

Raspberry y motores:

<https://projects.raspberrypi.org/en/projects/physical-computing/14>

<https://keithweaverca.medium.com/controlling-stepper-motors-using-python-with-a-raspberry-pi-b3fbd482f886>

<https://makersportal.com/blog/raspberry-pi-stepper-motor-control-with-nema-17>

<https://www.aranacorp.com/en/control-several-motors-with-raspberry-pi-and-the-motorhat/>

Motores y arduino:

<https://www.quora.com/How-do-I-run-3-stepper-motor-on-one-Arduino-UNO-What-kind-of-driver-is-needed-for-various-Stepper-motor>

<https://photoscs.wordpress.com/2014/03/20/arduino-stepper-code-library/>

<https://www.quora.com/Can-we-connect-2-3-stepper-motors-using-arduino-uno>

<https://forum.arduino.cc/t/how-to-run-multiple-stepper-motors/420508>

Cámara y arduino:

<https://arduino.github.io/arduino-cli/0.22/platform-specification/>

<https://github.com/jeremyblow/depthid>

file:///C:/Program%20Files/FLIR%20Systems/Spinnaker/doc/C++/html/_programmer_guide.html

<https://www.flir.com/support-center/iis/machine-vision/application-note/using-spinnaker-on-arm-and-embedded-systems/>

<https://rahulvishwakarma.wordpress.com/2020/06/23/blackfly-s-usb-spinnaker-sdk-integration-with-jetson-agx-xavier-development-board/>

<https://github.com/AravisProject/aravis>

<https://picamera.readthedocs.io/en/release-1.13/quickstart.html>

<https://www.sparkfun.com/news/2112>

<https://www.flir.com/products/spinnaker-sdk/>

<https://github.com/neurojak/pySpinCapture>

<https://la.mathworks.com/matlabcentral/answers/365412-does-image-acquisition-toolbox-support-flir-point-grey-blackfly-s-model-camera>

<https://la.mathworks.com/matlabcentral/answers/408704-interface-and-control-flir-blackfly-s-with-matlab-64-bit-platform-code>

Set ups:

<https://m.all3dp.com/2/3d-printer-gantry-simply-explained/>

<https://www.thingiverse.com/thing:2556325>

<https://reader.elsevier.com/reader/sd/pii/S2468067220300079?token=E99EC60EEC7DC08FC524033B907ABDCAB4891C386AD82C48FFBA6F34BA279B6AF90EB0FD56A3507B408CC9796619BDB2&originRegion=us-east-1&originCreation=20220517180718>

<https://www.digikey.com/es/articles/easy-build-how-to-implement-linear-stage-raspberry-pi-project>

<https://www.fuyumotion.com/linear-positioning-system-xy-stage-2-axis-vertical-motion-table-product/>

https://www.researchgate.net/publication/334294019_LOW_COST_X-Y_CORE_POSITIONING_SYSTEM_USING STEPPER MOTOR

https://www.researchgate.net/publication/326843167_Low_Cost_X-Y_Core_Positioning_System_Using_Stepper_Motor

<https://forum.arduino.cc/t/cartesian-robot-x-y-z-axis/2204/7>

[https://reprap.org/wiki/McWire_Cartesian_Bot_1_2_\(Death_March:_Do_not_build!!!\)](https://reprap.org/wiki/McWire_Cartesian_Bot_1_2_(Death_March:_Do_not_build!!!))

[https://reprap.org/wiki/McWire_\(Death_March:_Do_not_build!!!\)](https://reprap.org/wiki/McWire_(Death_March:_Do_not_build!!!))

<https://grabcad.com/library/cnc-plotter-x-y-z-cartesian-robot-1>

<https://grabcad.com/library/cnc-plotter-x-y-z-cartesian-robot-1>

<https://www.youtube.com/watch?v=aQIRVAgTVOW>

https://www.techno-isel.com/tic/catdas/zf1beltdriven_xytable.htm

<https://reprap.org/forum/read.php?14,833835,835242>

<https://arnabkumardas.com/cnc.html>

<https://drmrhorst.blogspot.com/2018/08/corexy-mechanism-layout-and-belt.html>

<https://forum.duet3d.com/topic/8021/corexy-belt-pattern>

<https://reprap.org/forum/read.php?397,592027>

<https://www.sciencedirect.com/science/article/pii/S2472630322014121>

CONTROL CON ARDUINO

El arduino en teoría no hay que comprarlo sería solo el controlador

<https://www.hobbytronics.co.uk/stepper-motor-sn754410>

Necesita 3

<https://www.eneka.com.uy/robotica/motores/controladores-motor/1234-lin00297-controlador-motor-paso-a-paso-20-1234-detail.html>

<https://www.youtube.com/watch?v=zUb8tiFCwmk>

<https://www.youtube.com/watch?v=OfyT1xTZC6o>

<https://reprap.org/forum/read.php?1,834113,834122>

<https://www.electroniclinic.com/arduino-cnc-shield-v3-0-and-a4988-hybrid-stepper-motor-driver-joystick/>

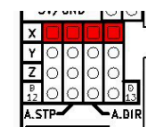
<https://www.handsontec.com/dataspecs/cnc-3axis-shield.pdf>

Conectando el extra de z en A los puedo mover al mismo tiempo

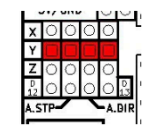
<https://www.zyltech.com/arduino-cnc-shield-instructions/> clone axis

