RoFI

Jan Mrázek, Viktória Vozárová

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ParaDiSe

Co je naším cílem?

Vyvinout rekonfigurovatelnou distribuovanou robotickou platformu.

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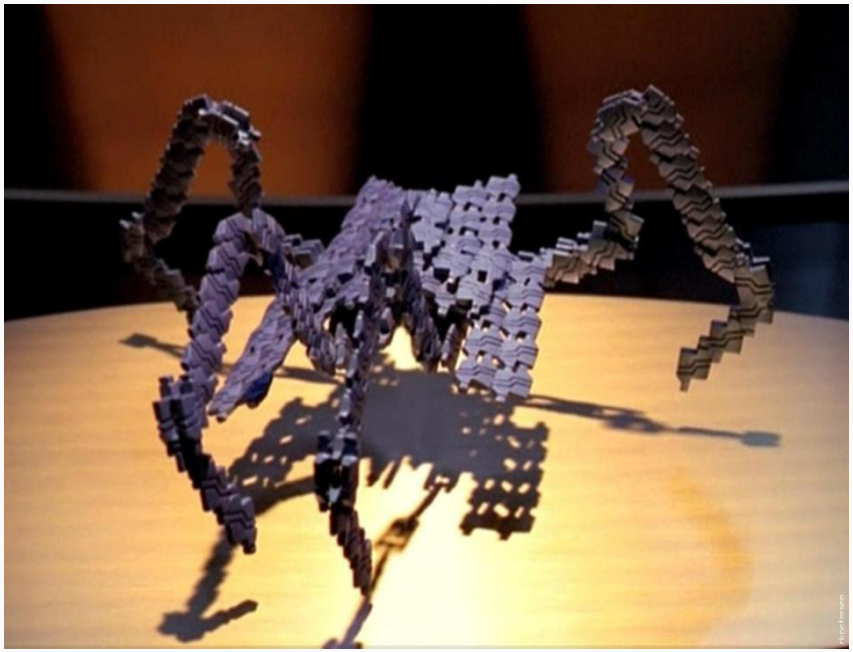

...v podstatě Replikátory z StarGate SG-1.

`https://youtu.be/gm0KUVByx40?t=49`

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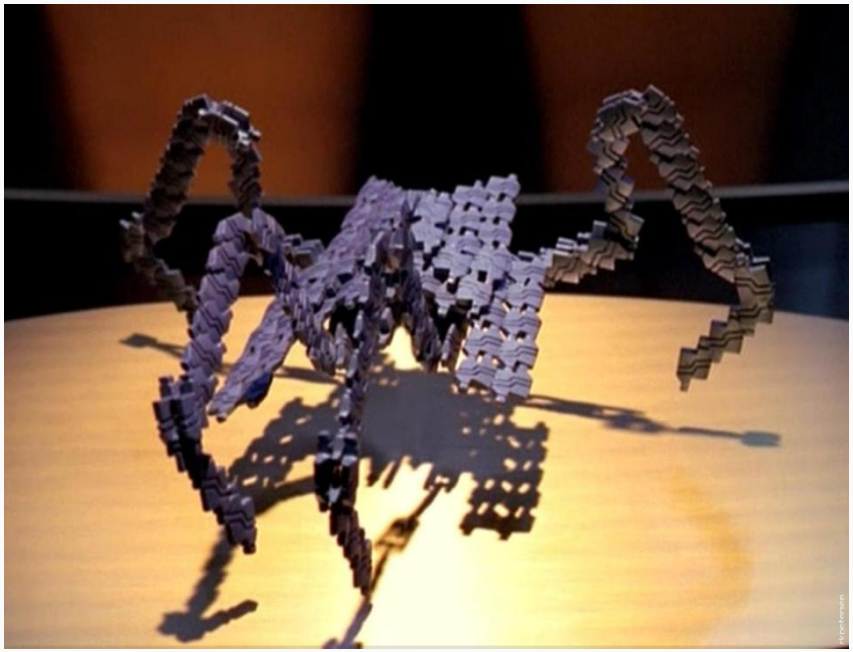
Vyvinout rekonfigurovatelnou distribuovanou robotickou platformu.



...v podstatě Replikátory z StarGate SG-1.

`https://youtu.be/gm0KUVByx40?t=49`

...prakticky `https://youtu.be/4oSavAHf0dg?t=164`.

Co je to replikátor?

