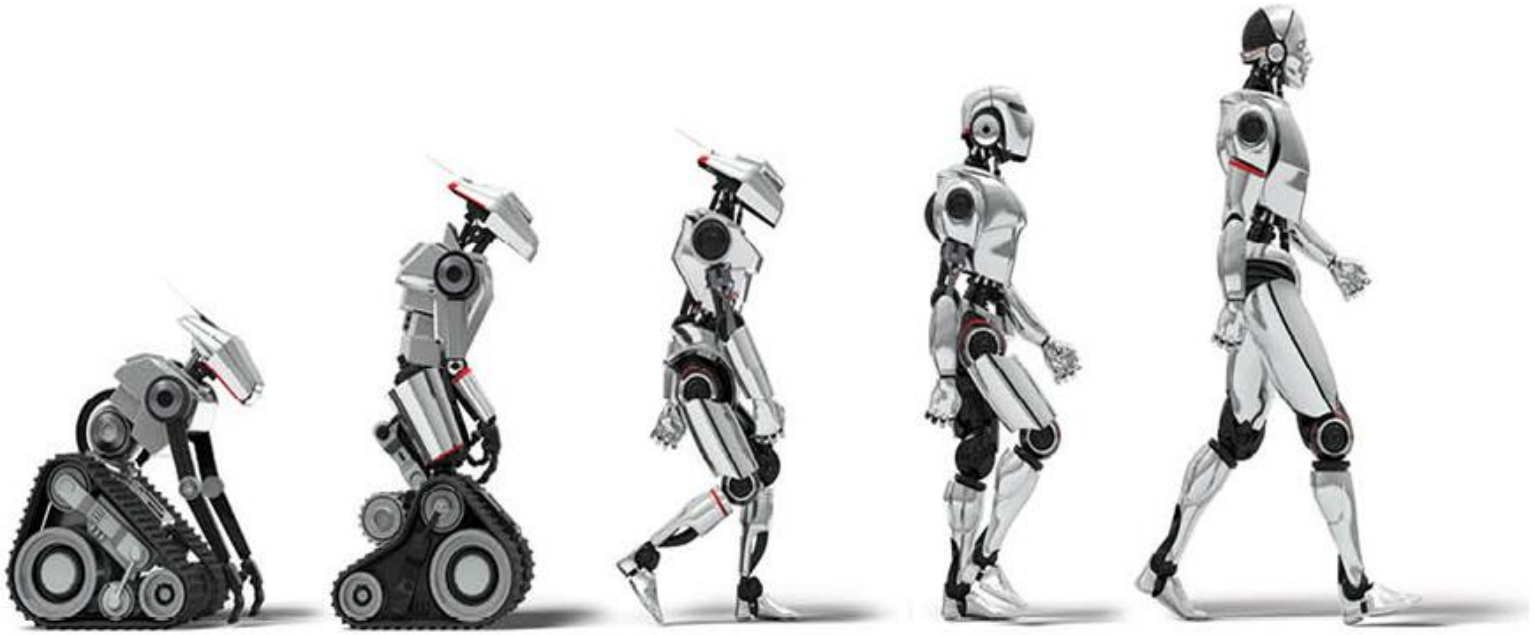

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Spark CENTRE

Robotics and Autonomous Systems Centre

Robotics and Autonomous Systems Centre

Vinícius A. Santos

Received his B.S. Computer Engineering from the Federal University of Goiás (UFG, Goiânia, Brazil) in 2015. He received Master Degree in Computer Science also at UFG in 2018. Researcher in Machine Learning at DATA H Artificial Intelligence developing solutions for autonomous vehicles . He is a member of robotics team Pequi Mecânico (UFG, Goiânia, Brazil), working in the development of soccer robots between 2013 and 2018. He also worked in the development of electronic and computational systems for the monitoring of crops at EMBRAPA (Goiânia, Brazil), in 2014 and 2015.

Kleber Cabral

Currently enrolled in Ph.D. studies at Royal Military College, ON, Kingston, Canada. Master's degree in Electronic and Computing Engineering at "Instituto Tecnológico de Aeronáutica" - ITA - bachelor degree in Computer Engineering from Universidade Federal de Goiás (UFG - Goiânia, GO, Brazil).

Over 30 million U.S. workers will lose their jobs because of AI

By Associated Press
Published: Jan 24, 2019 11:25 a.m. ET

Experts say it could happen in two years or 20, but it's happening

Bartek Sadowski

A line of automated transport robots sit before operating to move shelving units.

Robots aren't replacing everyone, but a quarter of U.S. jobs will be severely disrupted as artificial intelligence accelerates the automation of existing work, according to a new Brookings Institution report

We can do different!

Robotics and Autonomous Systems Centre

Droid Equinox is a weekly meeting to share technical knowledge about robotics, embedded artificial intelligence hardware and autonomous decision making.

Our goal is to develop local talents and generate professional updating.

Every Thursday - 7 PM at Spark Centre

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Droid Equinox

- Robots are rapidly evolving from factory workhorses, which are physically bound to their work-cells, to increasingly complex machines capable of performing challenging tasks in our daily environment.
- The objective of this course is to provide the basic concepts and algorithms required to develop mobile robots that act autonomously in complex environments.
- The main emphasis is put on mobile robot locomotion and kinematics, environment perception, localization and mapping, and motion planning

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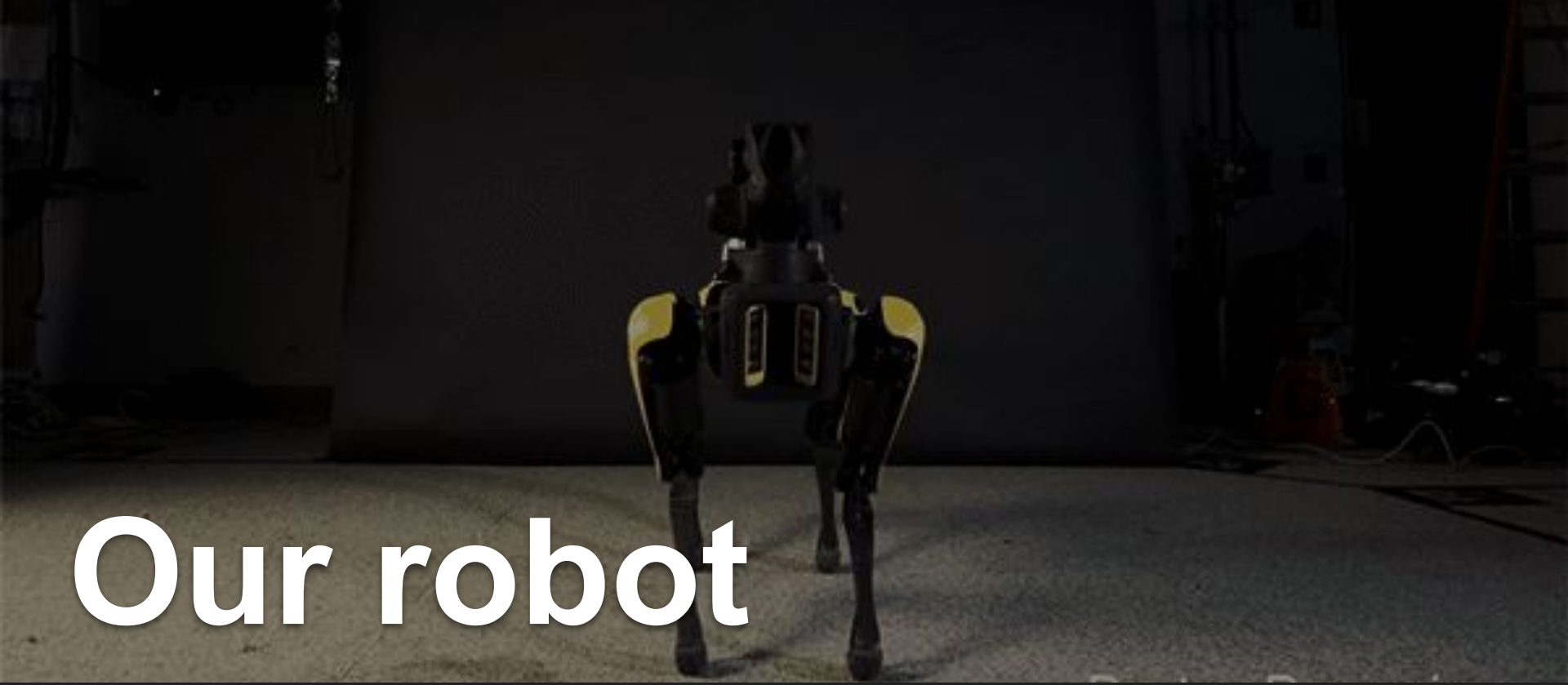
Please access:

