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Design and Prototype xyz piezo micromanipulator

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Important links

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[Piezo user manual](#)

Value accounting

If you work on any of these prototypes, or make a new prototype, go on the [VAS page](#) of the project to log contributions or to create new processes.

General description

An xyz piezo micromanipulator/positioner. This device will be incorporated into the [Mosquito Scientific Instrument System](#) and into the [Touch-sensitive robot for micromanipulation](#). It will also be distributed separably, for other applications.

The main goal is to develop a low-cost and modular piezo-based manipulator. The project was initiated under [Phil's project](#).

Designs and prototypes

Electronics - the piezo driver

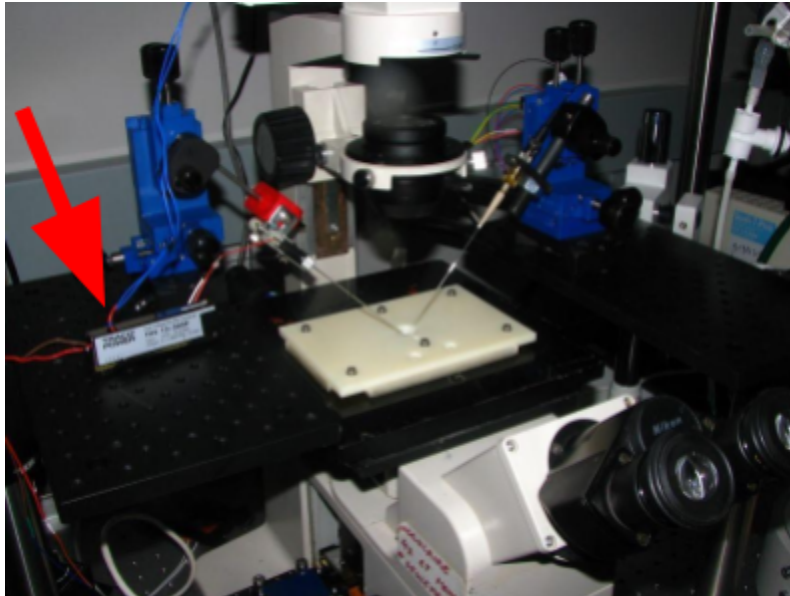
[Open older electronic design doc.](#)

Driver 1ax V1 - Jonathan

See the first electronic designs and prototypes by Jonathan [here](#) and [here](#).

These versions were based on EMCO and TRACO DC/DC converters.

The TRACO-based 1-axis driver was tested at Phil's lab.



Driver 2ax V2 - FredericC and Jonathan

A new working version of the electronic piezo driver was completed by Frederic C. See report [here](#). [See video presentation](#). We had [manufacturing problems with this design](#) in fact the original working prototype was never recreated, perhaps this new version never actually worked other than in that initial prototype.

[Piezo Bill of Materials \(BOM\)](#) for FredericC/Jonathan I-st prototype.

This version is based on RECOM dcDC/DC converter and the APEX amplifier.

Driver 2/3 ax V3 drivers - Antonio and Jonathan

[MPM - S1 - 2ax](#)

This is a product!

[Project page](#)

[Technical manual](#)



[MPM - S1 3ax](#)

Prototypes ready for sale, after customer feedback a production baseboard and output pcb need to be optimized and manufactured.