Co si bereme jako inspiraci:

- rekonfigurovatelnost
- distribuovanost
- fault tolerantnost
- integraci s prostředím

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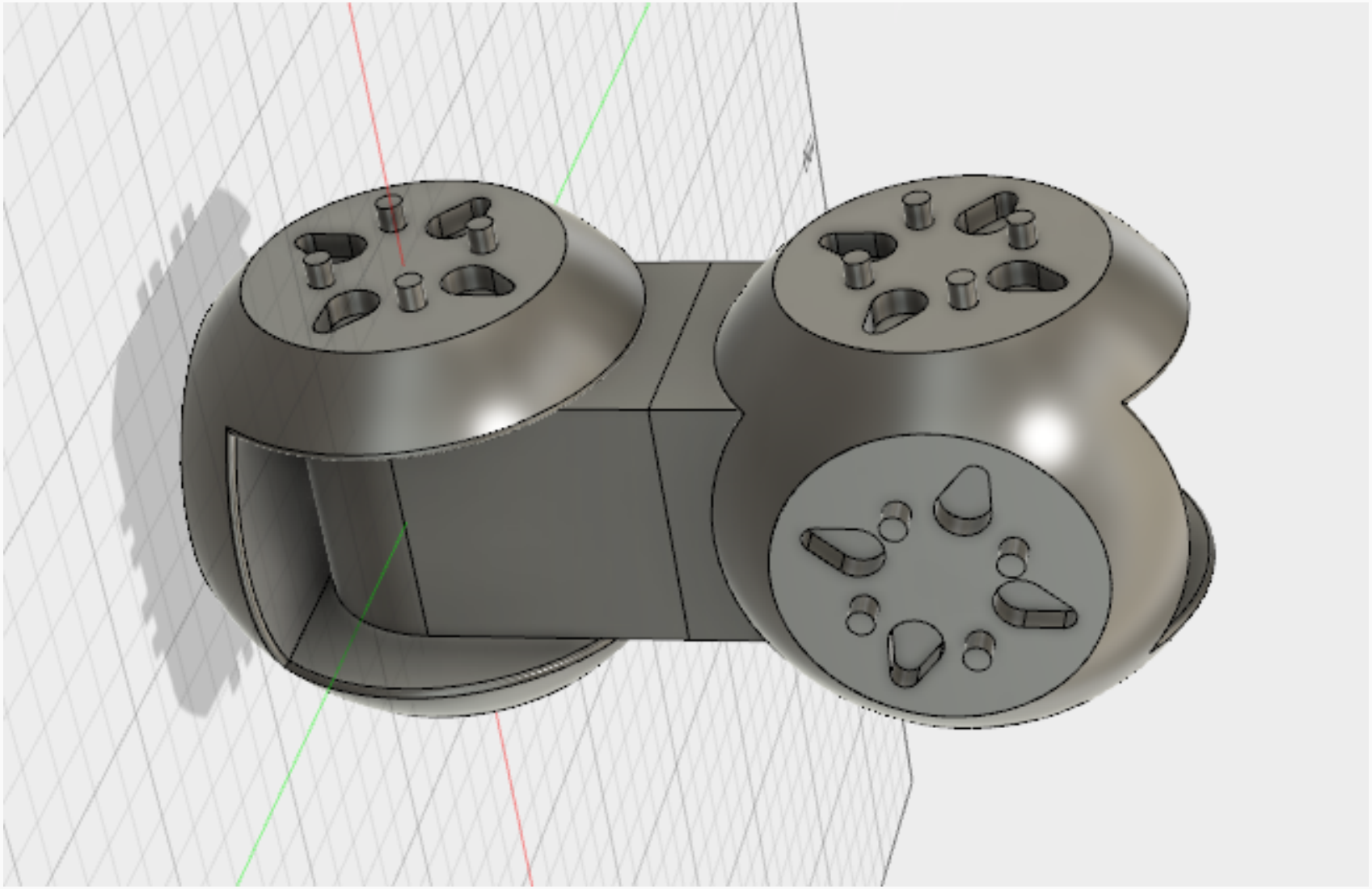
Čemu se chceme vyvarovat:

- přílišná autonomnost
- snaha se ovládnout svět

RoFI aka pozemský replikátor



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Jak unikátní jsme?