https://colab.research.google.com/drive/1D71nWkKN_ml8HDv-SpMsQ7Aqxkoow3mW



Our robot

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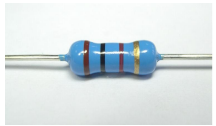
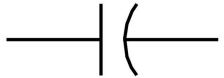
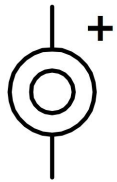
Other components

- Many **other components** are used to **build circuits** for many **tasks**. For us, they'll be used to **create our robots**.







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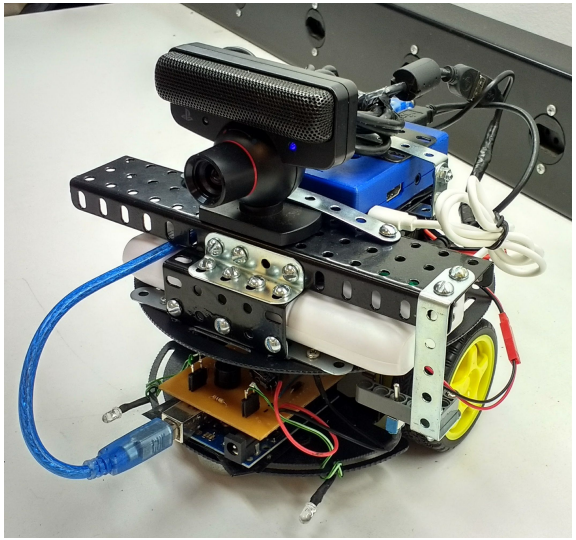
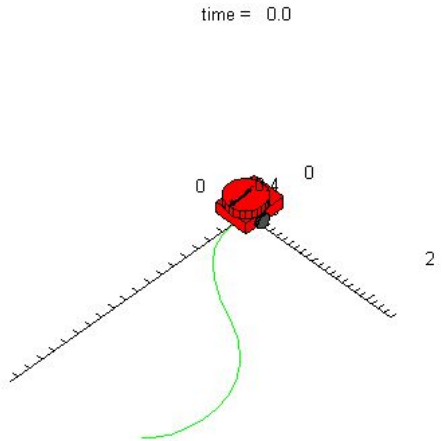
Robot

- We'll build a **Differential Wheeled Robot**. The **differential drive** is a **two-wheeled drive system** with **independent** motors for each **wheel**





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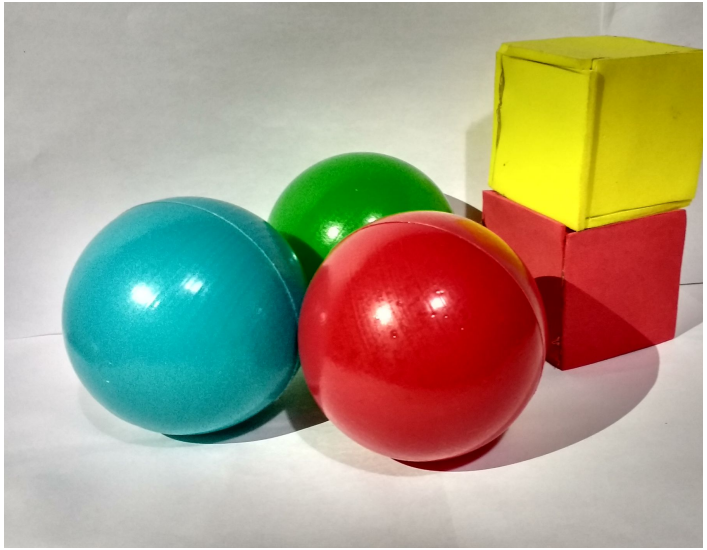
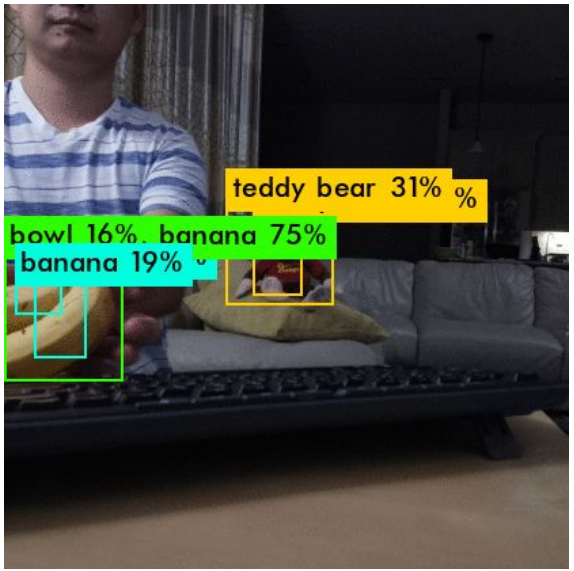
Navigation

- We'll use **objects** to **guide our navigation** and the **tasks** to be done





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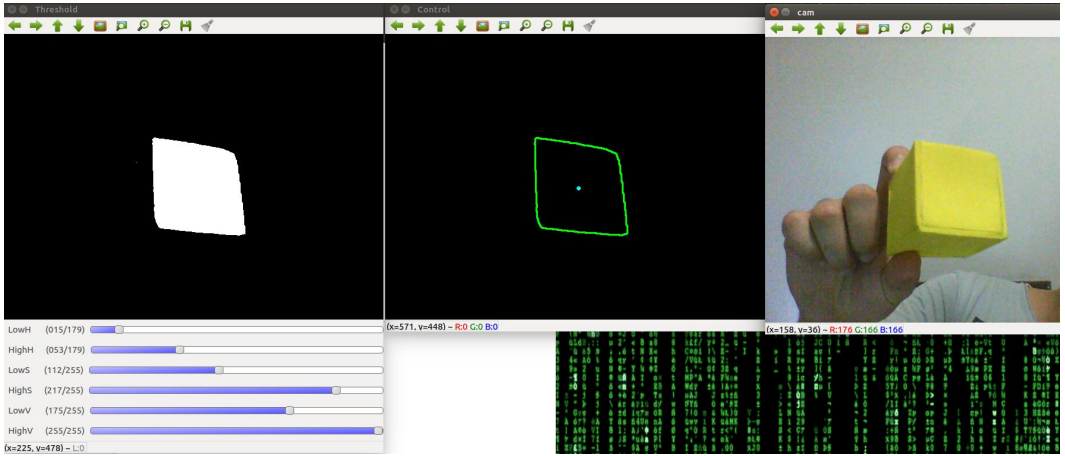
Color Detection

- **Color Detection** is the task of **pixel classification** of a **specific color**



