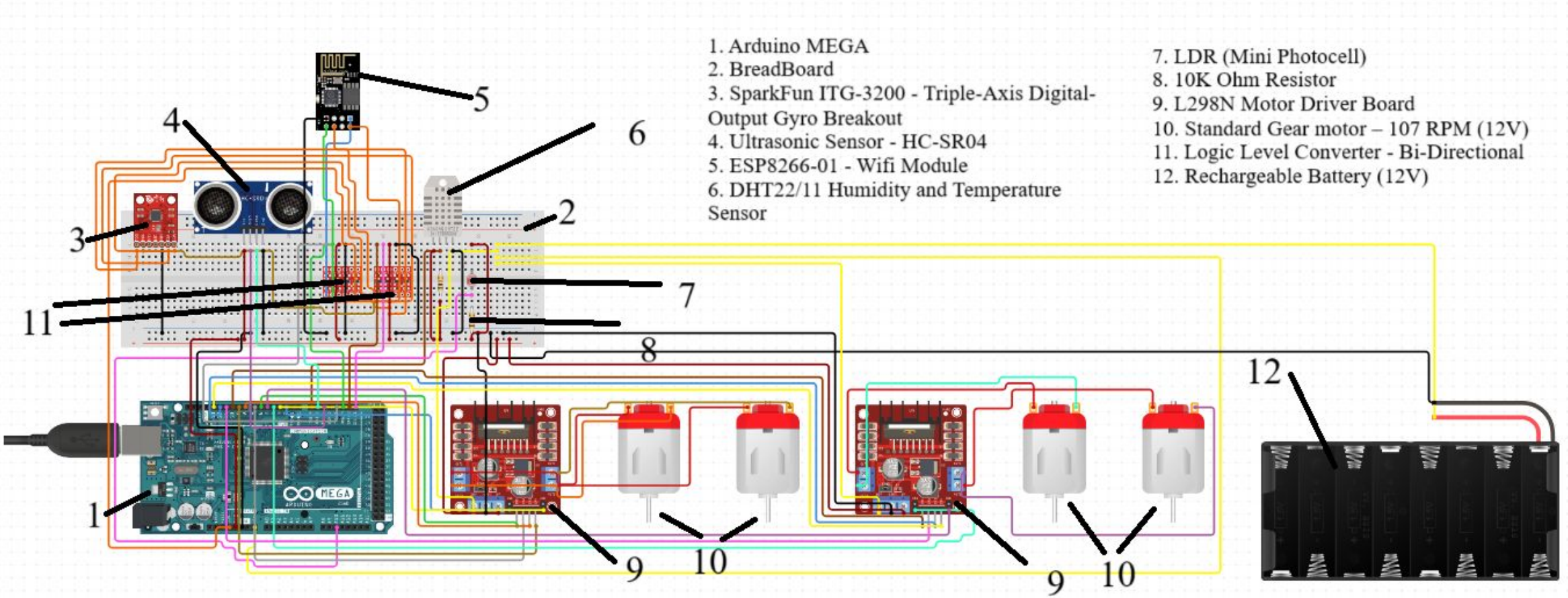
**Replaces regular wheels**

Usually slower but can traverse difficult terrain

It’s like a pit stop

Travel anywhere

# Circuits: Arduino Uno




Arduino uses pins to connect components and allows to reprogram them to create custom settings and operations


