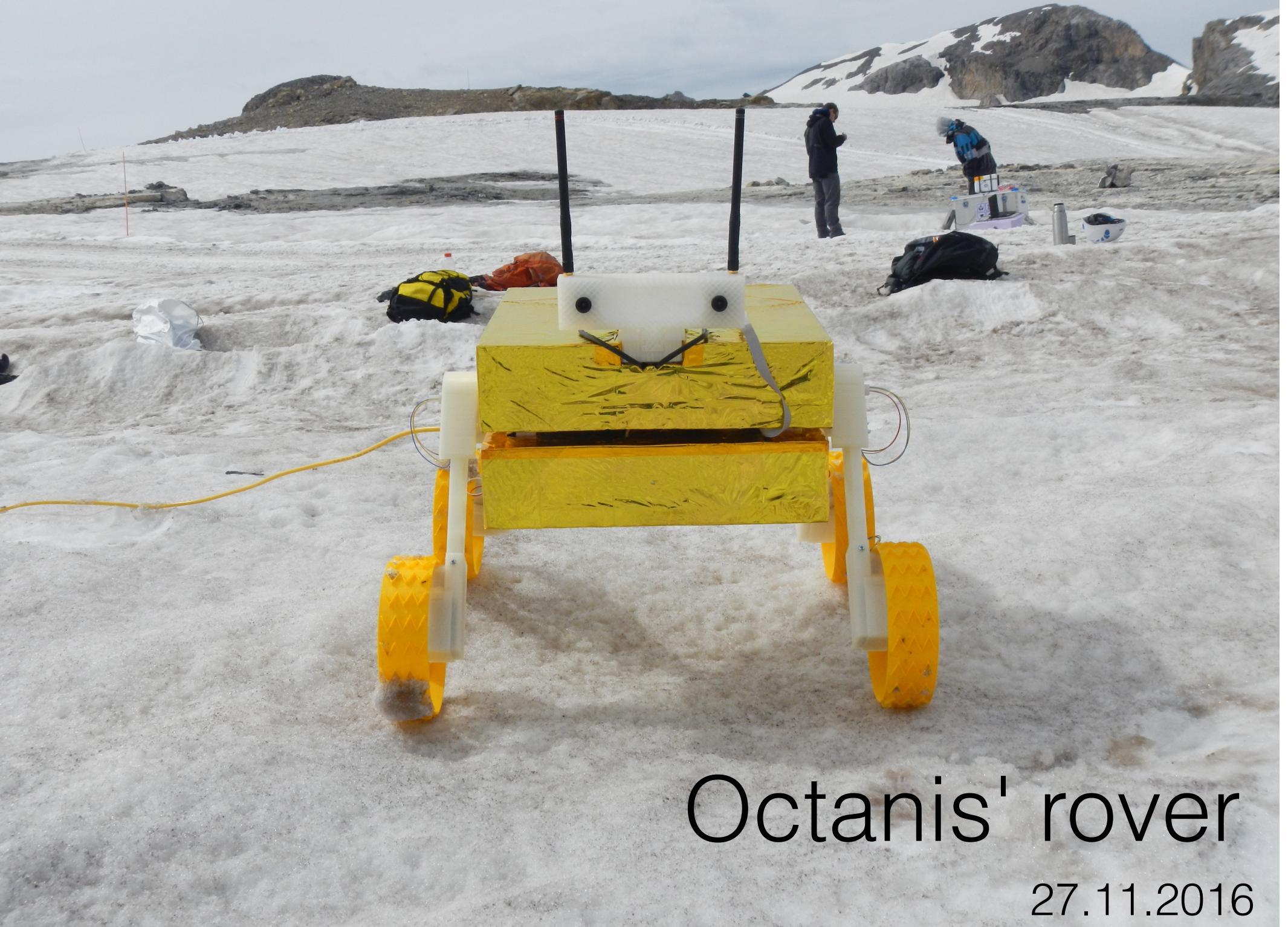


Remote controlled cylinder

Océane Patiny



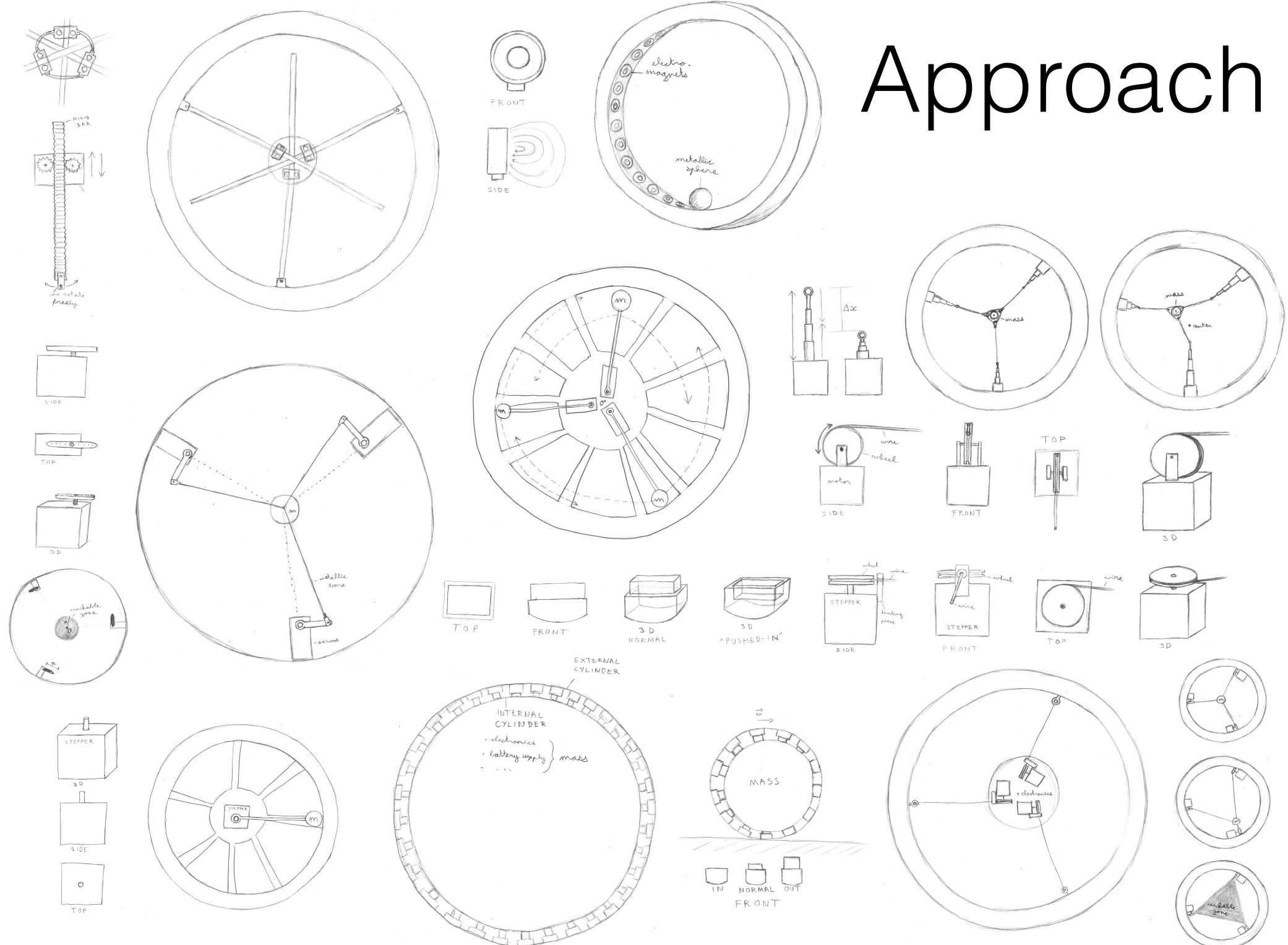
Octanis' rover

27.11.2016

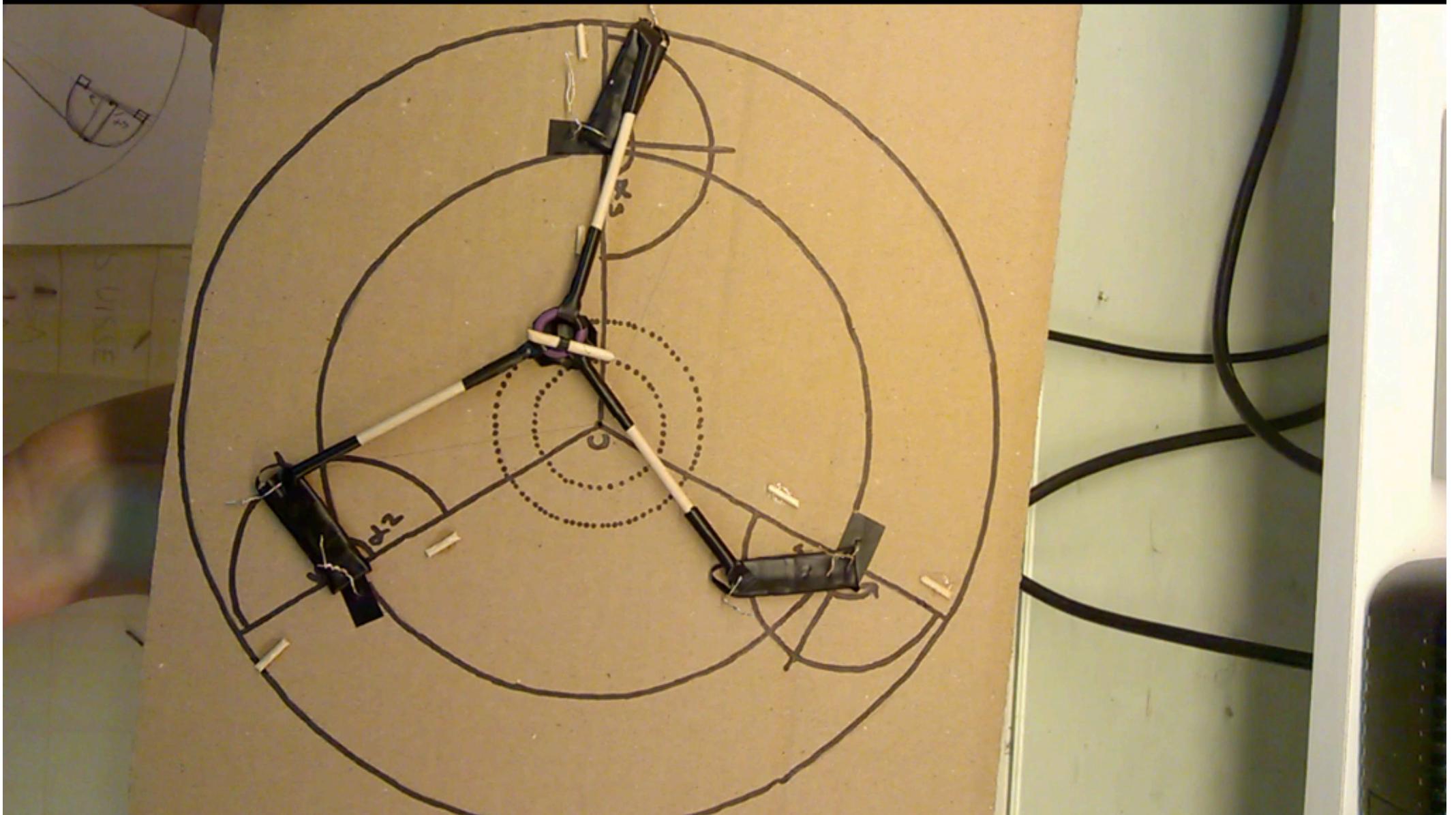