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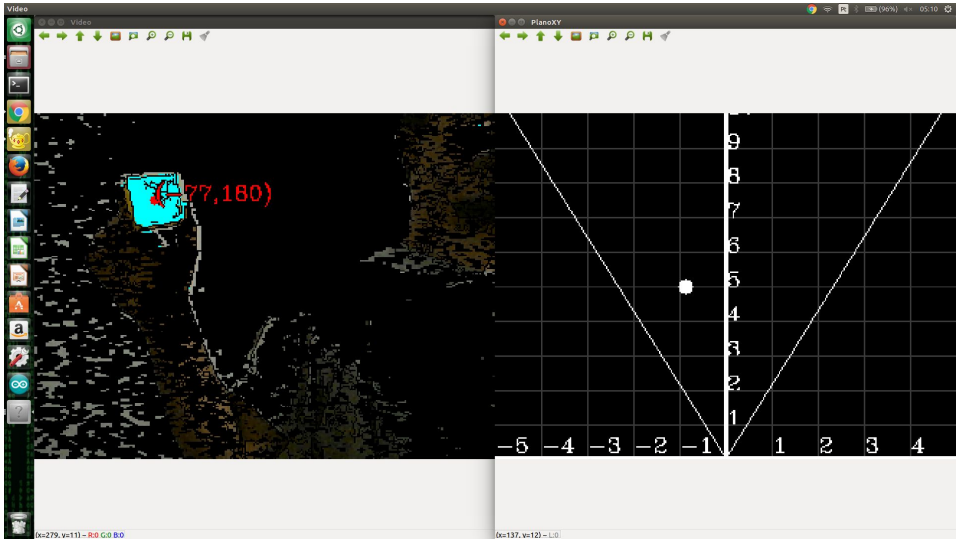
Navigating with Color Detection

- Once we find the **object** of the **color** we are **looking for** we can use it as a **signal** to **go towards** an **object** or **avoid it**



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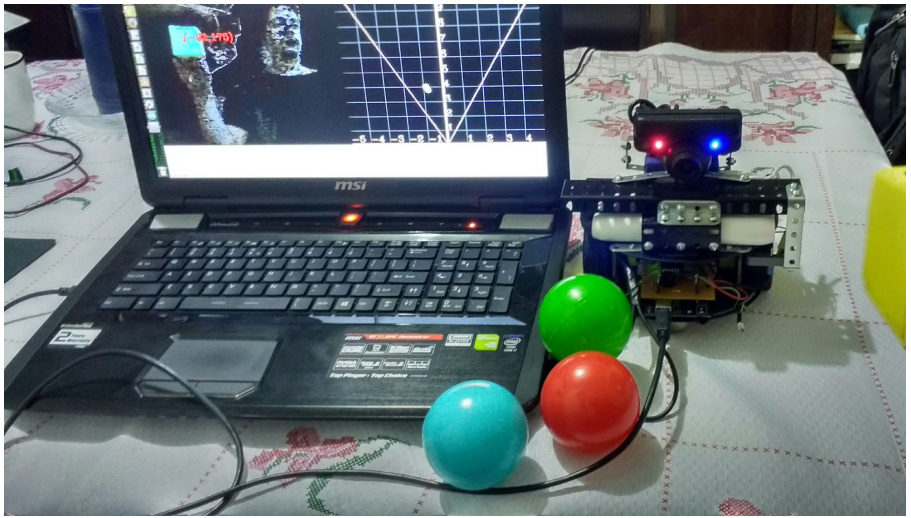
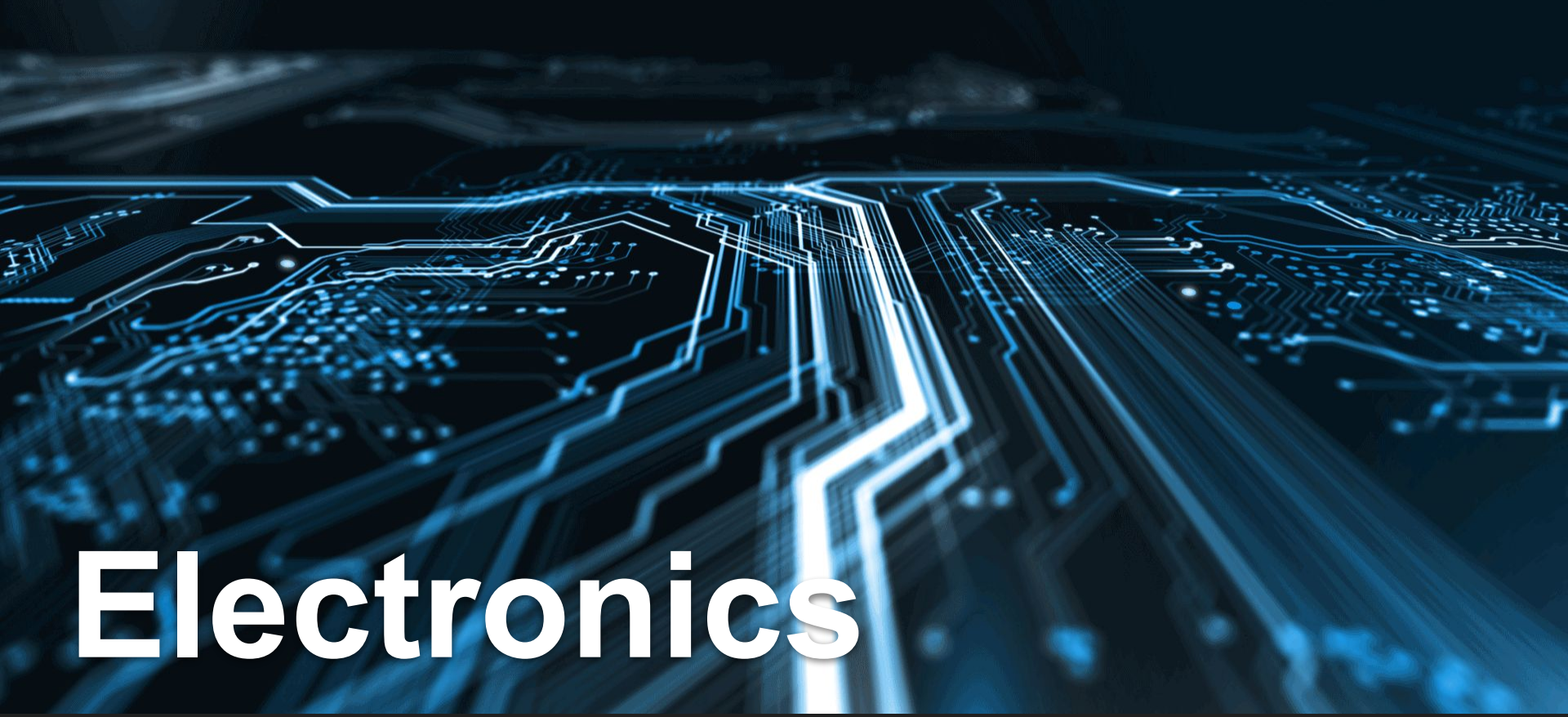
Robot





Electronics

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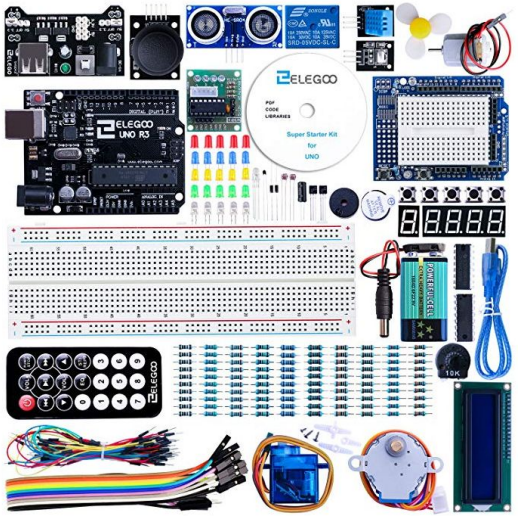
Development Kit