# Learn to code: Arduino

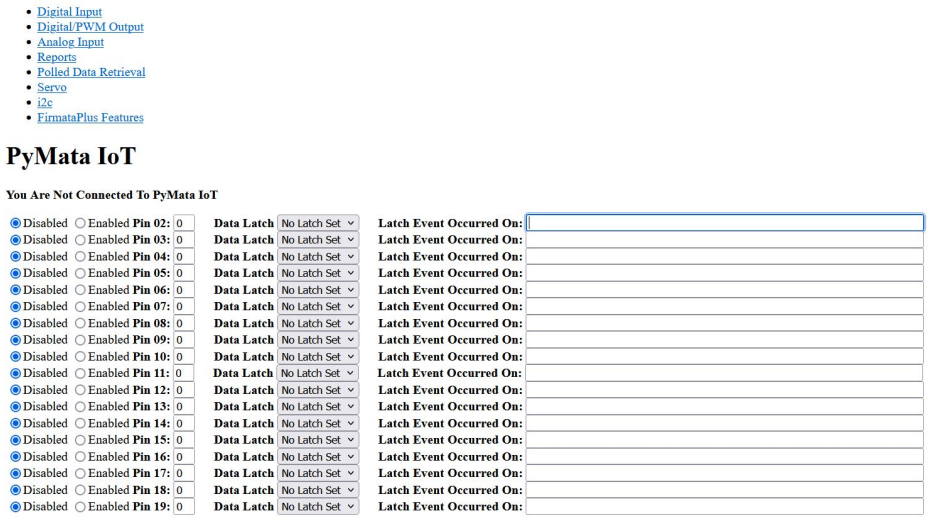
## Primary coding method: IDE

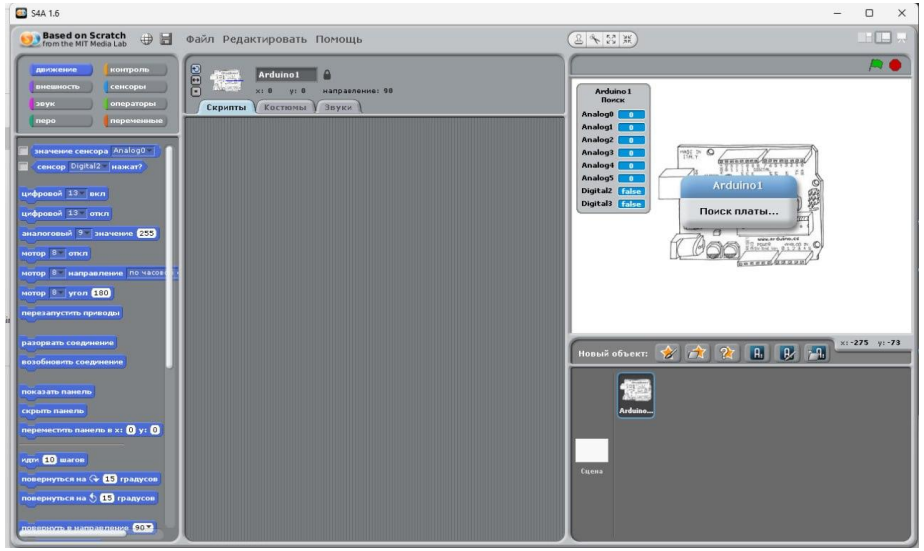
Arduino IDE is a software, which allows to create a code with a similar syntax to C++

But C++ is notorious for its difficulty

# Coding simplified

Don’t overwhelm children, make it a fun game




## Table of pins

- Assign Arduino pins from a table
- Set values and condition in the table
- Quick and easy way to replace coding and still learn coding principles

## Blocky Arduino

- Instead of writing code, build a program with blocks
- Each block has parameters that can be modified (speed, frequency, etc)

# Cost calculation per Rover

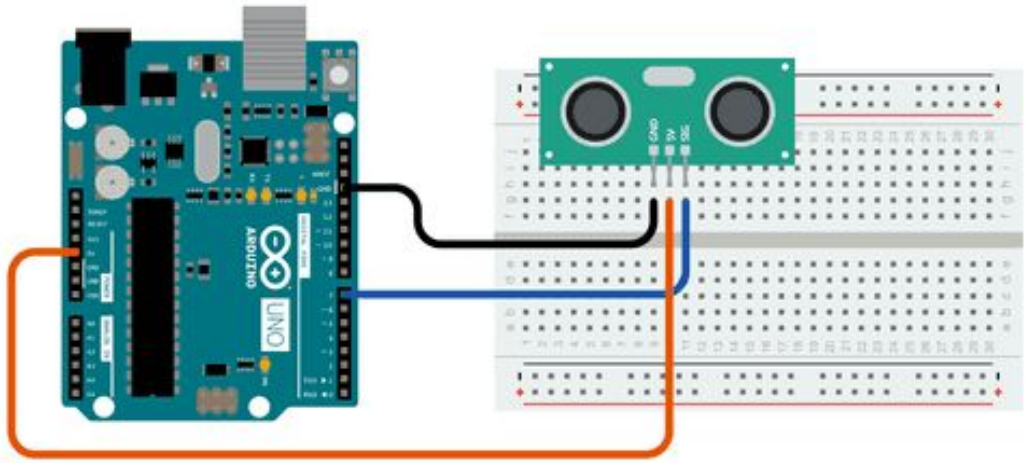
| Part name | Price per unit, KZT | Quantity per model | Total price, KZT |
|---|---|---|---|
| Arduino MEGA | 2500 | 1 | 2500 |
| BreadBoard | 460 | 1 | 460 |
| L298N Motor Driver Board | 600 | 2 | 1200 |
| Standard Gear motor – 107 RPM (12V) | 350 | 4 | 1400 |
| Rechargeable Battery (12V) | 1800 | 1 | 1800 |
| ESP8266-01 - Wifi Module | 450 | 1 | 450 |
| Logic Level Converter - Bi-Directional | 125 | 2 | 250 |
| SparkFun ITG-3200 - Triple-Axis Digital-Output Gyro Breakout | 530 | 1 | 530 |
| 10K Ohm Resistor | 2.5 | 2 | 5 |
| Ultrasonic Sensor - HC-SR04 | 250 | 1 | 250 |
| DHT22/11 Humidity and Temperature Sensor | 500 | 1 | 500 |
| LDR (Mini Photocell) | 10 | 1 | 10 |
| Joysticks and gamepads | 400 | 1 | 400 |
| Camera | 440 | 1 | 440 |
| **TOTAL PRICE, KZT** | **10195** | | |