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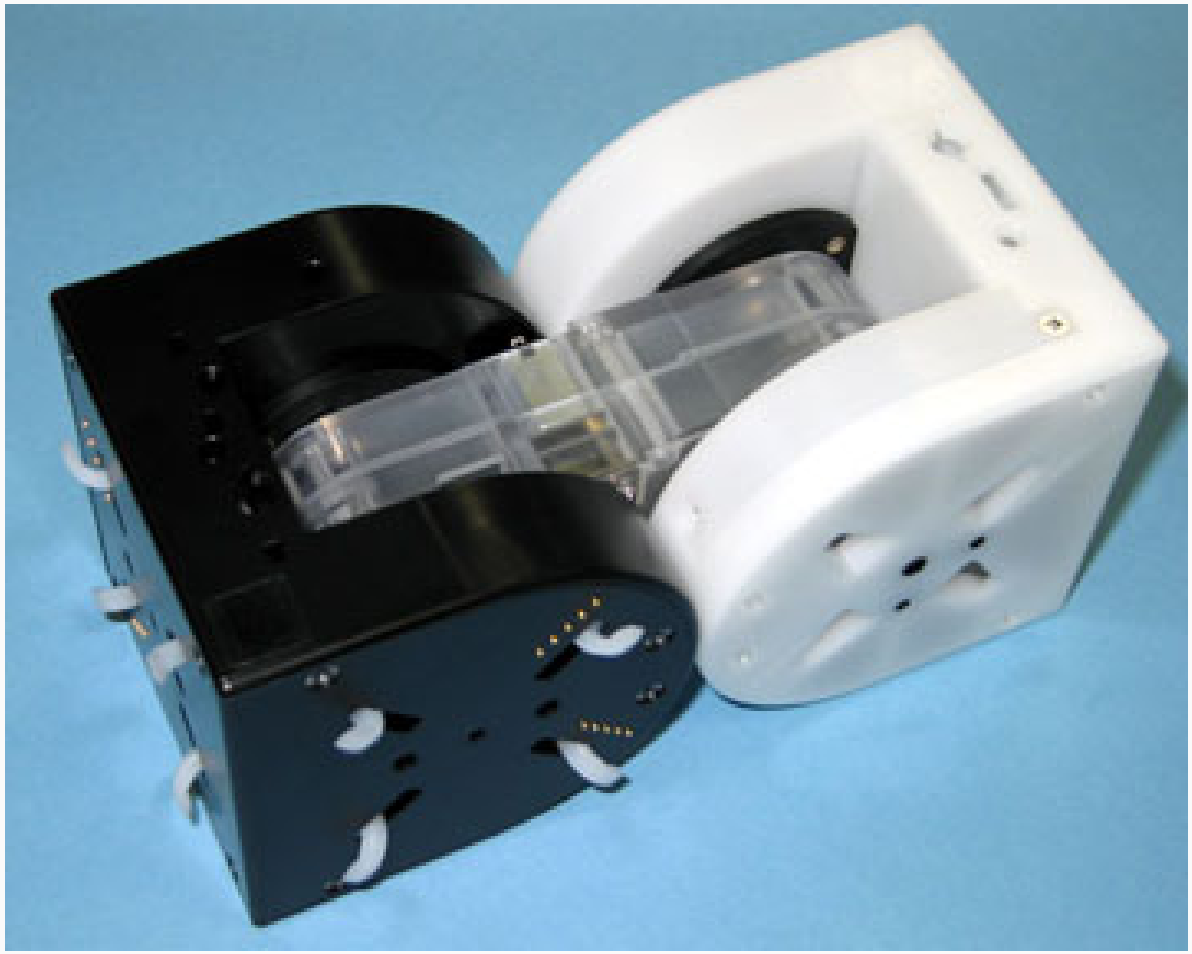
MTRANS



