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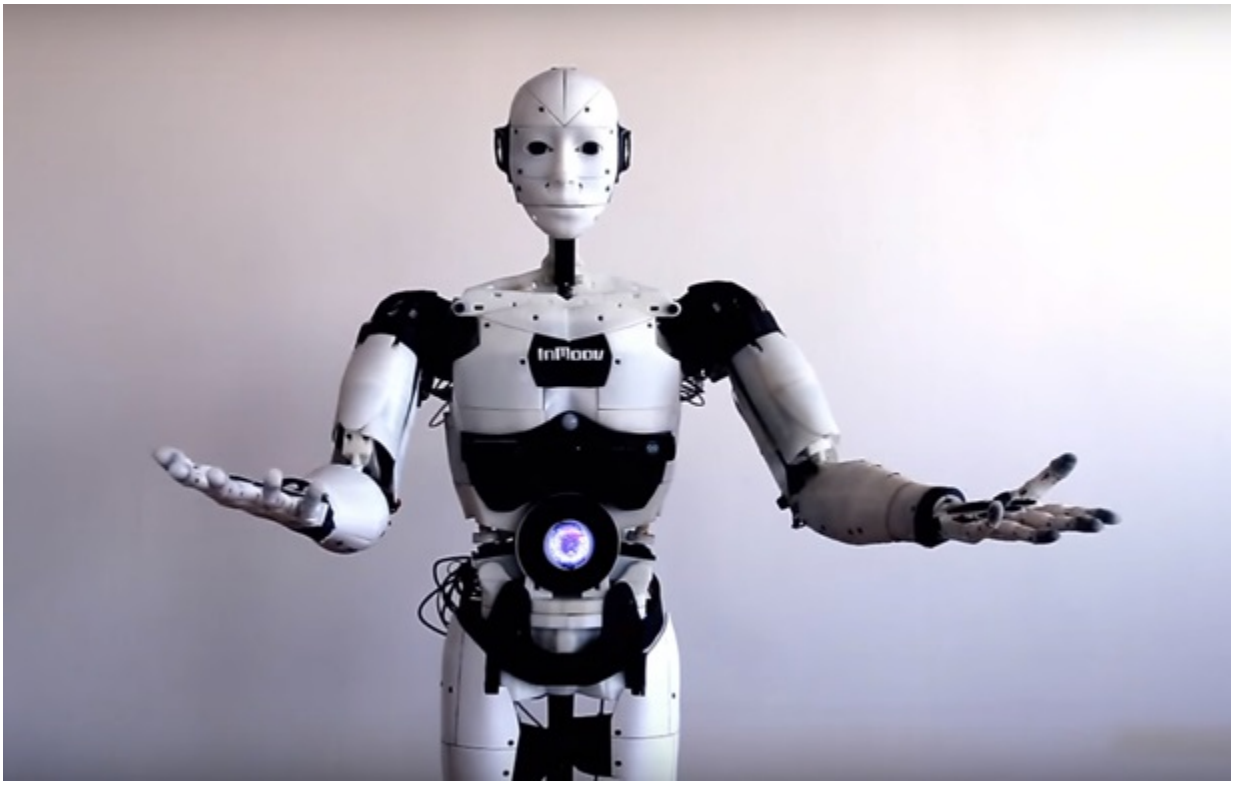
RACAI Z-34

Specifications



Foreword :

First of all, the Inmoov Robot is an open source project initiated by the french sculptor and designer Gaël Langevin. He began this project in January 2012 with a prosthetic hand, and the rise of 3D printers permitted anyone to create his own Inmoov and to improve it. At the present time there are 180 versions of Inmoov in the world. Our objective is to build the 181 and to control it with artificial intelligence.

Summary

1. Project definition

This project is a robotic arm up to the shoulder (including joint) controlled by artificial intelligence with a Mexduino card.

There will be two way of interaction :

- With a **neural network** on openCV to recognise a simple move

  The goal is to make the Mexduino recognize simple movement with a small camera and his neural network after training the artificial intelligence.

- With **Myoware** sensors to move the arm up and down and a glove with resistive wire pressure sensor to make the fingers moves

  This part of the project will enable us to control the MexBot Z-34 with muscular activity.

This robotic arm will be made in PETG PLA fully 3D printed
The arm of Z-34 will be fixed on a vertical steel bar.

2. Hardware

Liste of equipment

- ➔ 6 x Servos MG995
- ➔ 4x HS-805BB servo
- ➔ 1x Arduino Uno
- ➔ small airsoft plastic balls
- ➔ Pliers
- ➔ SilentBlocs
- ➔ wood screws
- ➔ little screws
- ➔ 2x nuts
- ➔ 10x wires
- ➔ 8x Springs (ressorts)
- ➔ 5x ServoPulley
- ➔ White silicone Grease
- ➔ 3mm Filament or bolts
- ➔ 10 pieces of 75cm long of your braided fish line 200LB
- ➔ Electricals wires
- ➔ Color ribbon
- ➔ some strips of copper of about 3 to 4mm large (tiny triangles)
- ➔ little rounds in 4/5mm thick antistatic foam
- ➔ Epoxy glue and hard glue
- ➔ 3mm screw
- ➔ 3.5 mm bore
- ➔ 2x Plastic zip
- ➔ 4x Philips wood screws of 3,5 x 16 mm

Building of the arm

The hand and the forearm are composed of 6 brain motors. Fives motors controle fingers by a nylon thread, the last motor makes the wrist move.

list of the 3D pieces to print

- ➔ 1x Thumb
- ➔ 1x Index
- ➔ 1x Majeure
- ➔ 1x RingFinger

- ➔ 1x Auriculaire (Pinky)
- ➔ 1x Bolt_entretoise
- ➔ 1x Wristlarge
- ➔ 1x Wristsmall
- ➔ 1x topsurface
- ➔ 1x coverfinger
- ➔ 1x robcap3
- ➔ 1x robpart2
- ➔ 1x robpart3
- ➔ 1x robpart4
- ➔ 1x robpart5
- ➔ 1x ElbowShaftGear (if you built the bicep)

Building of the controller without neural network

This part of the project will be make in a second time, when the neural network controller will be operational or if the project take late

The controller works with or without cable connection, so if there is no cable connection, a bluetooth connection starts.

The controller is composed of three muscular activity sensors, five resistive film pressure sensors (variable resistance) and an accelerometer. And also a bluetooth module.

Resistive film is fixed on a glove it has to wear to control the robot, each resistive film controls one finger, if you bend a finger the MexBot Z-34 do the same.

There is three muscular activity sensor on the arm of the opérator, one at the middle of his biceps, one at the side of his shoulder and the last on his back to control the movement of the robotic arm

The accelerometer is optional if we need more precision to control the robotic arm.

It will be attached on the top of the glove with resistive films

3. Software

Neural Network

The neural network works with the Computer Vision of openCV (python langage)

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Arduino

The Arduino will function connected to the computer with openCV. The card will control all the motors of the arm individually.

We'll use the library **Servo.h**

4. Control with muscular activity sensor

The glove controller has to works without cable connection so we'll have to code the bluetooth module

Then we'll have to calibrate the resistive film pressure sensors, and the muscular activity sensors and make sure of their position on the opérator's body.

If we have to use the accelerometer we'll have to search how to use it.