Introduction to Mobile Robots: Veggie

Lecturer
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Veggie

Veggie chassis: HCR ROBOT

- Price 530 $ (only chassis)
- Supports up to 15 Kg
- Include :
- - Chassis
- - 2 x Wheels
- - 2 x Motors with encoders and reduction (50 $ each)
- -3 bumpers (contact sensors on the front)

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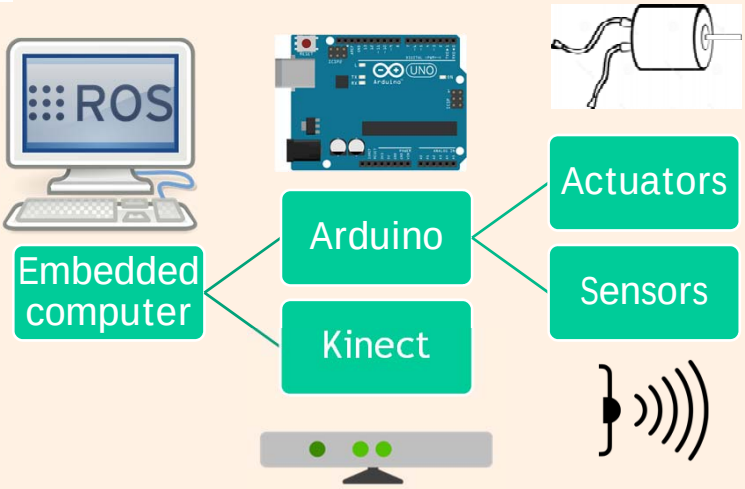
Veggie architecture



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Electric Motors

- Working voltage:12v
- Gear ratio 51:1
- Stall current 3.6 A
- No load (after gearbox): 146 rpm
- Encoder resolution 13 PPR
  - Quadrature (multiply by 4)
- Gearbox ratio (multiply by 51)
- Total pulses per rotation = 13 * 51 * 4 = 2652 pulses

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Motor Driver

- Specification required
- - Analog voltage control
- - Input voltage (12 volts)
- - Two motors, two motor drivers or one dual motor driver
- - Able to handle at least 3.6 A x 2

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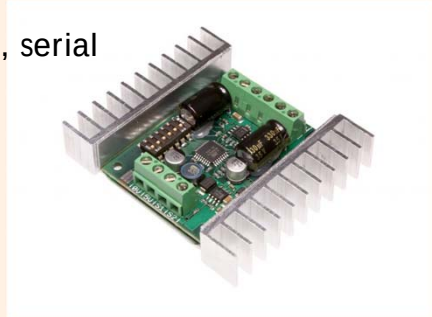
Sabertooth Dual 12 A

- Features
- -Price 80 $
- -Dual 12 A, 6v-24V
- -Thermal and overcurrent protection
- -Lithium protection
- - Input modes: Analog, R/C, serial



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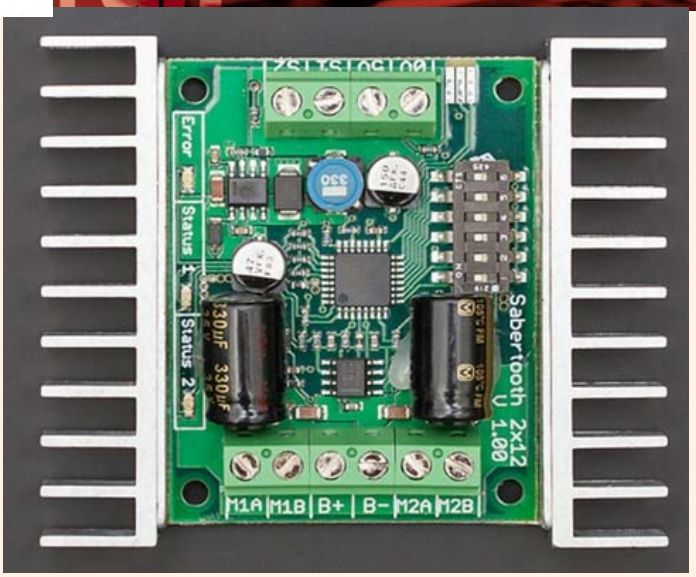
Sabertooth Dual 12 A