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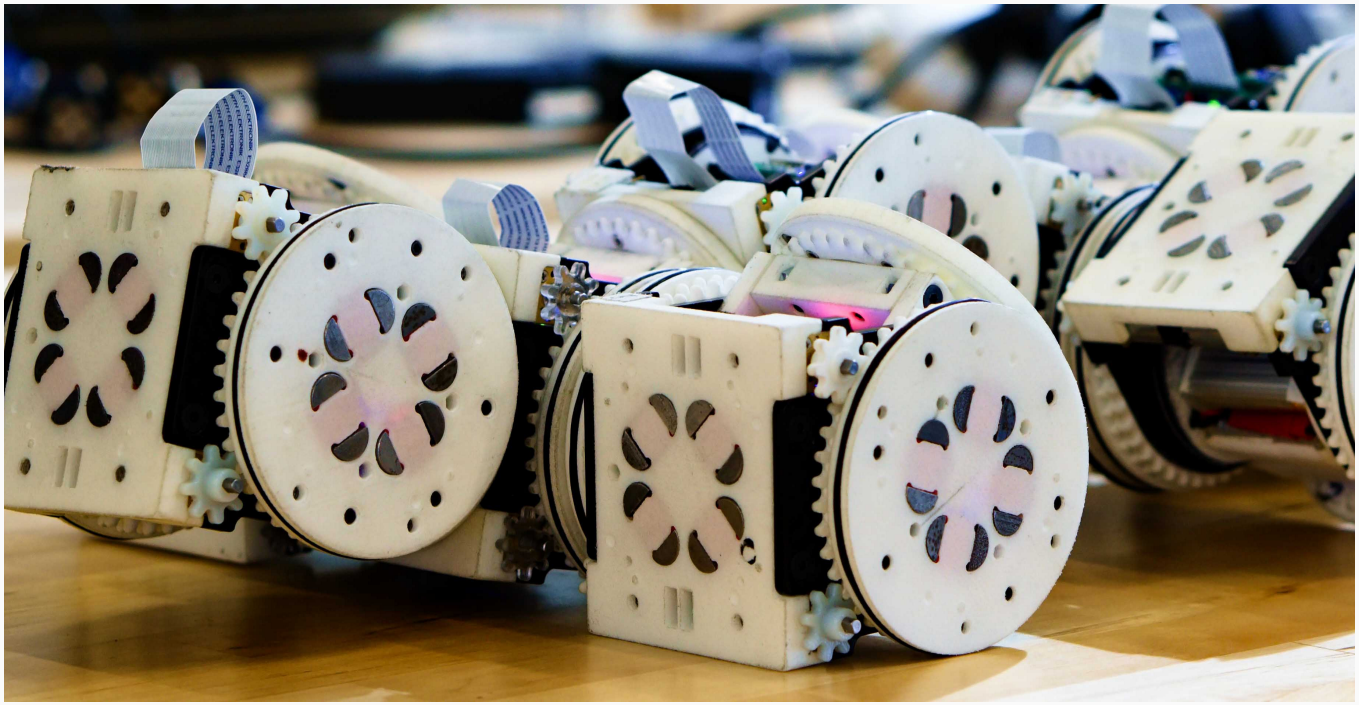
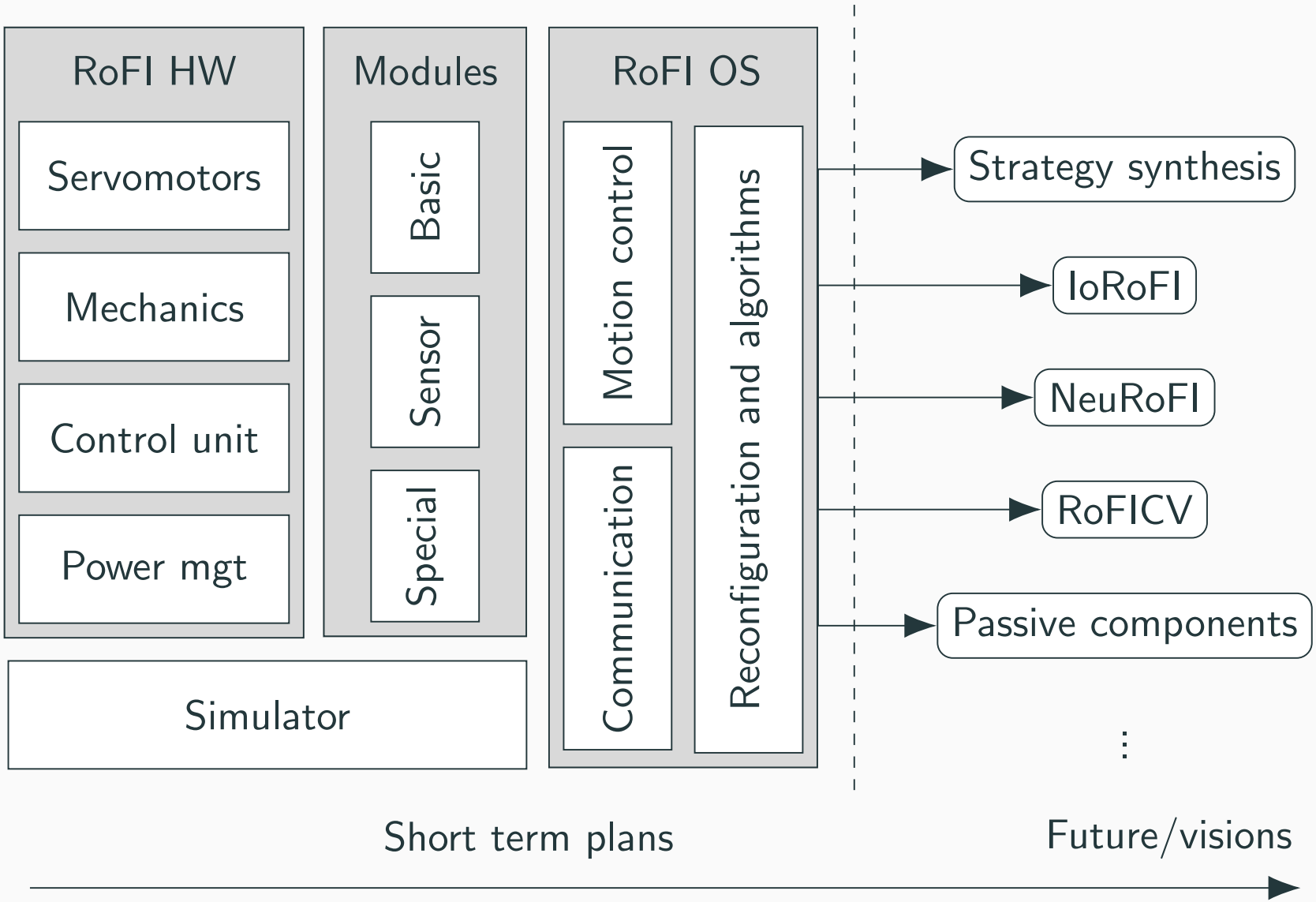
SMORES