# Concept



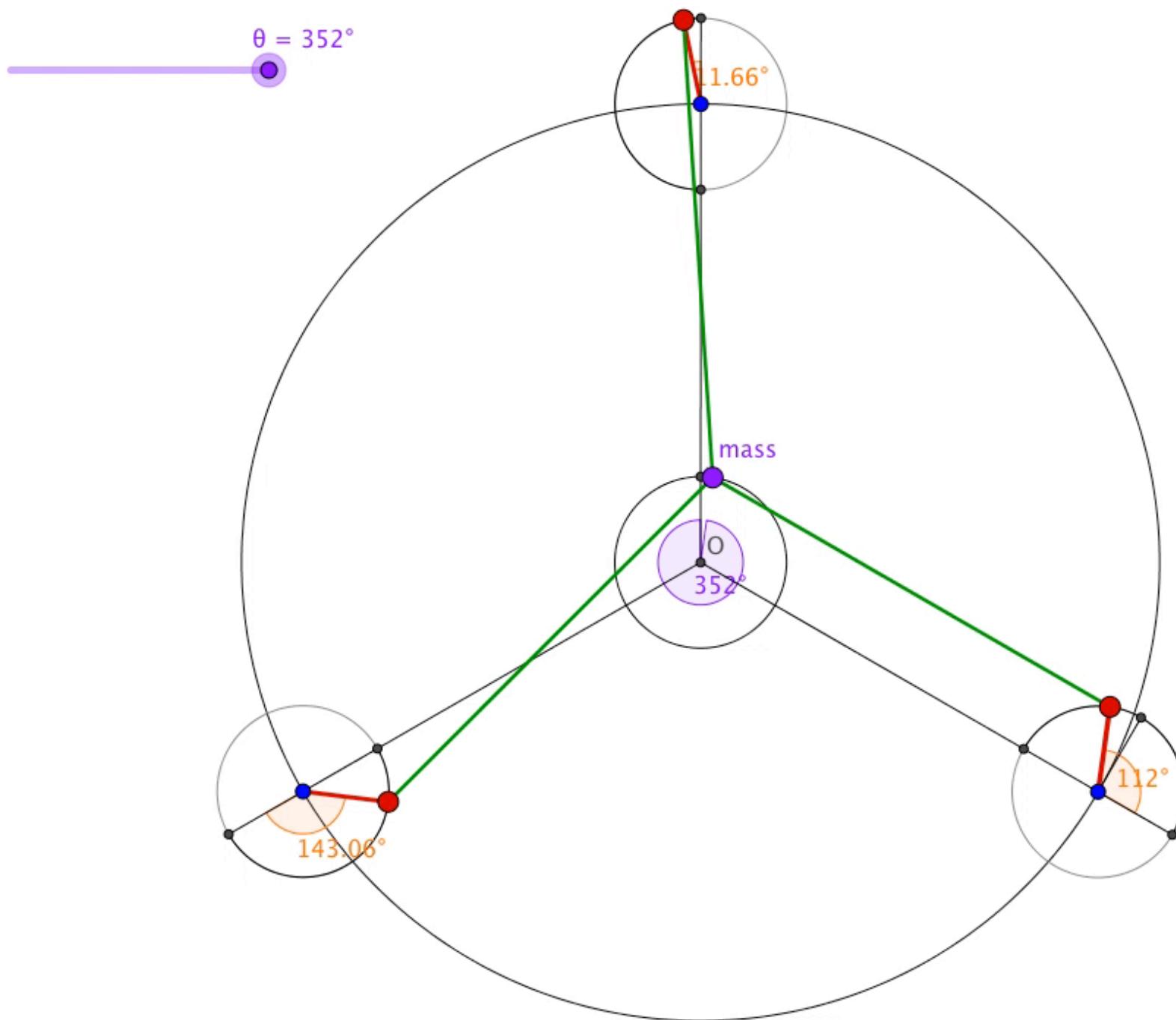
# Approach



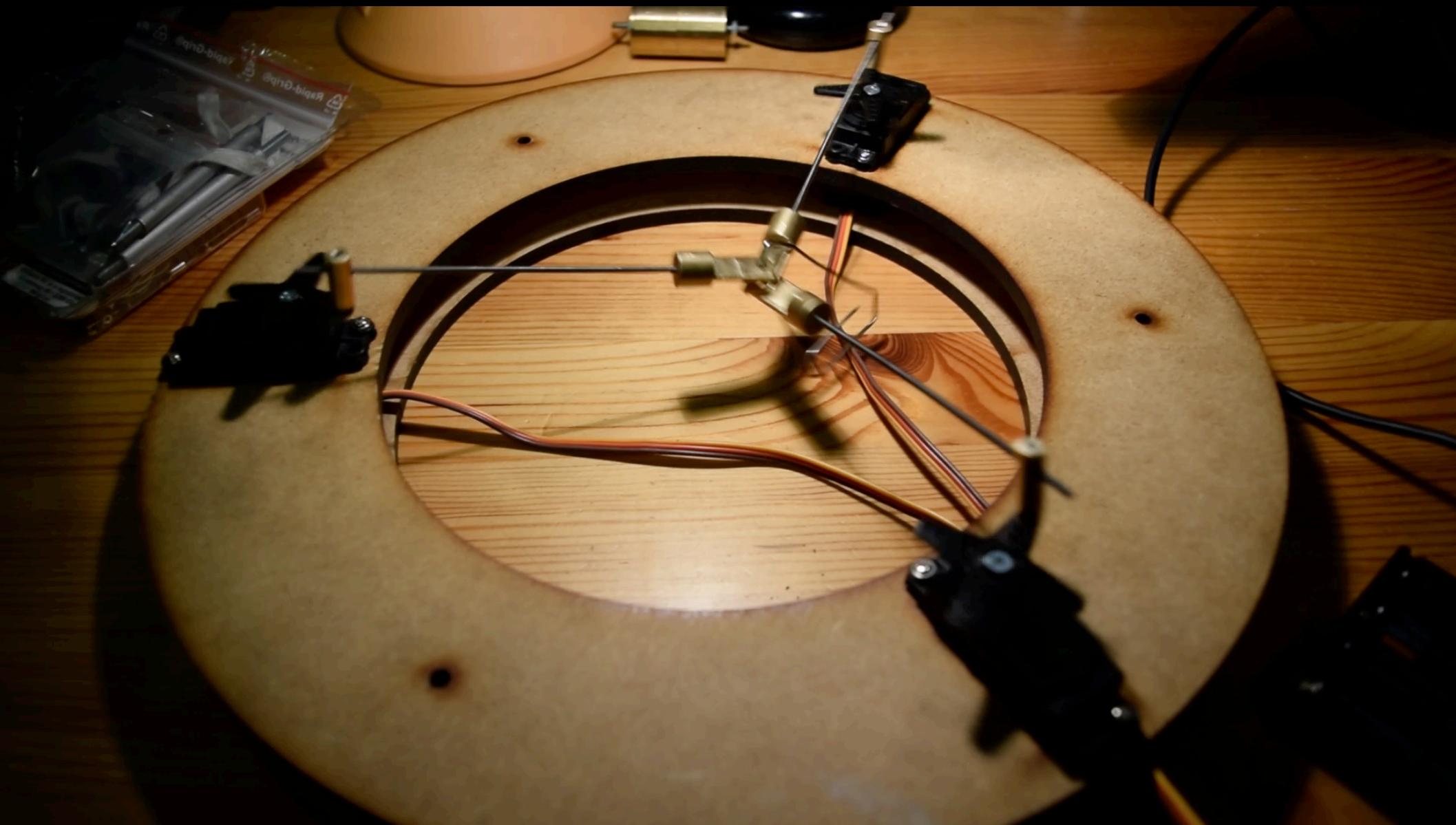
# Proof of concept: keep it easy



## Second model: using GeoGebra to see actual limitations



First mass movement test on cp2:  