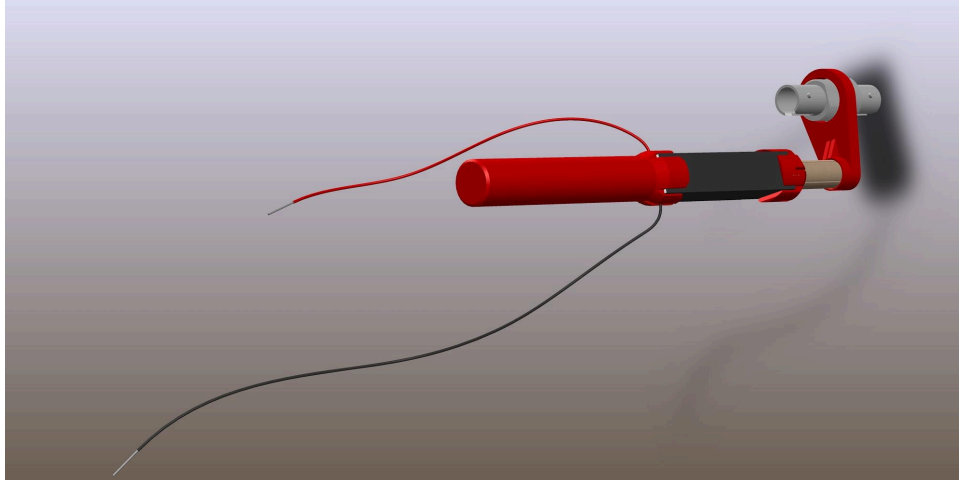


Mechanics - the piezo actuator

Actuator 3 ax V1 (stack+tube) - for the Mosquito

Design

[See 3D design](#) made by Daniel

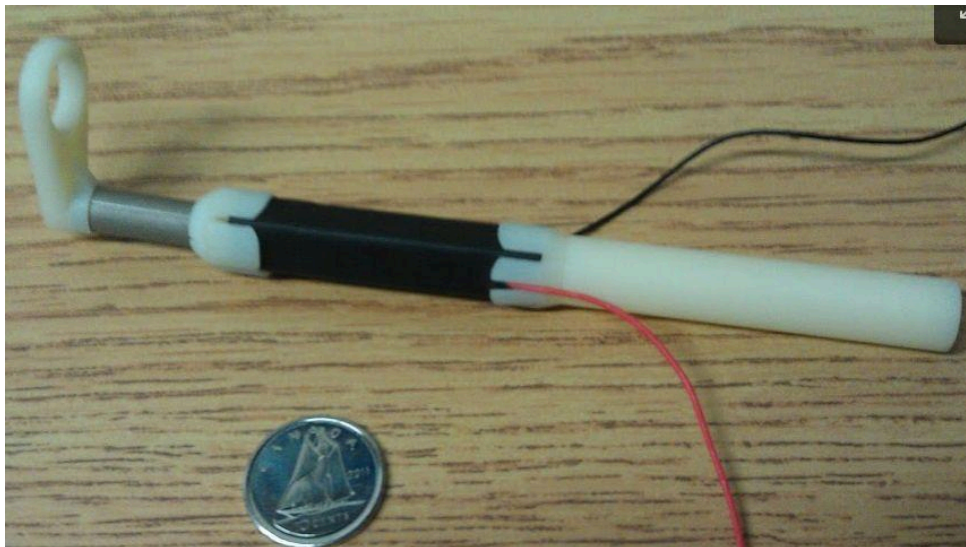


NOTE: has a major flow, the piezo stack needs to be pre-compressed!

Prototype

Printed in China (see Jonathan)

See [picture album](#) (belongs to Daniel).



The first prototype was made using PCL. 2 prototypes were made after, once using machined parts from China (picture above) and the other time using 3D printed parts.

This prototype uses a [piezo tube from BPO](#) and a [piezo stack](#).

Problems with these designs

1. The piezo tube is fragile and breaks inside the polymer adapter.
2. We also understood that the piezo tube must be ordered with its 5 wires already soldered for a better connection.
3. The adapters for the piezo stack get too loose with time
4. Because the piezo tube is too fragile, a hard shale should be put around it to protect it from lateral forces that might break it.

Actuator 3 ax (stack+tube) V2 - for the Mosquito

Design

See 3D design is in Solid Works - made by Daniel



Some problems discussed above haven't been addressed in this newer design.

NOTE: has a major flow, the piezo stack needs to be pre-compressed!

Designed to work with a [piezo tube from PBO](#) and a [piezo stack](#).

Prototype

not existing

Actuator 2 ax (tube) V3 - for the Mosquito

Design



Based on Dilson's piezo actuator. [Open Design](#).