Jak unikátní jsme?

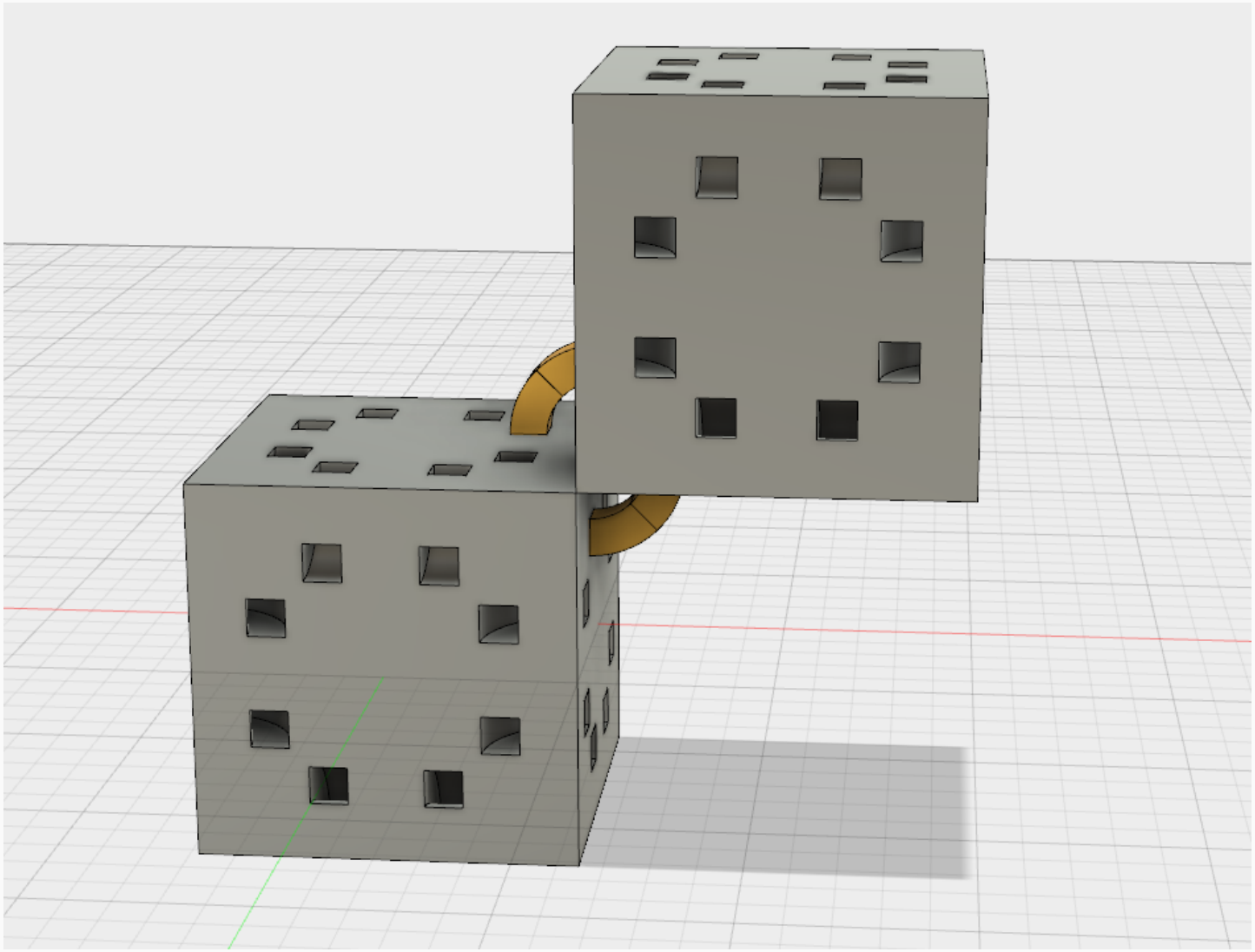
Roombots

Vize projektu



Evoluce RoFI

První koncept – Kostičky