- A kit with some electronics components for the basics



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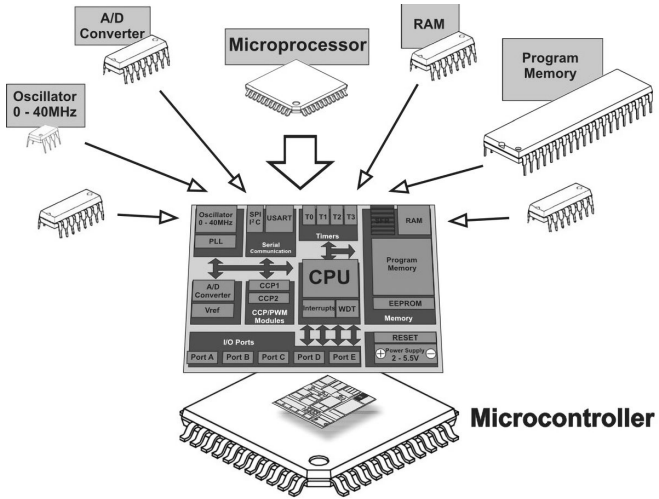
Microcontroller

- **Microcontrollers** are known as **single-chip computers**. These **chips** are an **evolution** of **digital circuits** to **increase the complexity** of task possible with them.



Microcontroller

- **“Small computer”: Process inputs** and **outputs** between the **device** and the **external components** connected to it.
- **Embedded Platform: Interacts** with the **environment** through **hardware** and **software**.

Arduino

- **Arduino** is an **open-source platform** used for **building electronics projects**. **Arduino** consists of both a **physical programmable circuit board** (often referred to as a microcontroller) and a **piece of software**

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Arduino

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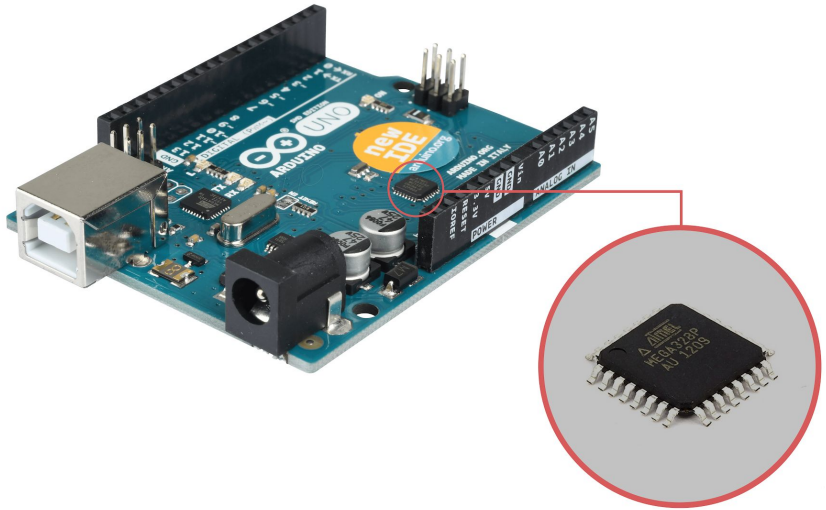
Arduino



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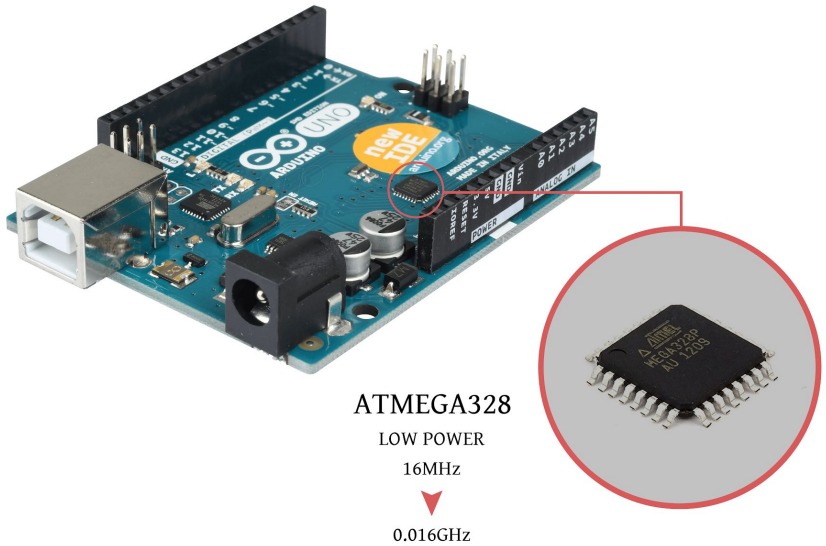
Arduino



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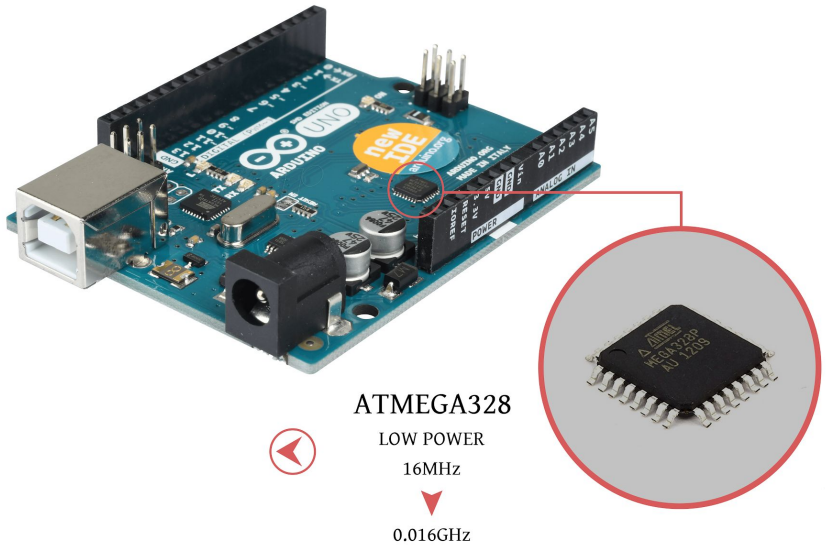
Arduino



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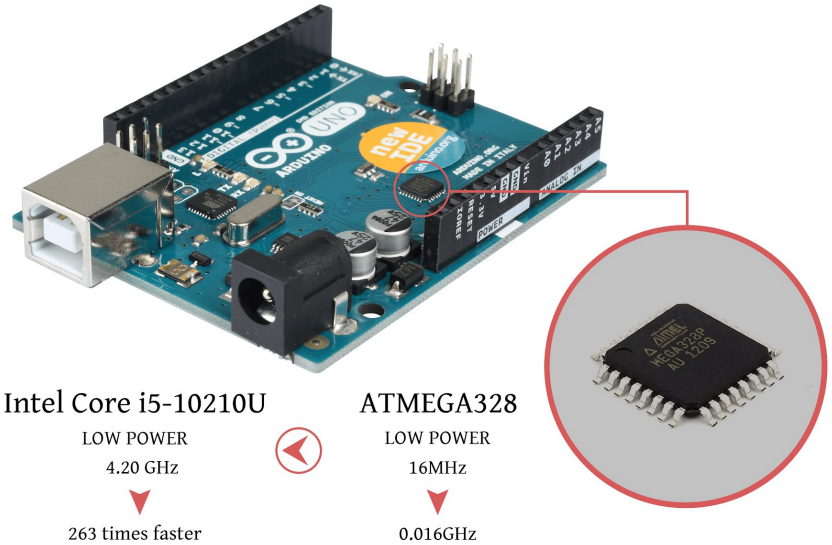
Arduino



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Arduino

- **USB: Powered** directly from a **computer**
- The circuit has protection to not damage USB computer port