using an Arduino® micro



# Mathematics

$$M = \pi R^4 g$$

$$\Sigma M = I \alpha$$

$$\alpha = \kappa R$$

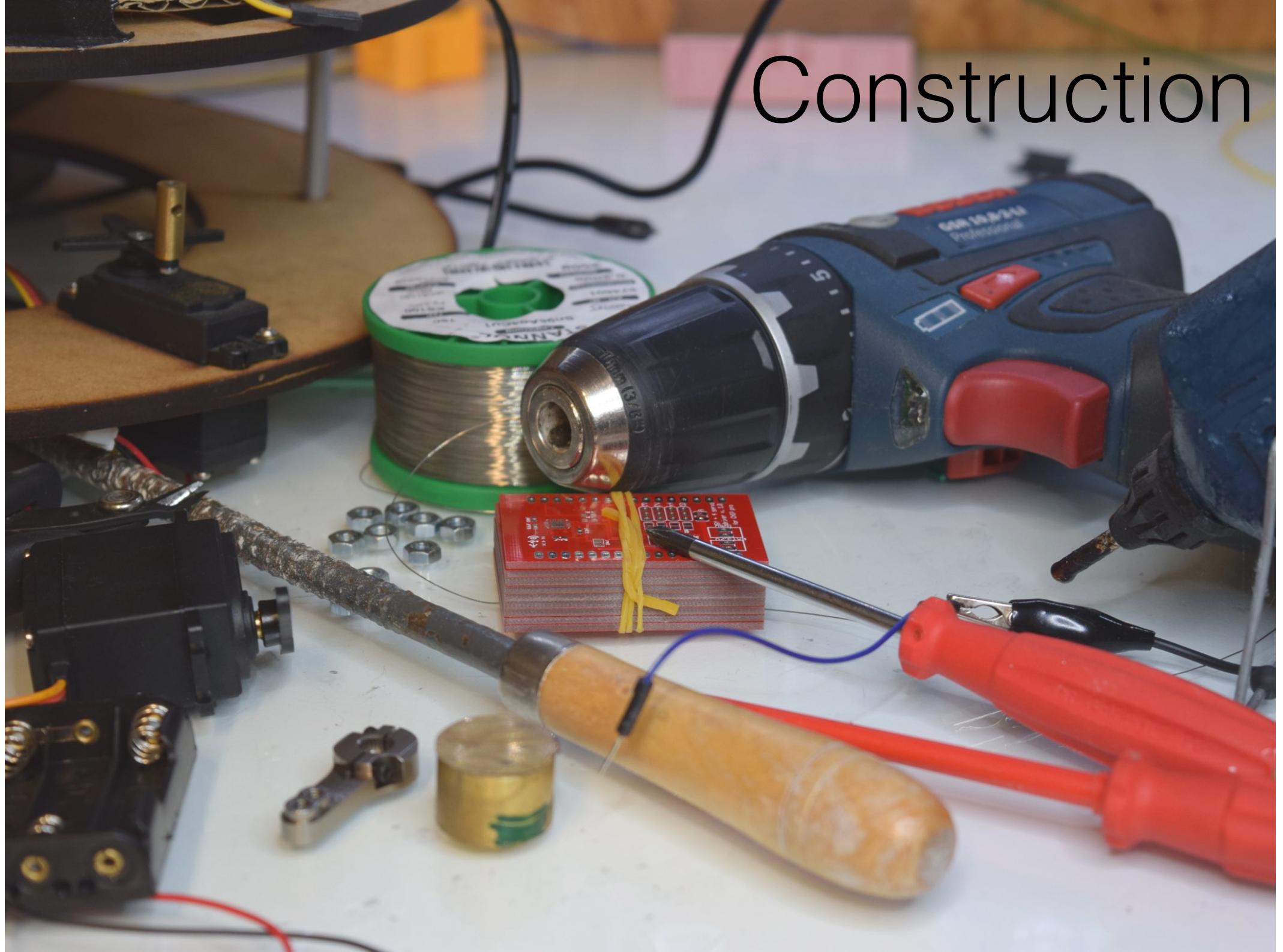
$$\Rightarrow \pi R^4 g = I \frac{\alpha}{R}$$

$$\Rightarrow \alpha = R \kappa \pi g \cdot \frac{1}{I}$$

$$\text{K} \cdot \pi \cdot R^4 \Rightarrow M R \kappa I$$

$$\begin{aligned} & \text{Left side: } \frac{d}{dx} (x^2 + y^2 + z^2)^{1/2} \\ &= 2x + 2y + 2z \\ & \text{Right side: } \frac{d}{dx} ((x^2 + y^2 + z^2)^{1/2}) \\ &= \frac{1}{2} (x^2 + y^2 + z^2)^{-1/2} (2x + 2y + 2z) \\ &= x + y + z \\ & \text{Equating: } 2x + 2y + 2z = x + y + z \\ & \Rightarrow x + y + z = 0 \end{aligned}$$