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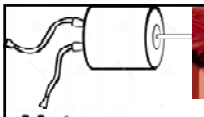
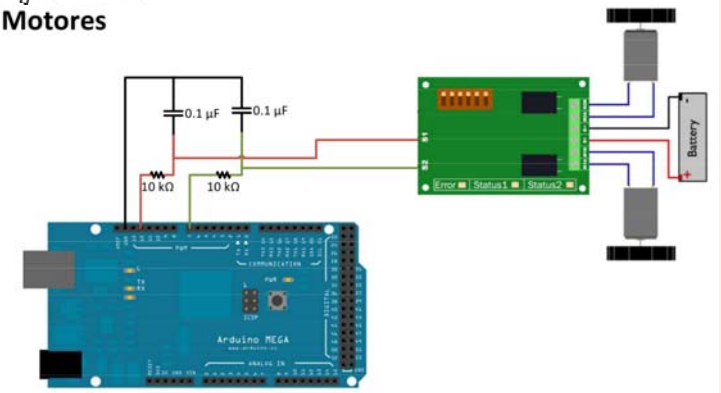
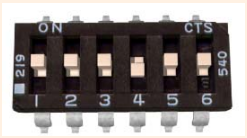
Motor Driver Connection





- Selecting control mode and allow lithium type power source



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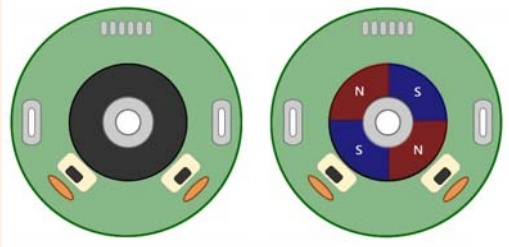
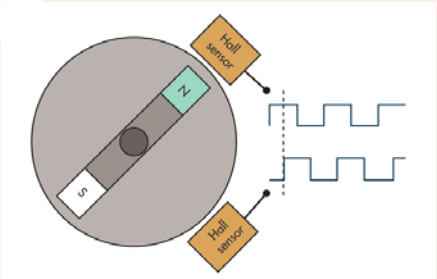
Encoders

- Magnetic Encoder: Hall effect sensor





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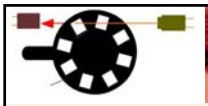
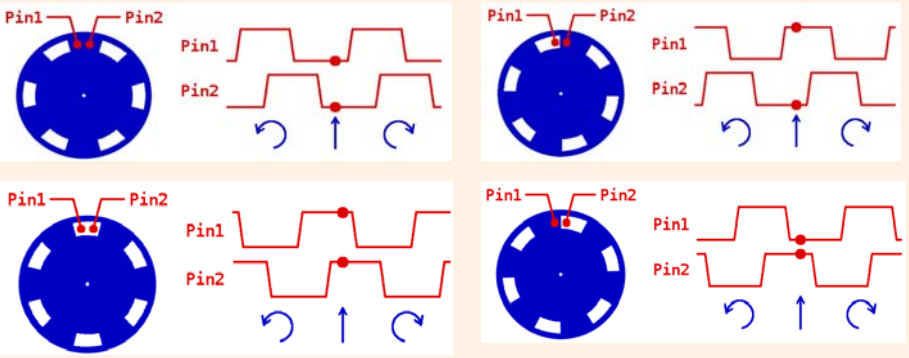


Encoders Quadrature



Encoder: 13 pulses per motor rotation (multiply this by 4 for Quadrature)
Gearbox ratio 51/1
Total amount of pulses per wheel rotation: 13 * 51 * 4 = 2652 pulses

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Battery

- Price 25 $
- Lead-acid battery
- 12 volts
- Weight 2 kg
- Capacity 8Ah
- Smartphones 3000 mAh

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Sensors

- 3 BUMPERS (Digital input)
- 2 Encoders (Digital input interrupts)
- 6 ultrasonic sensors (I2C communication)
- 8 optical distance sensors (Analog input)
- 1 IMU -3 axis accelerometer and 3 axis gyroscope (I2C communication)
- 1 GPS (Serial communication)