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Arduino

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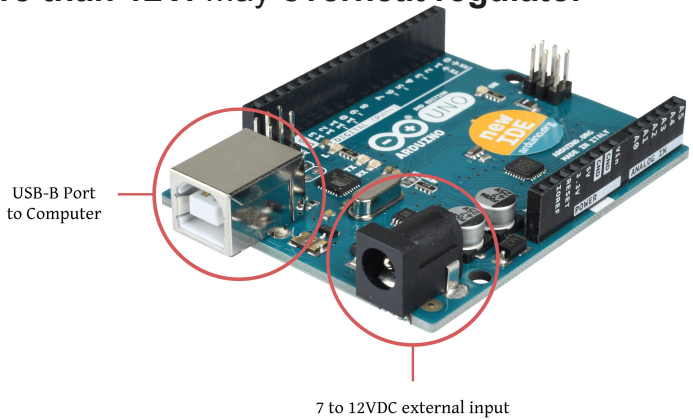
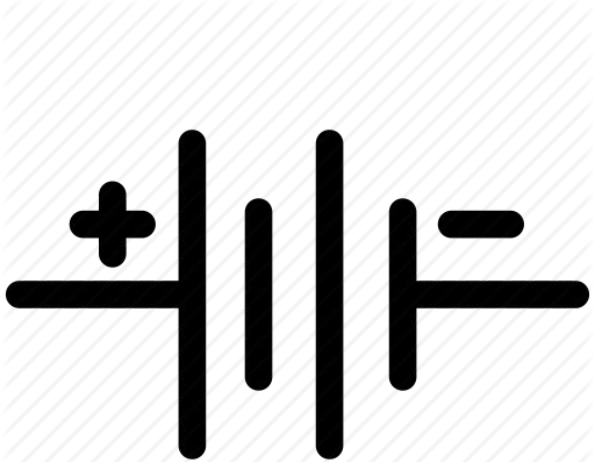
Arduino

- **External Input voltage:** Recommended **external input voltage** with a **voltage between 7** and **12 volts**
- **Less than 7V:** May cause **instability**
- **More than 12V:** May **overheat regulator**





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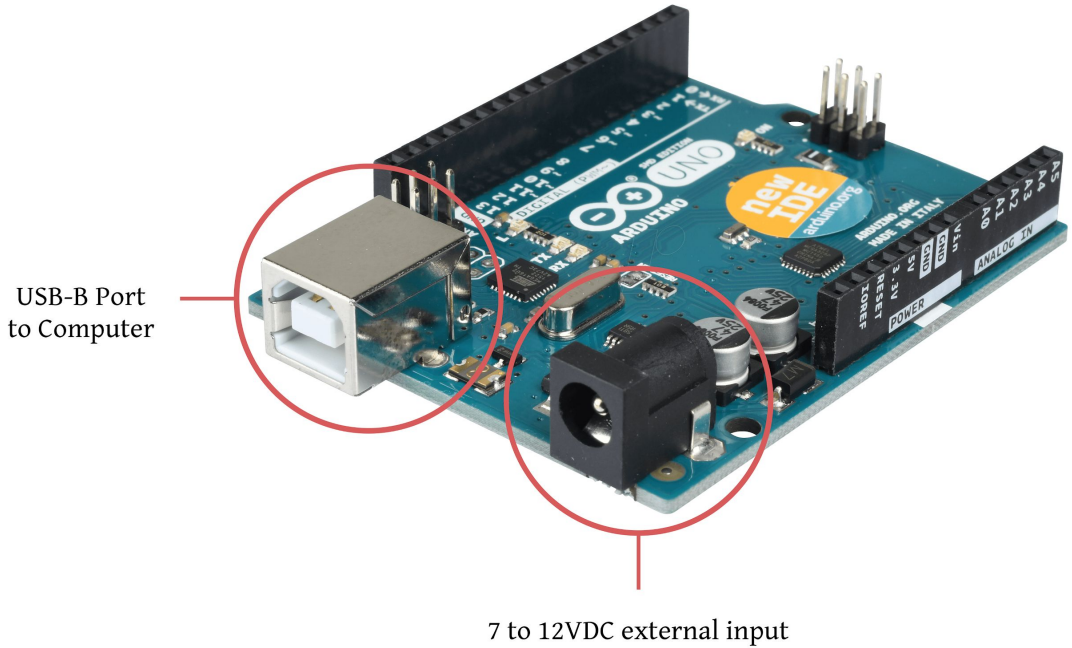
Arduino



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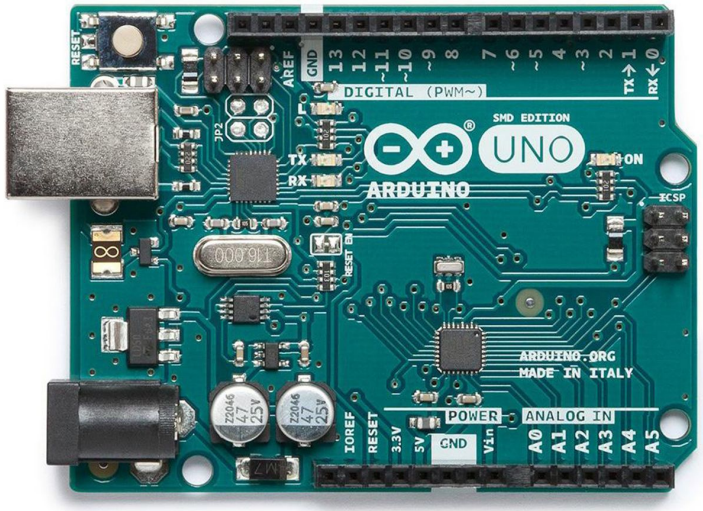
Arduino



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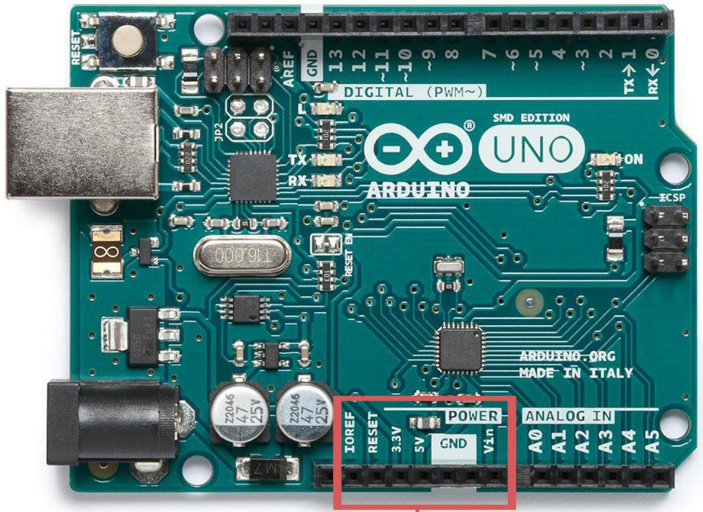
Arduino



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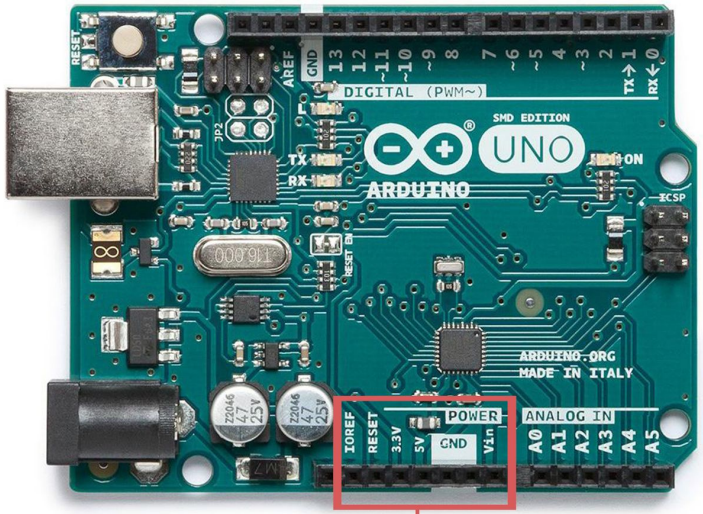
Arduino