4th Axis Configuration

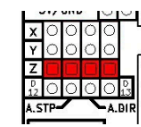
Using two jumpers the 4th axis can be configured to clone the X or Y or Z axis. It can also run as an individual axis by using Digital Pin 12 for Stepping signal and Digital Pin 13 as direction signal. (GRBL only supports 3 axis's at the moment)



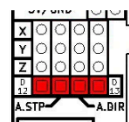
Clone X-axis to the 4th stepper driver
(marked as A)



Clone Y-axis to the 4th stepper driver
(marked as A)



Clone Z-axis to the 4th stepper driver
(marked as A)



Use D12 and D13 to drive the 4th stepper driver

Necesita 1 de estos

<https://www.eneka.com.uy/robotica/motores/controladores-motor/7054-driver-para-motor-paso-a-paso-a4988-7055-7500-detail.html>

hay sale 264 sin iva????????????????

y 3 de estos

<https://www.eneka.com.uy/robotica/motores/controladores-motor/7054-driver-para-motor-paso-a-paso-a4988-7055-detail.html>

hay sale 154 sin iva?????? cada uno

o de estos

<https://www.eneka.com.uy/robotica/motores/controladores-motor/7054-driver-para-motor-paso-a-paso-a4988-detail.html>

con todo junto

https://articulo.mercadolibre.com.uy/MLU-474569728-kit-arduino-cnc-impresora-3d-shield-controladores-a4988-_JM#position=14&search_layout=stack&type=item&tracking_id=2466b307-cb3f-4c42-a419-bebe4606c0eb

Pros: Segun el video se puede controlar directamente desde una especie de firmware

Dos shields stackeados

<https://www.robotec.com.uy/productos/AD046>

<https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/using-stepper-motors>

Tienen solo 1 y es usado en eneka

Polea para imprimir

<https://www.thingiverse.com/thing:4304802>

se puede editar

<https://github.com/vsergeev/3d-gears/blob/master/parametric-gt2-pulley/README.md>

<https://github.com/vsergeev/3d-gears/blob/master/parametric-gt2-pulley/README.md>

CONTROLAR ARDUINO CON JOYSTICK

https://www.youtube.com/watch?v=TMK_fLgpESQ

<https://www.electroniclinic.com/arduino-cnc-shield-v3-0-and-a4988-hybrid-stepper-motor-driver-joystick/>

<https://www.eneka.com.uy/robotica/modulos-posicion-inerciales/7024-acelerometro-de-triple-eje-adxl345-7024-detail.html>

<https://www.thingiverse.com/thing:4409701/files>

<https://www.thingiverse.com/thing:2938073>

Comandos GRBL

<https://www.youtube.com/watch?v=moRGJTnljb4>

G-CODE

https://www.google.com/search?q=opencv+in+arduino&client=firefox-b-d&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiy6v-e1YX5AhUtjZUCHe-sBs0Q_AUoAnoECAEQBA&biw=1360&bih=615&dpr=1#imgsrc=thHfZC5nsrP0oM

<https://www.instructables.com/Face-detection-and-tracking-with-Arduino-and-OpenC/>

<https://create.arduino.cc/projecthub/shubhamsantosh99/face-tracker-using-opencv-and-arduino-55412e>

<https://pypi.org/project/EasyPySpin/>

https://flir.app.boxcn.net/v/SpinnakerSDK?pn=Spinnaker+SDK&vn=Spinnaker_SDK

<https://stackoverflow.com/questions/59221970/opencv-video-streaming-from-flir-camera-using-python>

<https://create.arduino.cc/projecthub/shubhamsantosh99/face-tracker-using-opencv-and-arduino-55412e>

<https://create.arduino.cc/projecthub/shubhamsantosh99/face-tracker-using-opencv-and-arduino-55412e>

<https://www.automatizacionparatodos.com/vision-artificial-arduino/>

<https://www.luisllamas.es/controlar-arduino-con-python-y-la-libreria-pyserial/>

<https://hetpro-store.com/TUTORIALES/pyserial-python-arduino-comunicacion-serial/>

<https://create.arduino.cc/projecthub/ansh2919/serial-communication-between-python-and-arduino-e7cce0>

LIGHT FIELD

<http://lightfield-forum.com/what-is-the-lightfield/>

https://en.wikipedia.org/wiki/Light_field

<https://accademia.stanford.edu/mich/lightfield-of-night/>

<https://hycasia.github.io/project/light-field-photography/>

<https://hycasia.github.io/publication/hou-spie-2016/>

<https://opg.optica.org/oe/fulltext.cfm?uri=oe-20-24-26624&id=246018>

<https://opg.optica.org/oe/fulltext.cfm?uri=oe-25-18-21887&id=371146>

https://www.researchgate.net/publication/337471409_Adaptive_periodic_d-function_array-based_three-dimensional_optical_refocusing_from_elemental_image_array

<https://stackoverflow.com/questions/57948003/how-to-increase-jupyter-notebook-memory-limit>

https://www.gnu.org/software/gnuastro/manual/html_node/Fourier-operations-in-two-dimensions.html

https://www.cis.rit.edu/class/simg716/handouts/06_notes_2Dfunctions.pdf

Goal line detection

https://www.cv-foundation.org/openaccess/content_cvpr_workshops_2013/W19/papers/Spagnolo_Non-invasive_Soccer_Goal_2013_CVPR_paper.pdf