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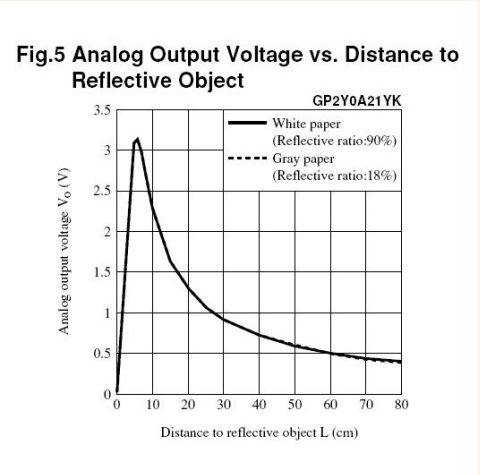
Optical distance sensor - Sharp GP2Y0A21YK

- Analog output that varies from 3.1V at 10cm to 0.4V at 80cm.



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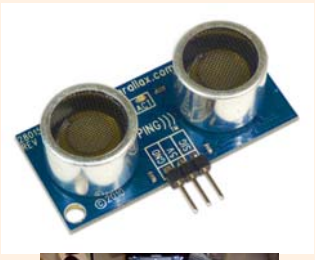
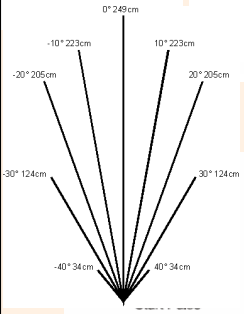
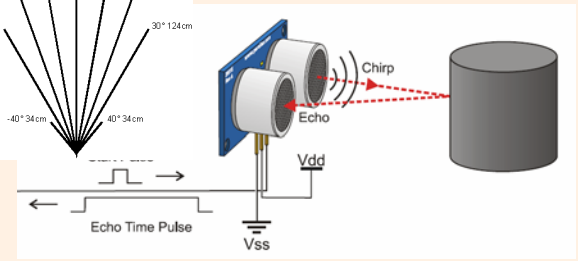
Distance Sensors: Ultrasound







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I2C

I^2C (Inter-Integrated Circuit) – is a serial computer bus used for lower-speed peripheral integrated circuit to processors and microcontrollers in short-distance, intra-board communication.

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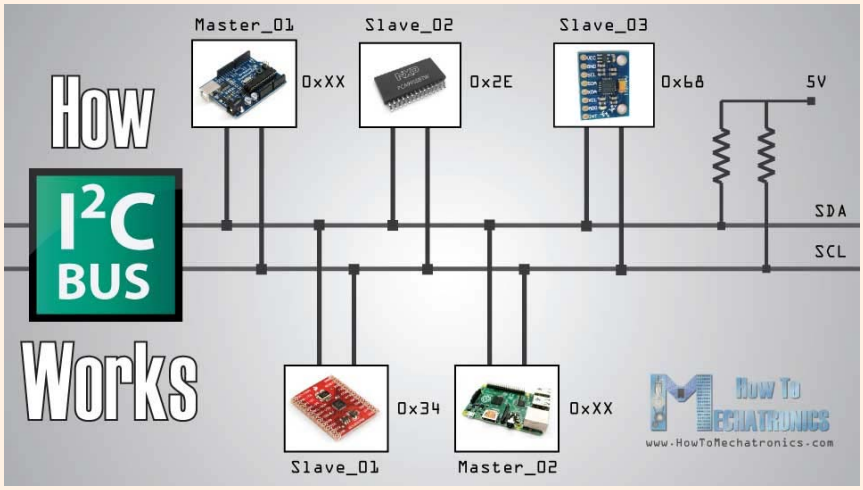
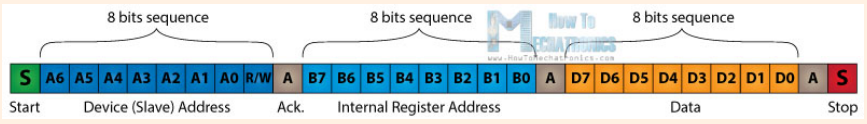
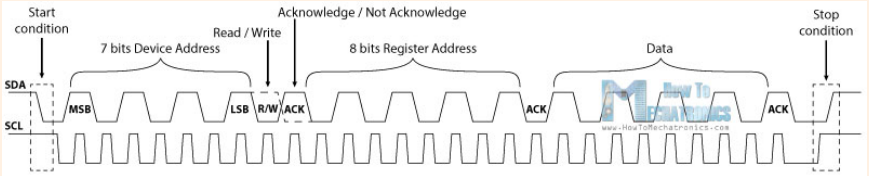
I2C