Pins related to power supply with different functions

Power Supply

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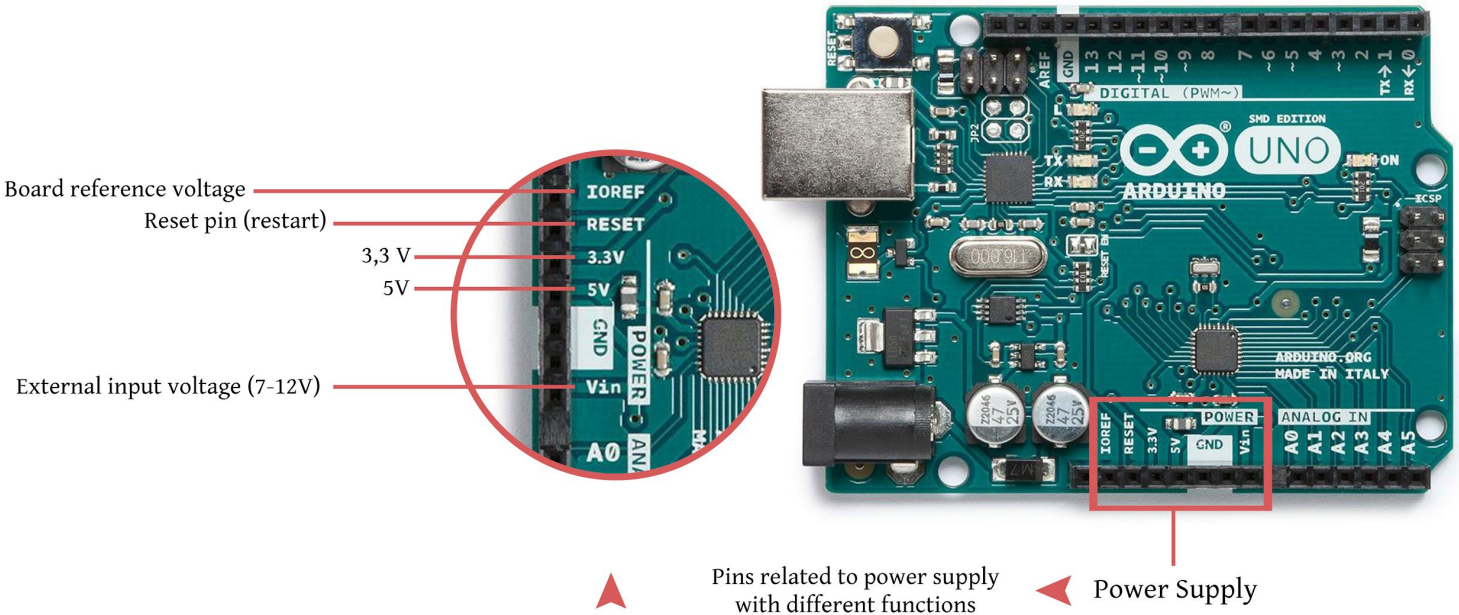
Arduino



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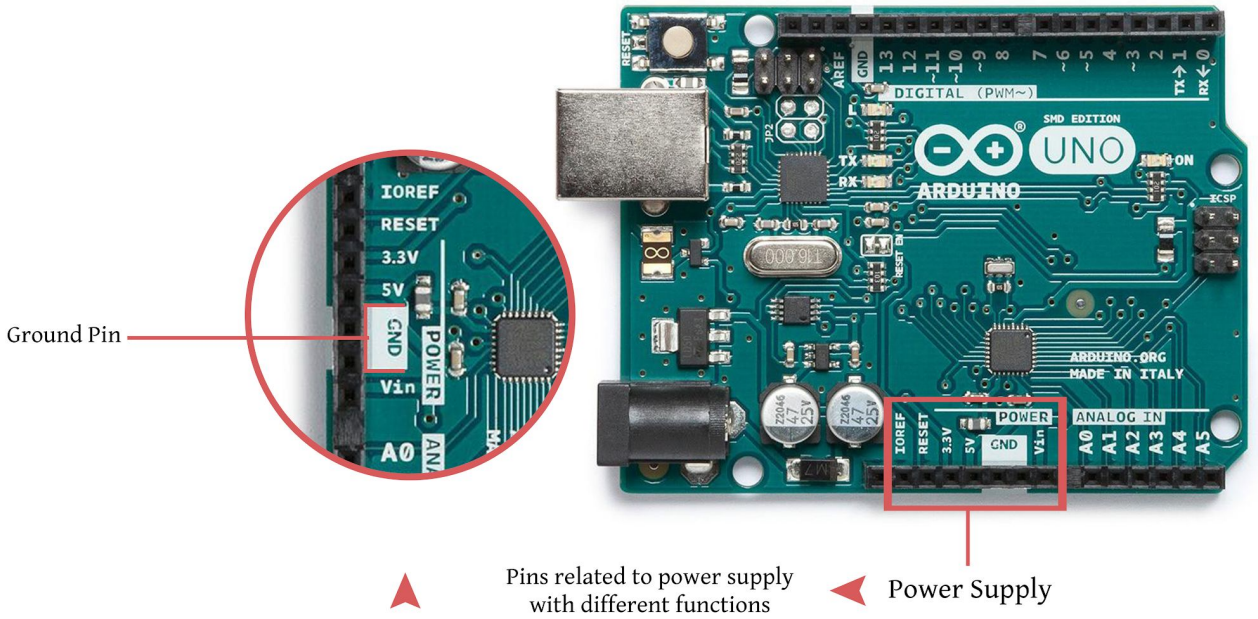
Arduino



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Arduino

- **Analog Pins**
  - Use **continuous values**
  - Used to **read continuous sensor values** (temperature, level ...)
  - **Not capable** of **analog writing**

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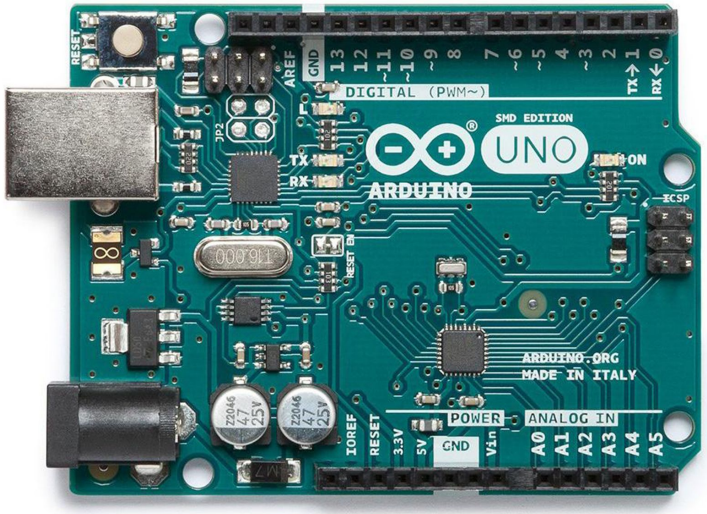
Arduino



