User Guide

June 2016

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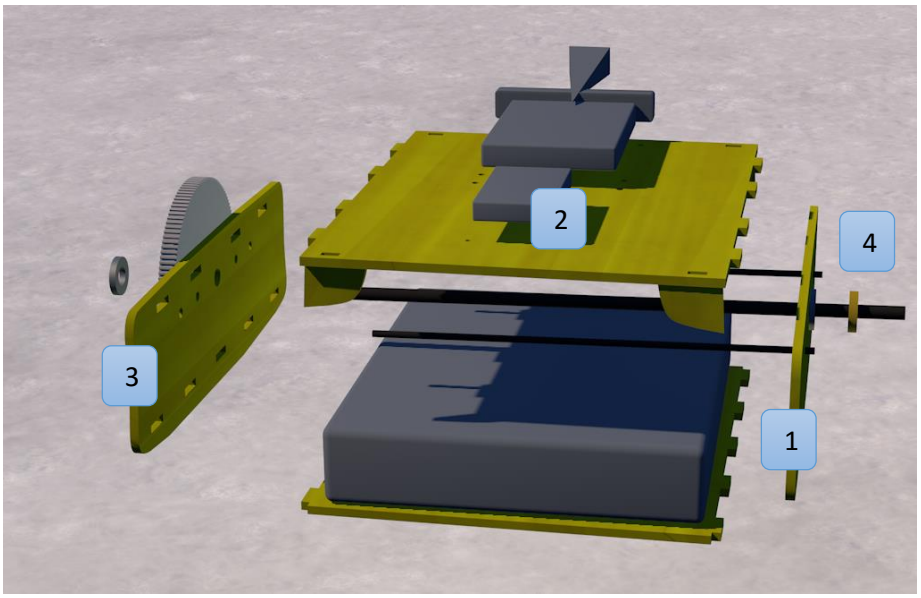
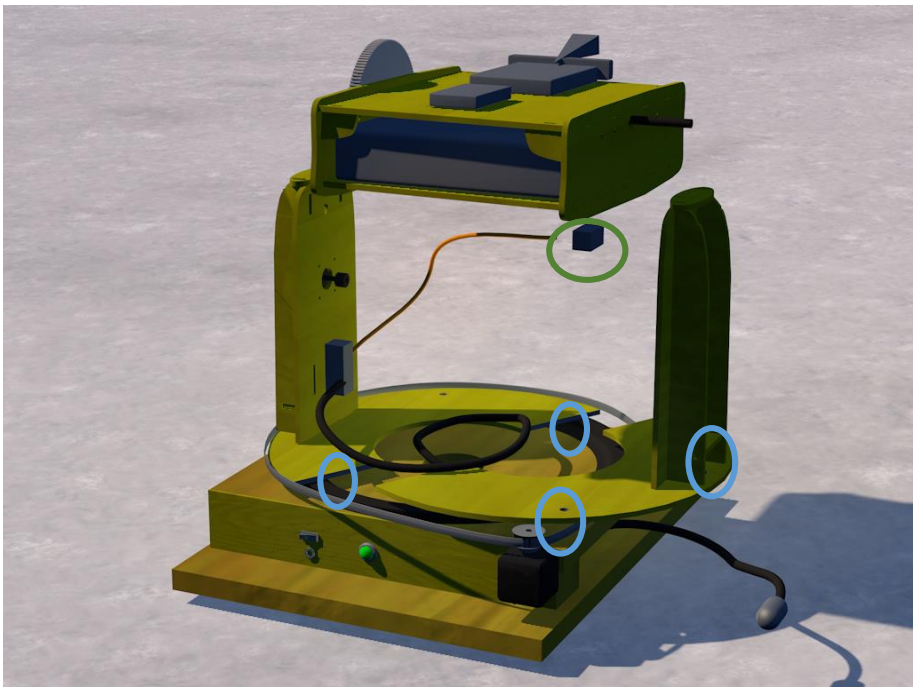
Assembly