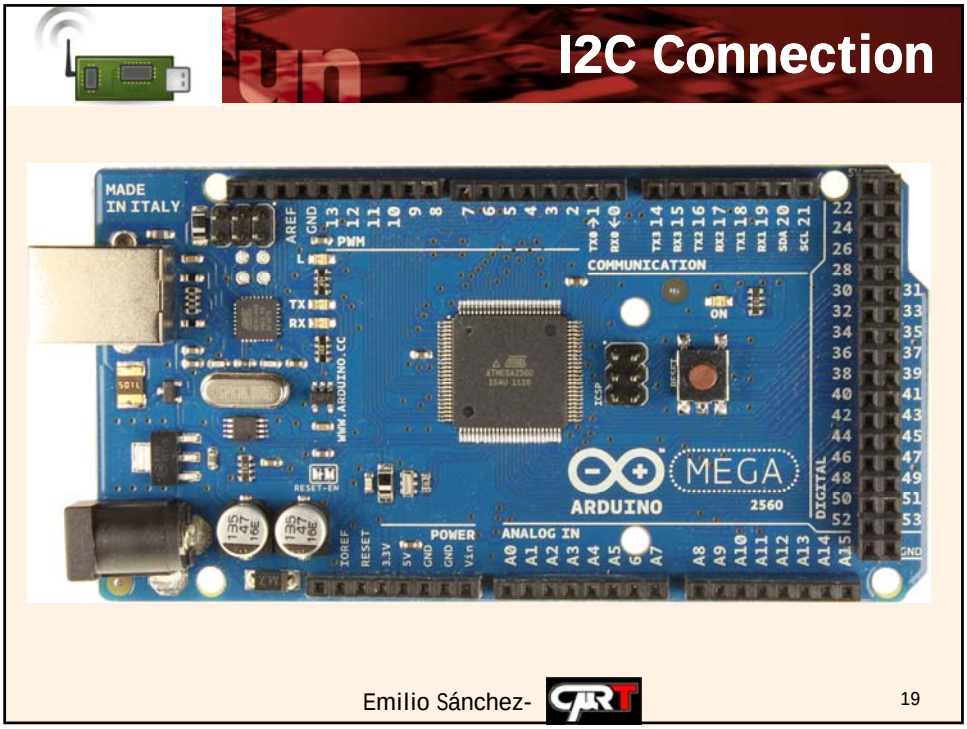


I2C

SDA (Serial Data)
SCL (Serial Clock)
https://www.youtube.com/watch?v=6IAkYpmA1DQ






I2C Connection
MADE IN ITALY
COMMUNICATION
PWM
MEGA
ARDUINO
2560
POWER
ANALOG IN
DIGITAL
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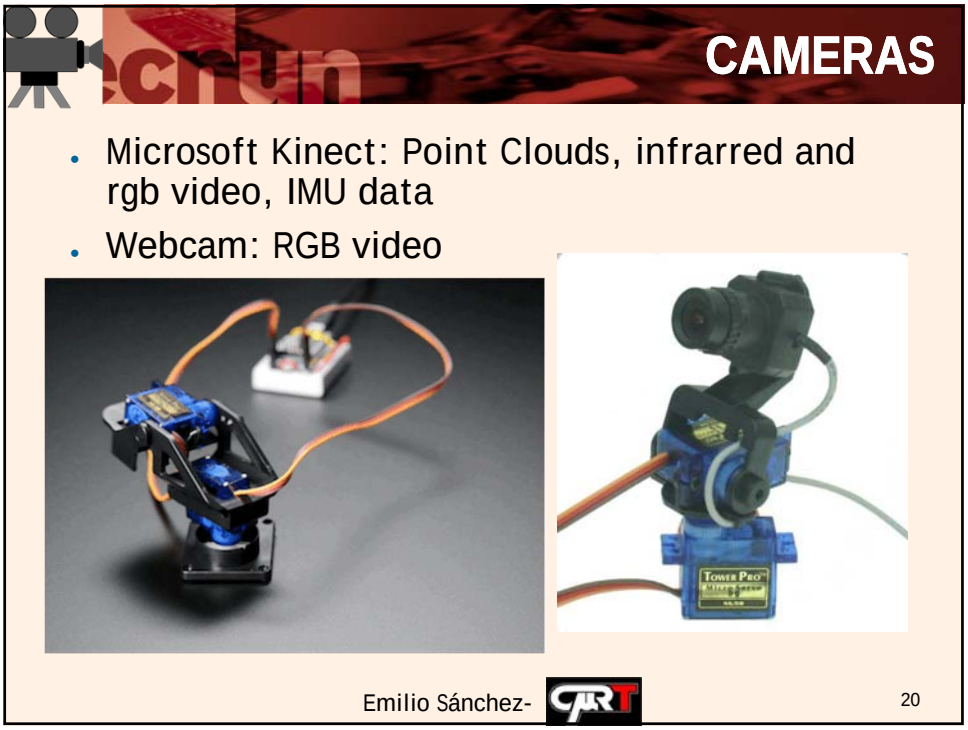
CAMERAS