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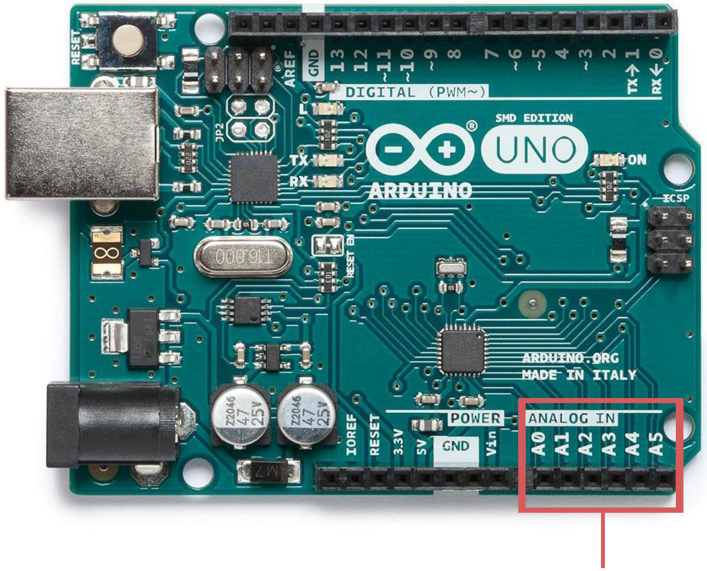
Arduino



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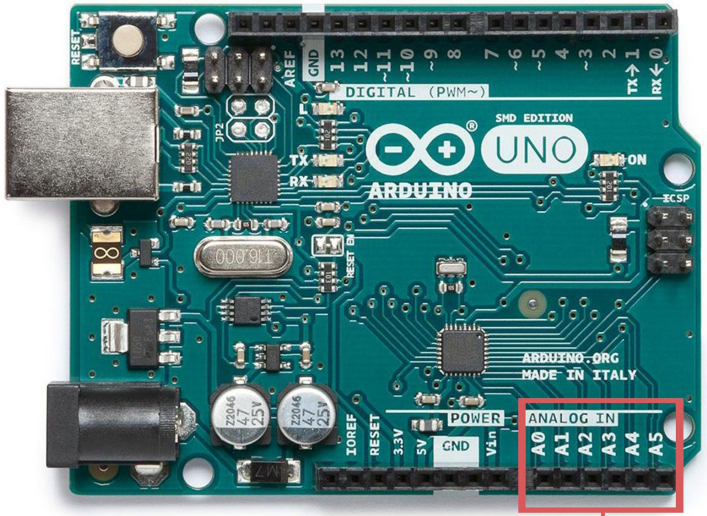
Arduino



Analog Input

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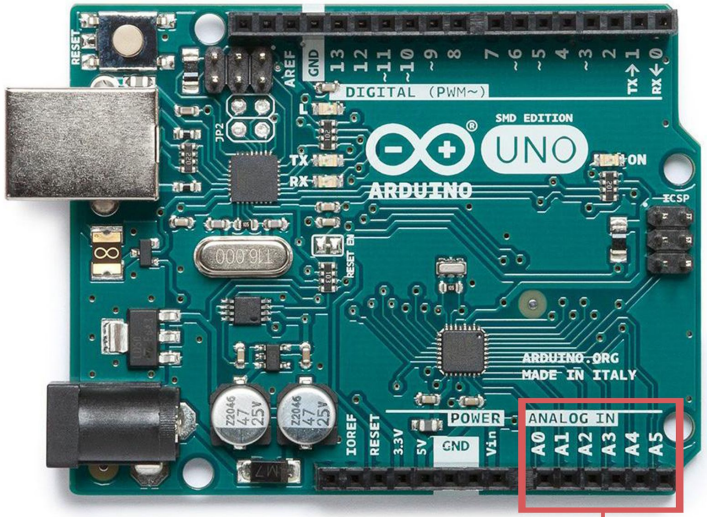
Arduino



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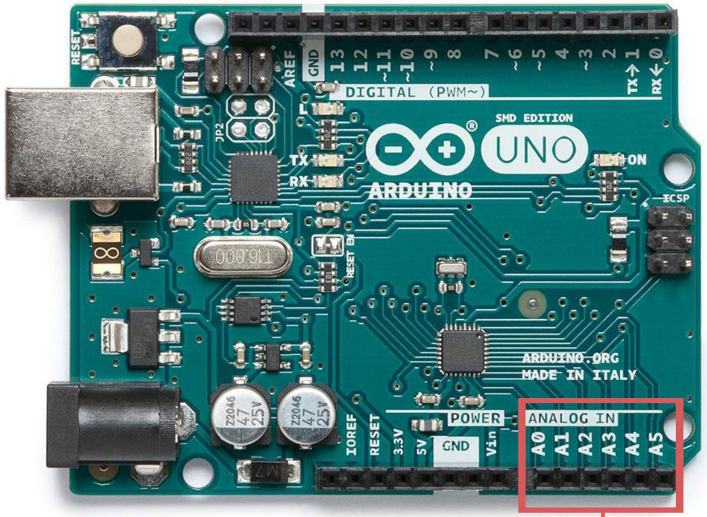
Arduino

ENTRADA DIGITAL



Arduino

- **Digital pins**
  - **Boolean values** (true / false)
  - Used to **read digital sensor values**
  - Used to **control digital devices** (LEDs, motors ...)

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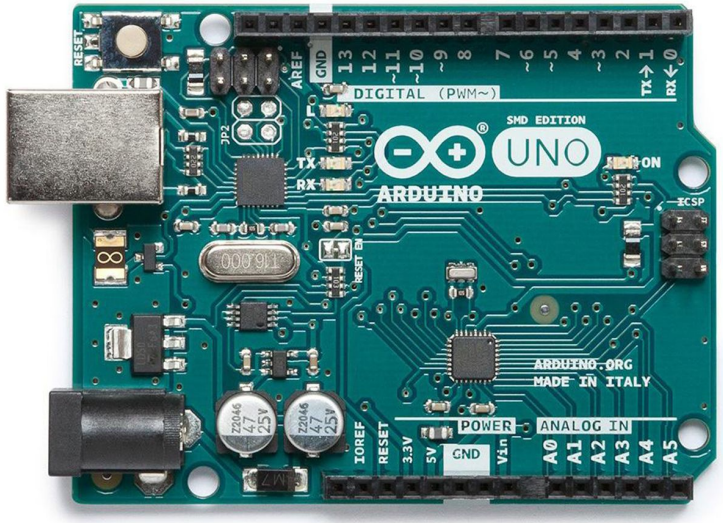
Arduino



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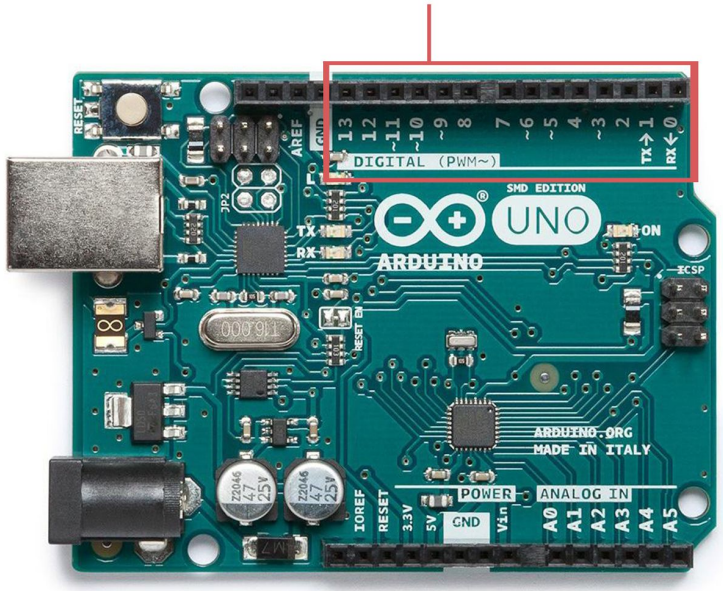
Arduino