# Construction



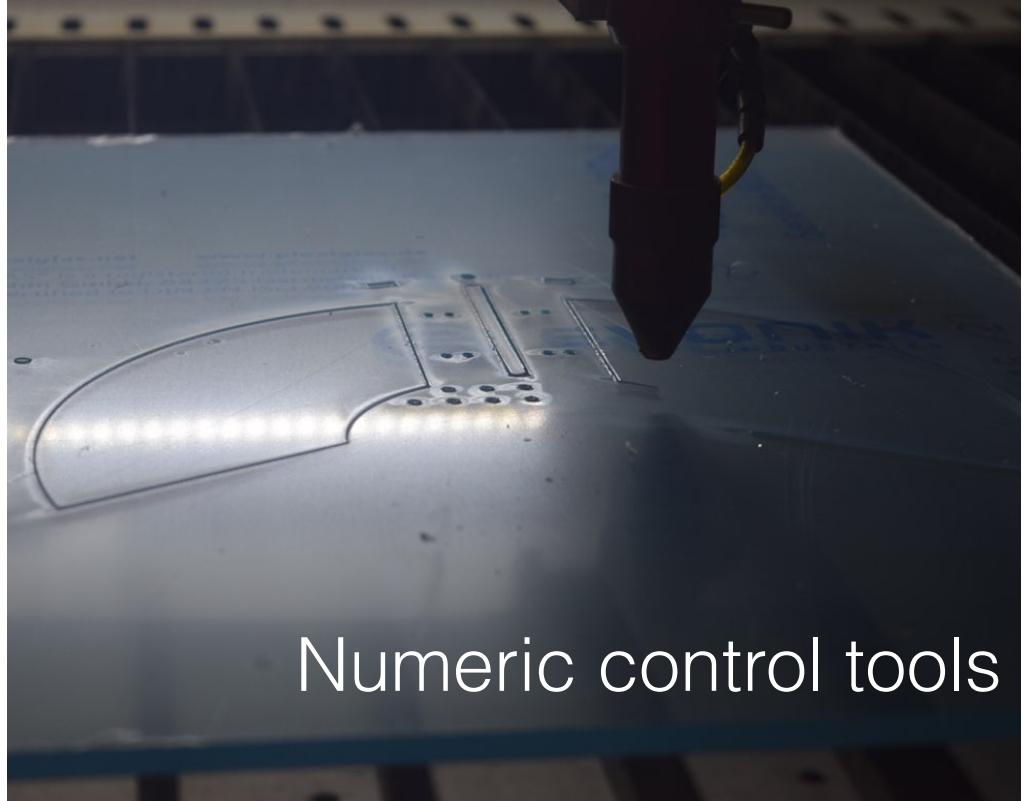
Soldering



Hand tools



Numeric control tools



Machine tools



File Edit View Search Terminal Help

```
[opatiny@localhost ~]$ cowsay -e '^:^' 'Bash, Node.js and some HTML...'
```

```
< Bash, Node.js and some HTML... >
```



```
[opatiny@localhost ~]$ echo 'This is the kind of thing done in bash'
```

```
This is the kind of thing done in bash
```

```
[opatiny@localhost ~]$ node
```

```
> function addition(a, b){return a + b}
```

```
undefined
```

```
> a = 0.1
```

```
0.1
```

```
> b = 0.2
```

```
0.2
```

```
> addition(a, b)
```

```
0.3000000000000004
```

```
> console.log('And this is how node works.')
```

```
And this is how node works.
```

```
undefined
```

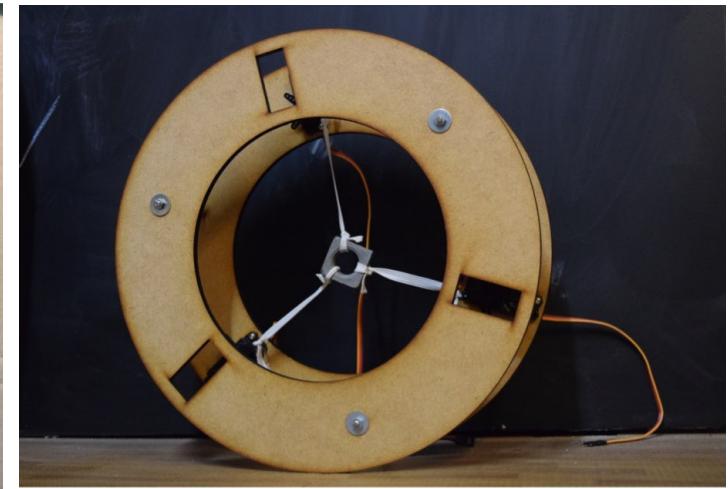
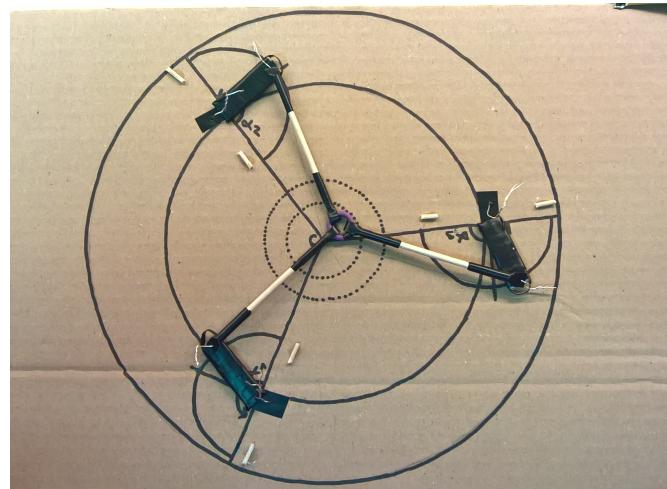
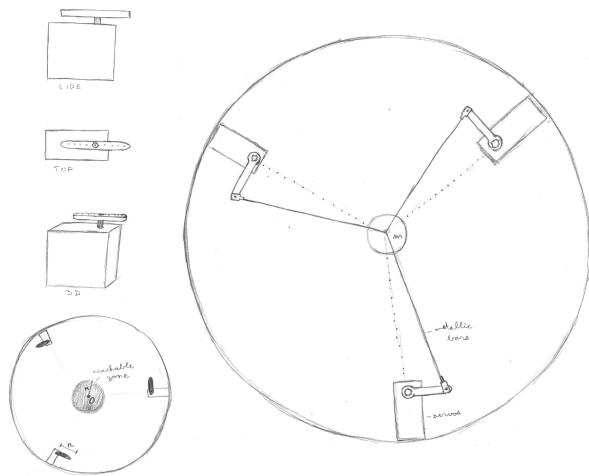
```
>
```

```
(To exit, press ^C again or type .exit)
```