Microsoft Kinect: Point Clouds, infrarred and rgb video, IMU data
Webcam: RGB video
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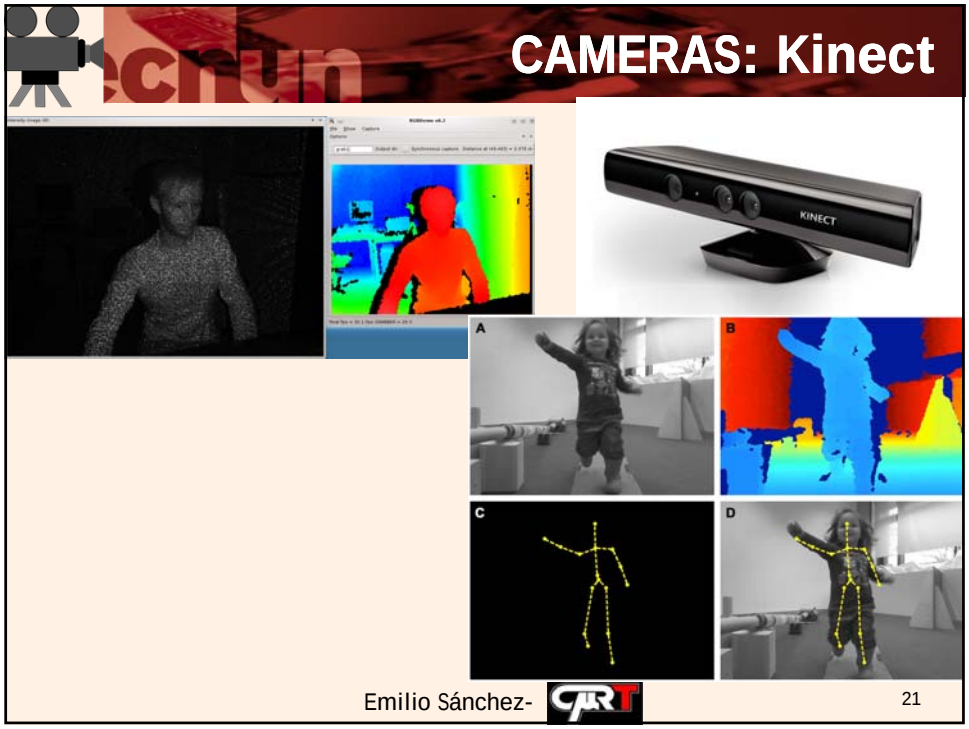
CAMERAS: Kinect
KINECT
A
B
C
D
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CAMERAS: Kinect
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