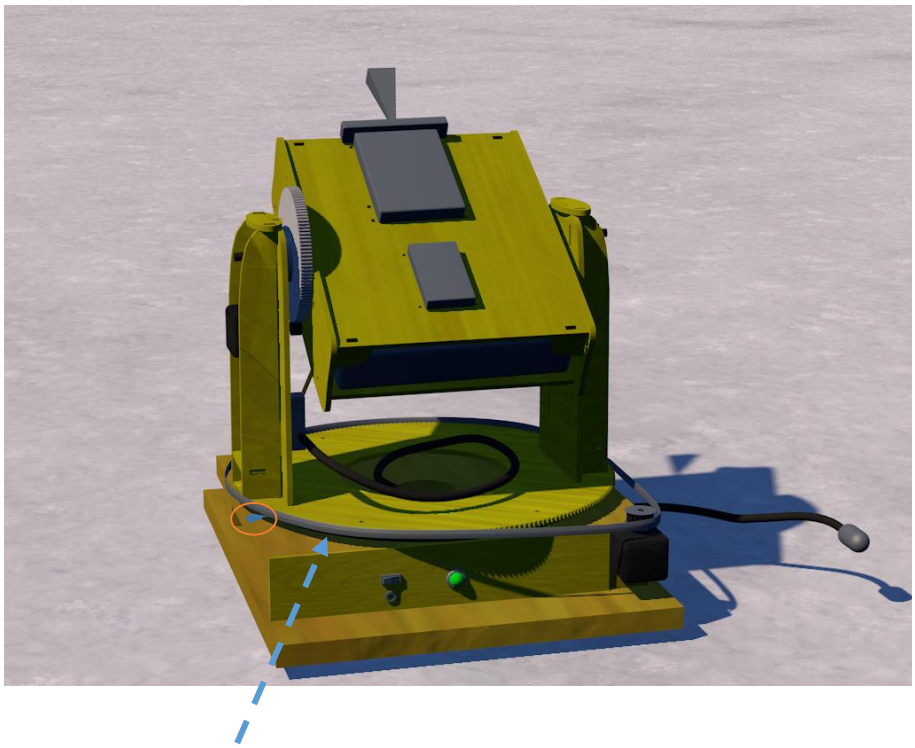
The arrows on top and bottom plate should point towards the cogwheel

1. Start on the right-hand side
2. Add the top plate with all mounted circuit boards
3. Close the box and fix the threaded rods with two nuts
4. Check both ball bearings and add the wooden spacer to the axle



- Position the box and mount the second pillar on the ball bearing
- Attach the accelerometer

Control



Startup sequence:

- Connect with the Arduino first, then flip the power switch
- Push the button to enable the vertical motor
- Push again to balance the box (can also be repeated later)
- Turn until the marker aligns with the distance sensor to enable the horizontal motor

The button can be used to interrupt any motor movement.

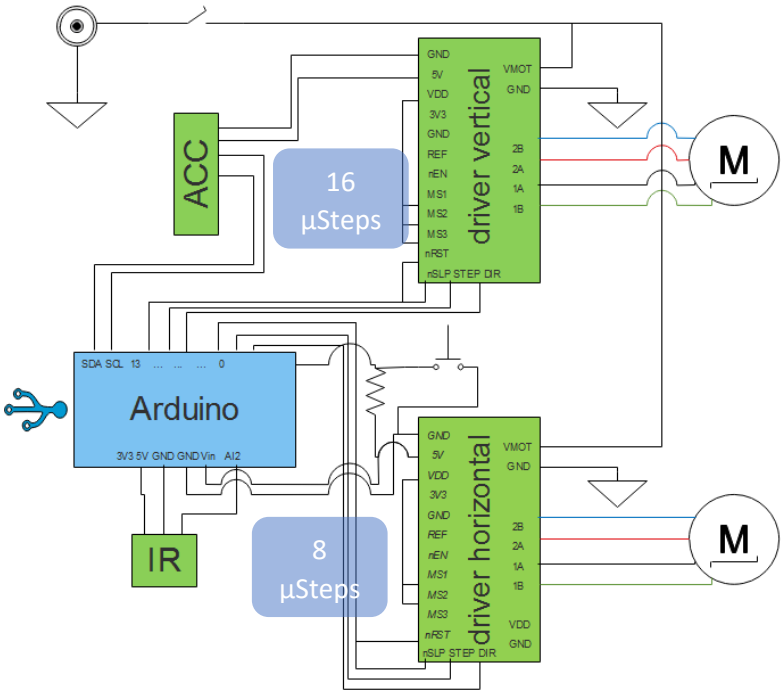
Implemented commands are:

['_x' ⇒ '_h' for horizontal or '_v' for vertical]

- move_x "angle" - a positive angle turns the box left or tilts the box up
- trig - trigger the other turntable
- sleep - disable both motors
- status - print current angles
- set [offset_x , msteps_x , trans_x]
- get [offset_x , msteps_x , trans_x , trig_width_x , spd_x]
- help - print commands