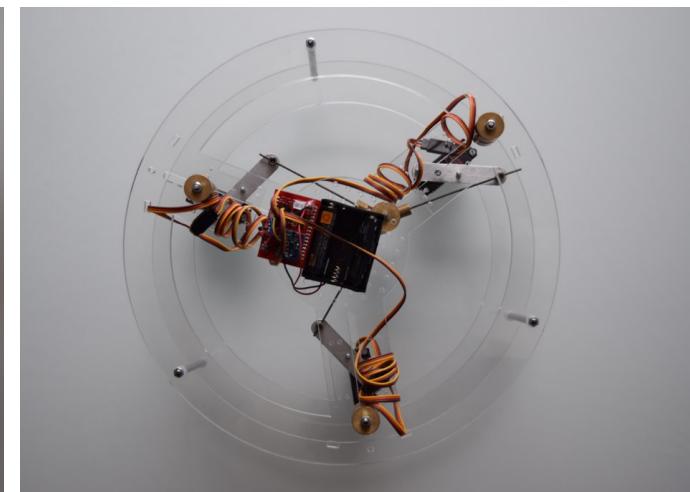
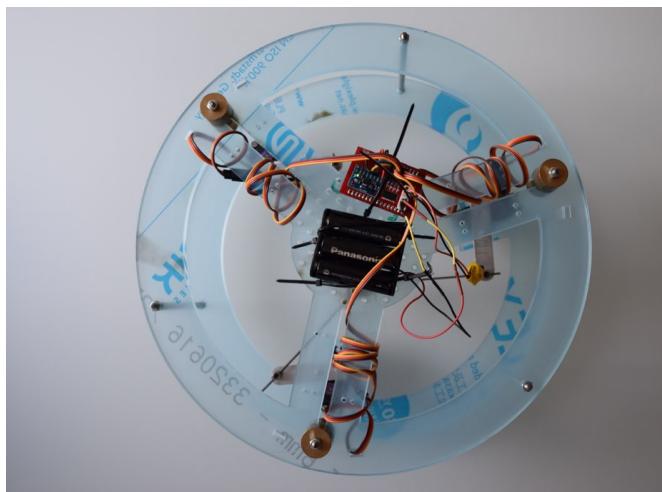
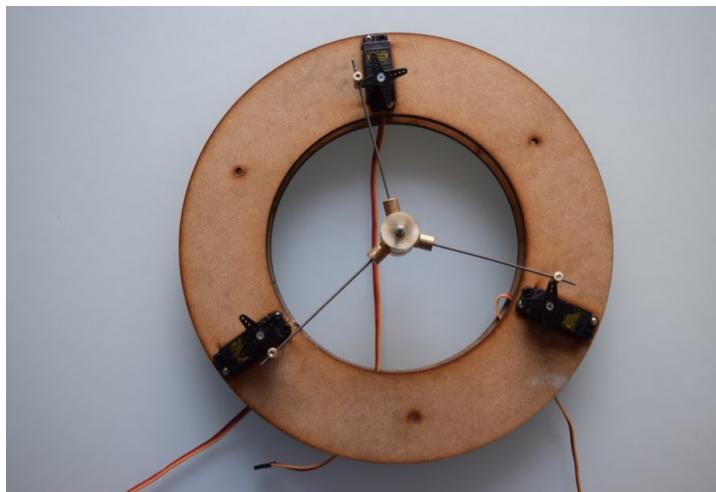
```
>
```

```
[opatiny@localhost ~]$ █
```