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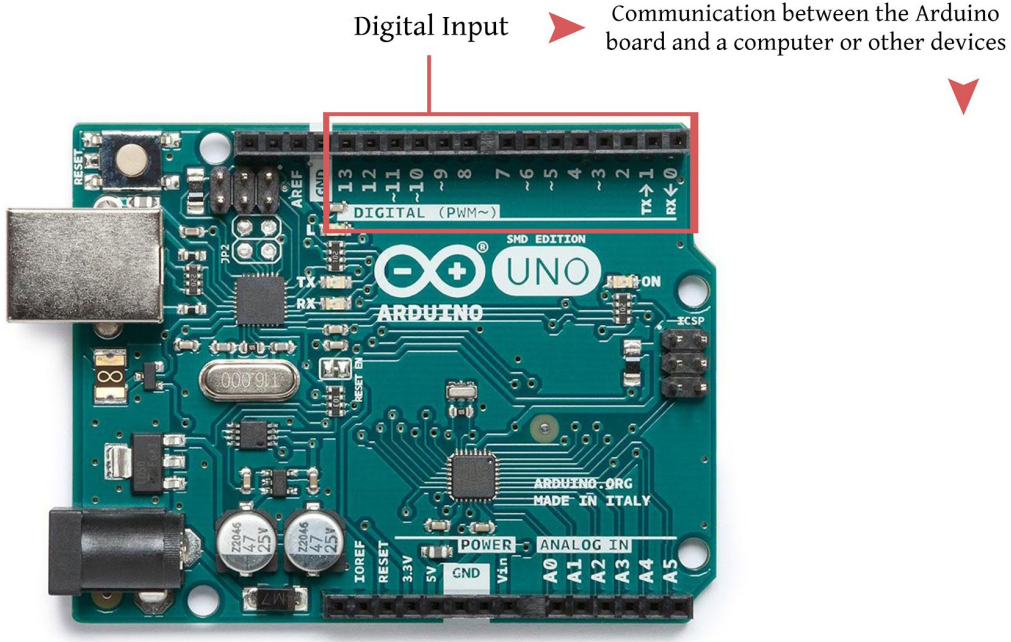
Arduino



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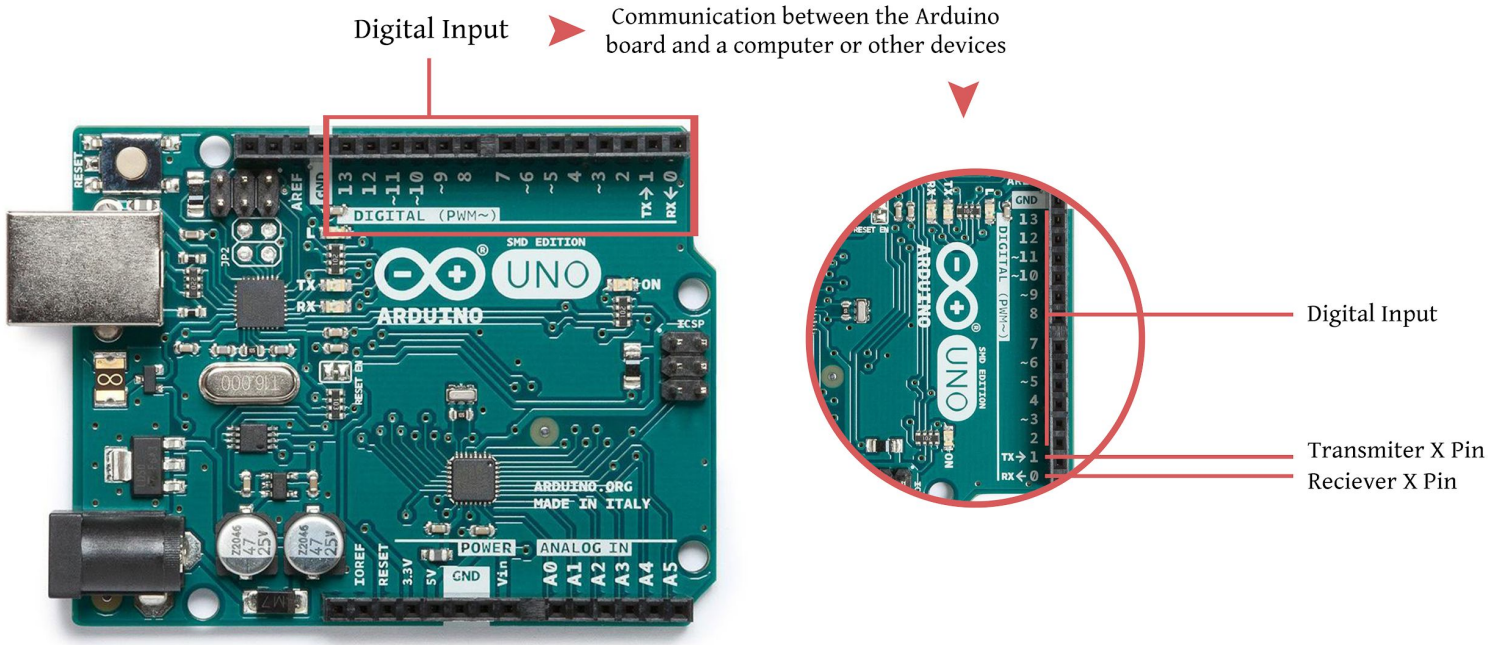
Arduino



Object Detection

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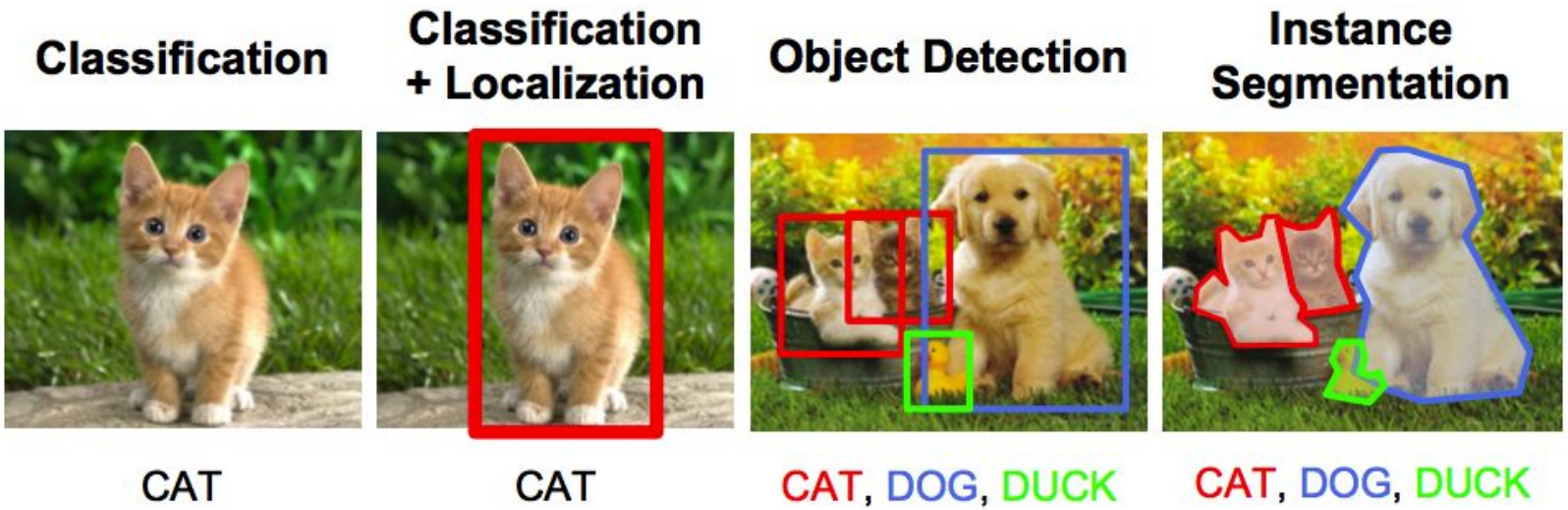
Object Detection



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THANK YOU