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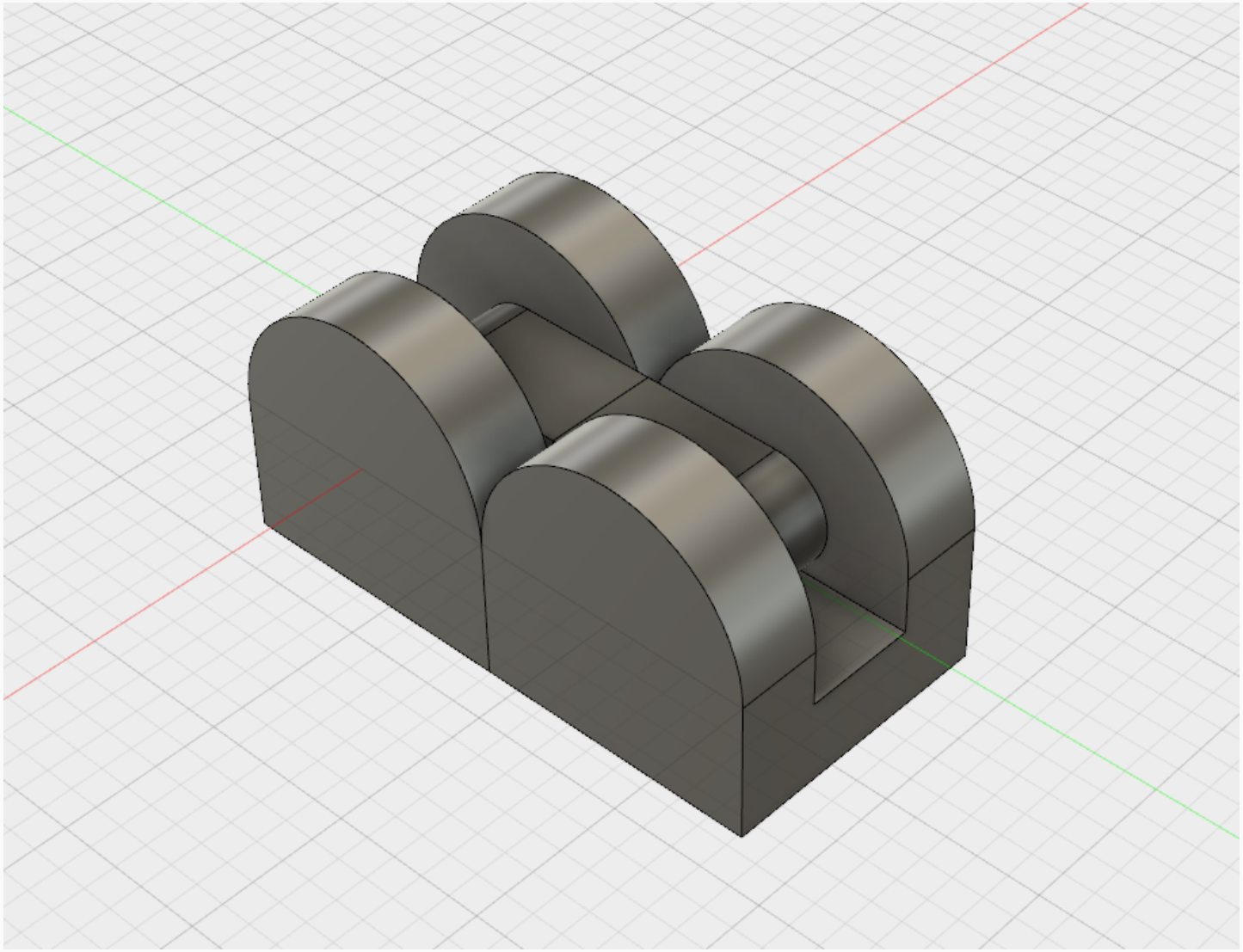
Druhý koncept