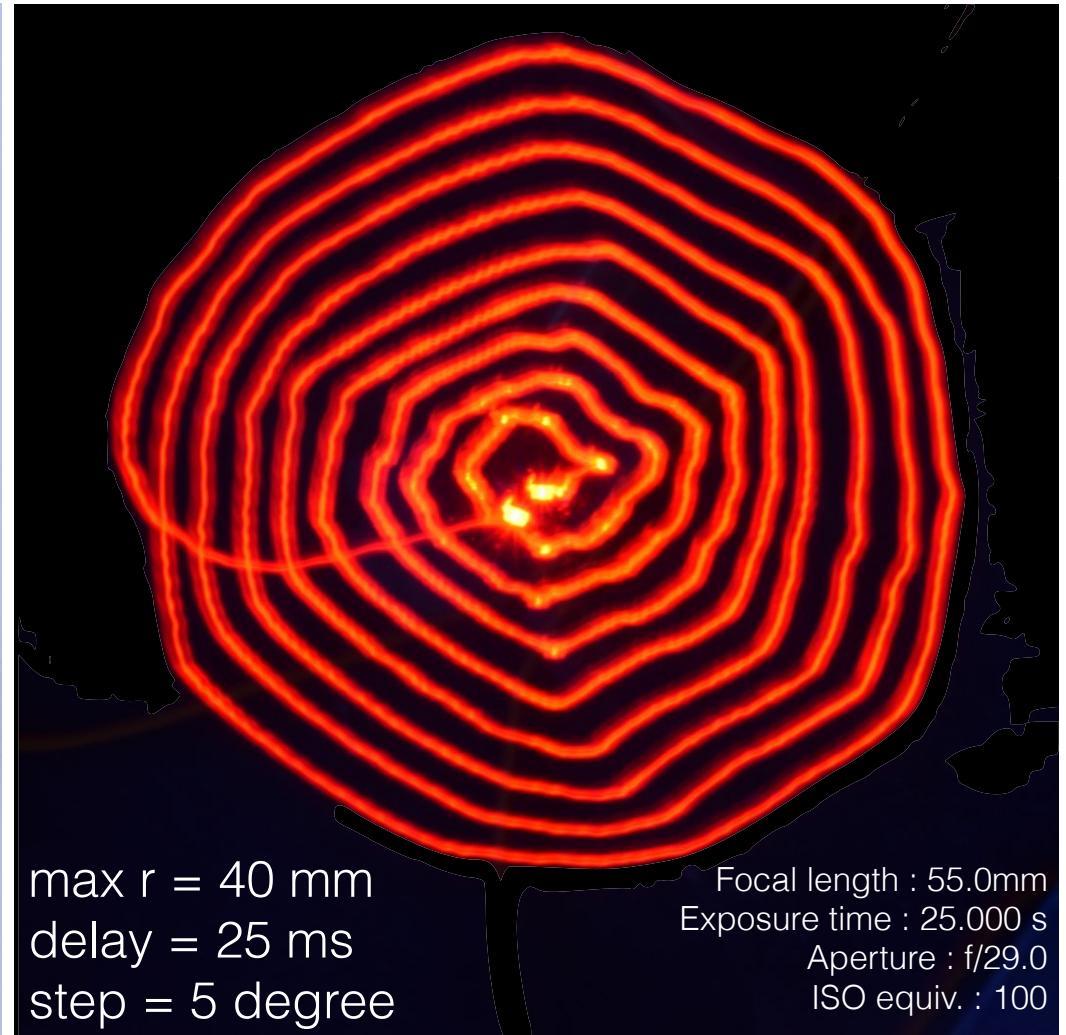
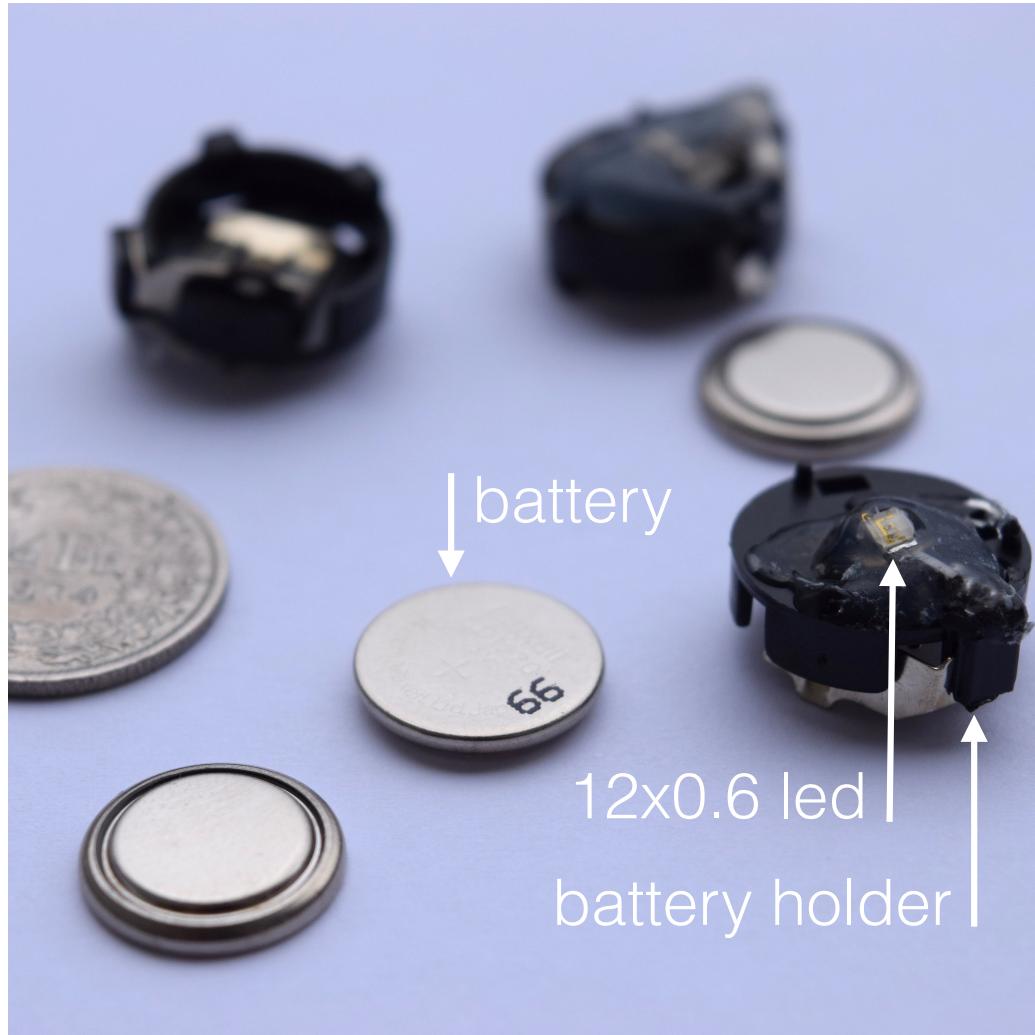
# Software



# Results



# The good friend: long aperture pictures



# Conclusion

## **2012:** *A Review of Active Mechanical Driving Principles of Spherical Robots*

"For true holonomy, the research challenge becomes developing an internal drive mechanism that can provide omnidirectional output torque to a sphere that can arbitrarily rotate around it, regardless of the orientation of either the sphere or the drive mechanism. In essence, the inner mechanics must be able to rotate three-dimensionally independently from the outer shell. Since the outer shell must be connected to the inner mechanics in some manner, this poses a difficult design challenge."