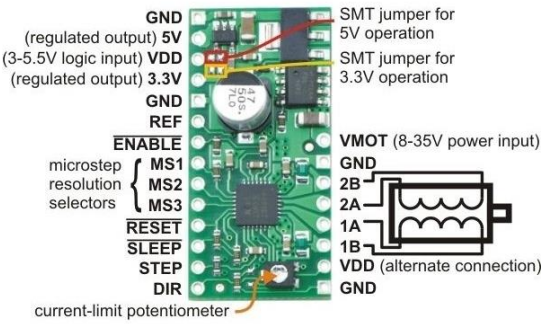
Miscellaneous

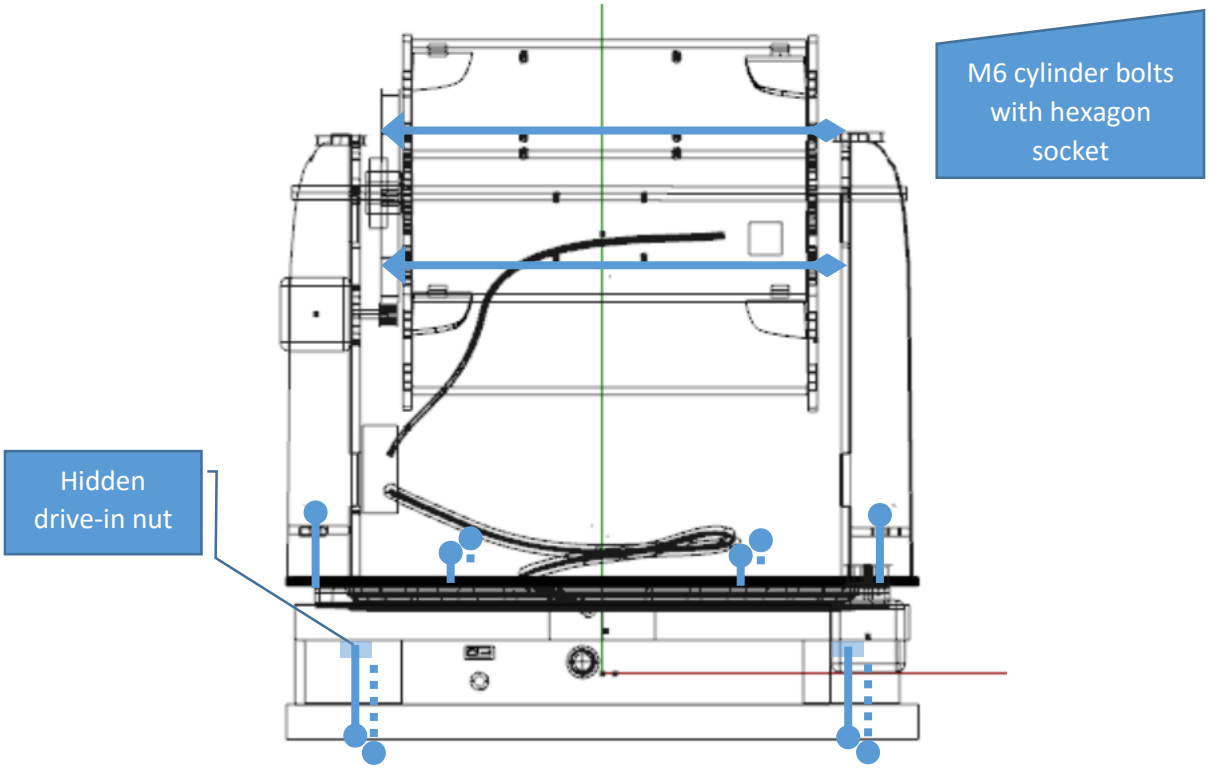
digital I/O	
0	SyncIn
1	SyncOut
2	(SDA)
3	(SCL)
4	nSLP_h
5	STP_h
6	DIR_h
7	button
11	nSLP_v
12	STP_v
13	DIR_v
analog I/O	
2	IR sensor



For maintenance remove the box from the turntable (secure the second pillar again) and flip everything upside down. Undo the 4 screws and remove the baseplate.

Both motor drivers have the 5V regulated output enabled (jumper). The nENABLE pin is not connected, thus always low. Pulling the nSLP and nRST pins high (same Arduino pin) enables the driver. The phase current (max. 1A) can be adjusted to allow more torque or reduce noise and heat generation. [$Vref \times 2{,}5 \approx Imax$]





The big toothed wheel (HTD profile) was generated using OpenSCAD. Everything above of the ball bearing is cut from 5mm medium-density fiberboard using the FabLab's laser cutter.

All software, vector graphics and spec sheets can be found in the git repository.

https://github.com/RWTH-iNets/turn-table

Version #	Transmission	µSteps	Steps per degree
1.0	$^{60}/_{12} = 5$	16	44.4
1.1	$^{150}/_{15} = 10$	16	88.9
2 [horizontal]	$^{227}/_{18} = 12{,}6$	8	56
2 [vertical]	$^{120}/_{12} = 10$	16	88.9