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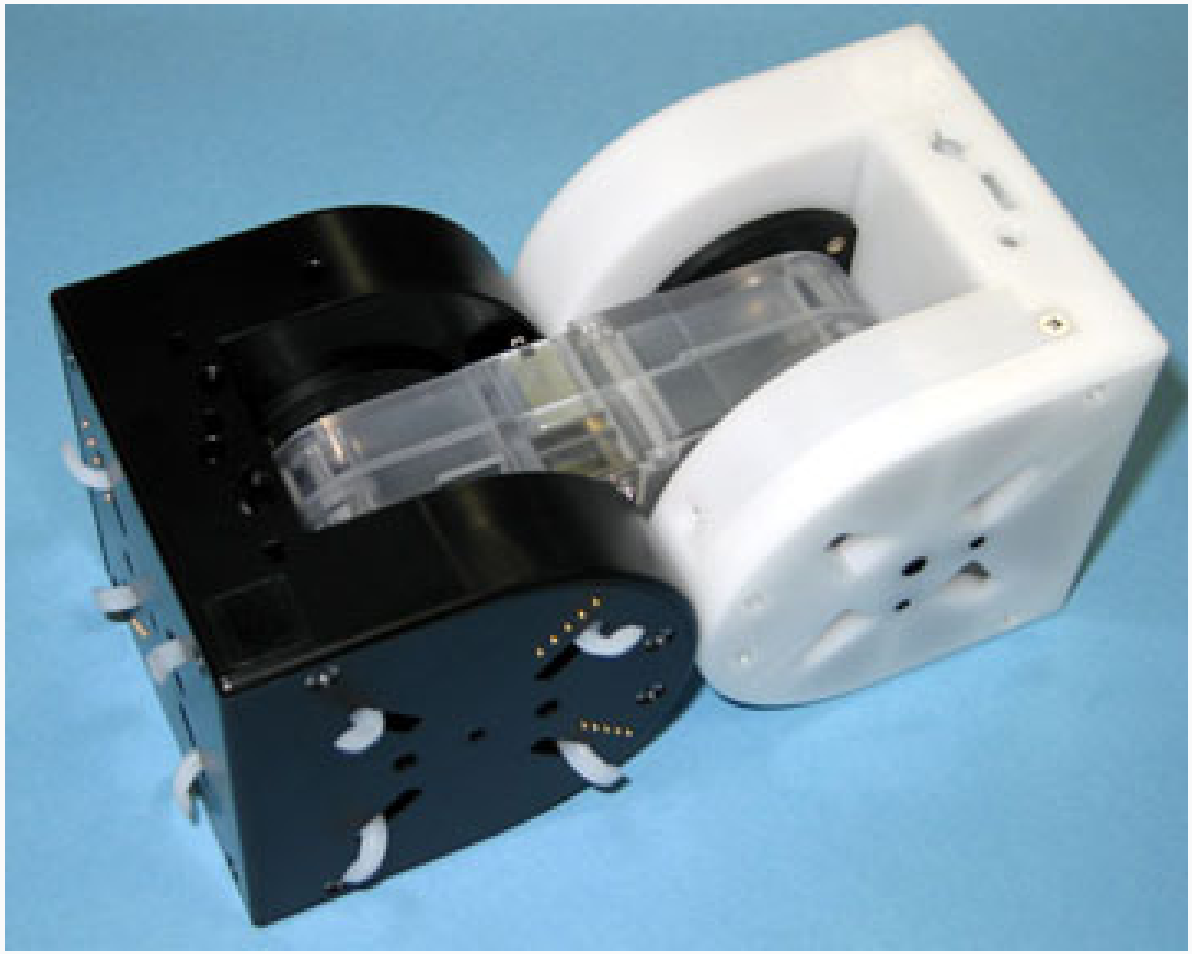
Zamykací systém – základ rekonfigurovatelné platformy