Prototype



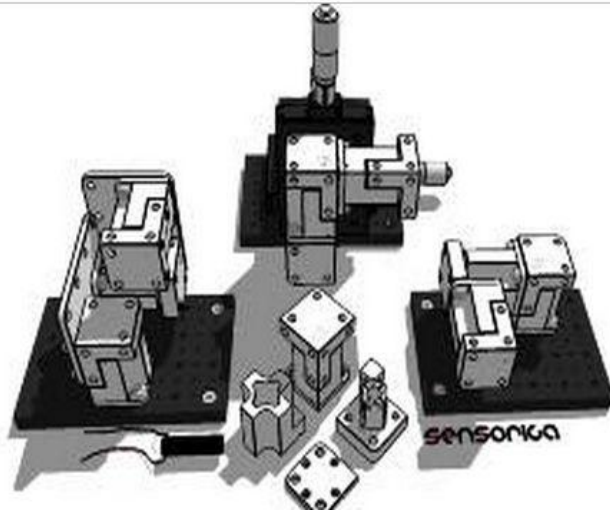
3D printed by Daniel at SENSORICA labs in Montreal, now used at Phil's lab.
The actuator uses a [piezo tube from BPO](#). [See assembly video](#).

This is a product!



Actuator 1 to 3 ax (stack) short range

Design



[open design by Daniel](#)

NOTE: this 1ax piezo actuator is composed of a pre-compressed piezo stack. This was a major flaw in previous designs.

Prototype

under development...

It uses 3 [piezo stack](#)

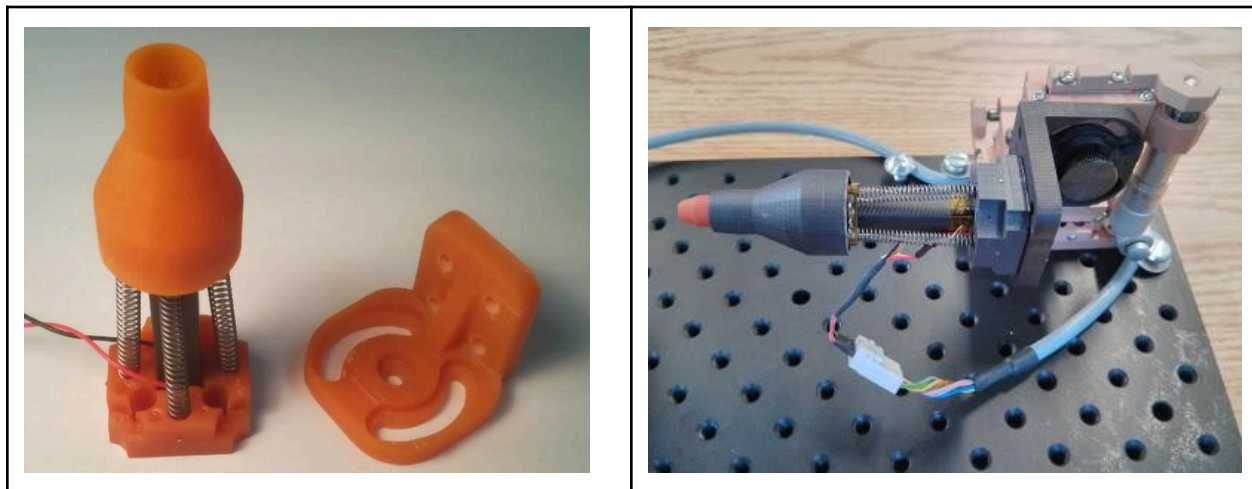
cost - approx 300\$ for machining from anodized aluminum 6061TS

Actuator 3ax (stack+tube)

Design

They are in the Dropbox, see with Antonio, used Solidworks.

Prototype



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Last Modified on Dec 9, 2013. Please keep us updated if you use this protocol and make improvements.

Authors, Tibi [add your name here](#)

Designed by Antonio, inspired from Daniel's previous designs, 3D printed by Daniel.
Designed to work with a [piezo tube from PBO](#) and a [piezo stack](#).

Actuator long range 1ax - piezo motor

See with Antonio.

Actuator 1ax (buzzer) stack low cost, long range v1

[Open main doc for the low cost piezo actuator.](#)

Enter other model ideas

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