# Automatic Control

Auto meaning “self”

## Rover will move by itself

- Ultrasonic sensor can detect obstacles
- Once obstacle is detected, rover moves away

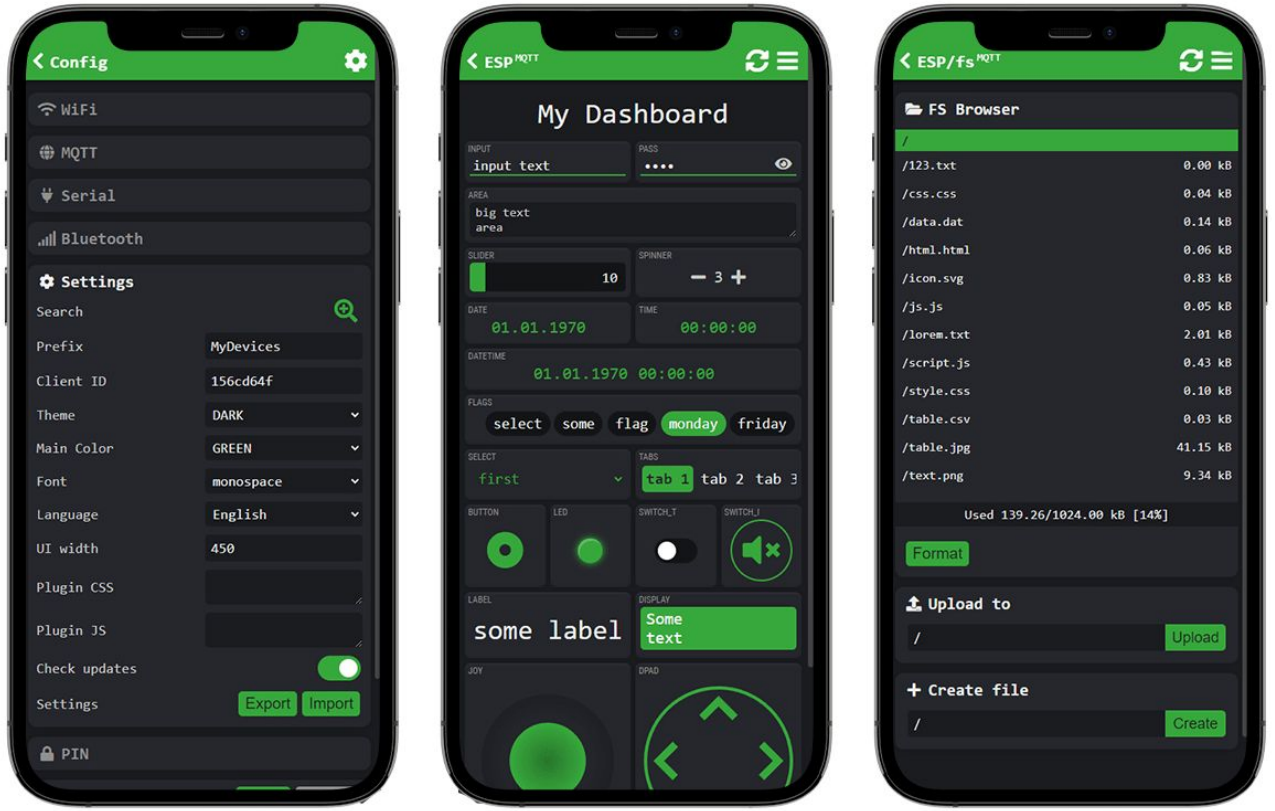


# Manual Control

You are in charge

## Rover will follow your command

- Using Wi-Fi module, connect a smartphone to rover
- Input directions with joystick/d-pad and the rover will follow



Project Report:
https://docs.google.com/document/d/1t-YMsOOALD0eHMdYNdmuJVq21oUiMuTkZ9GE4wRHI-U/edit?tab=t.0

# Thank You!

Q&A time