Požadované vlastnosti:

- mechanická odolnost
- symetričnost (rotační & pohlaví)
- odolnost vůči nezarovnání
- spotřeba energie
- rychlost

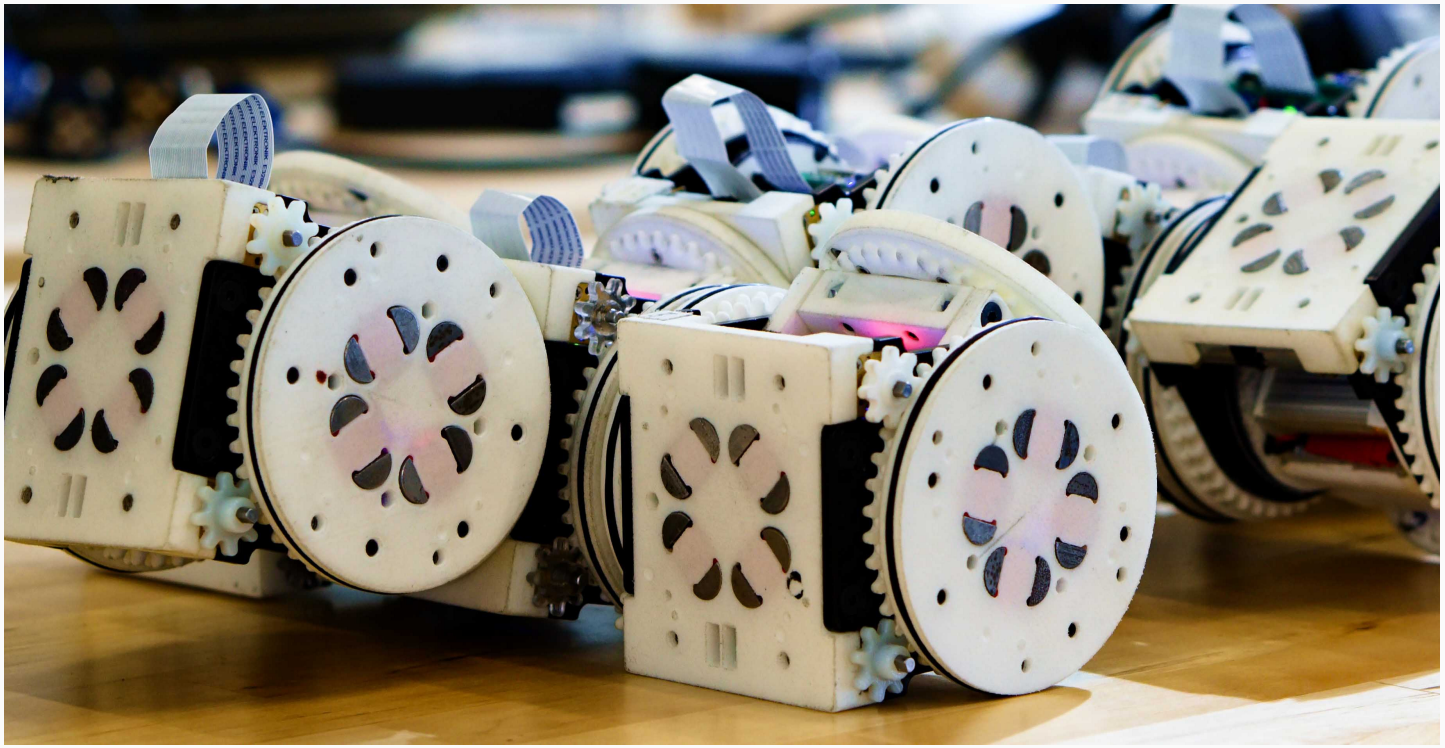
Možné zamykací systémy

Háčky

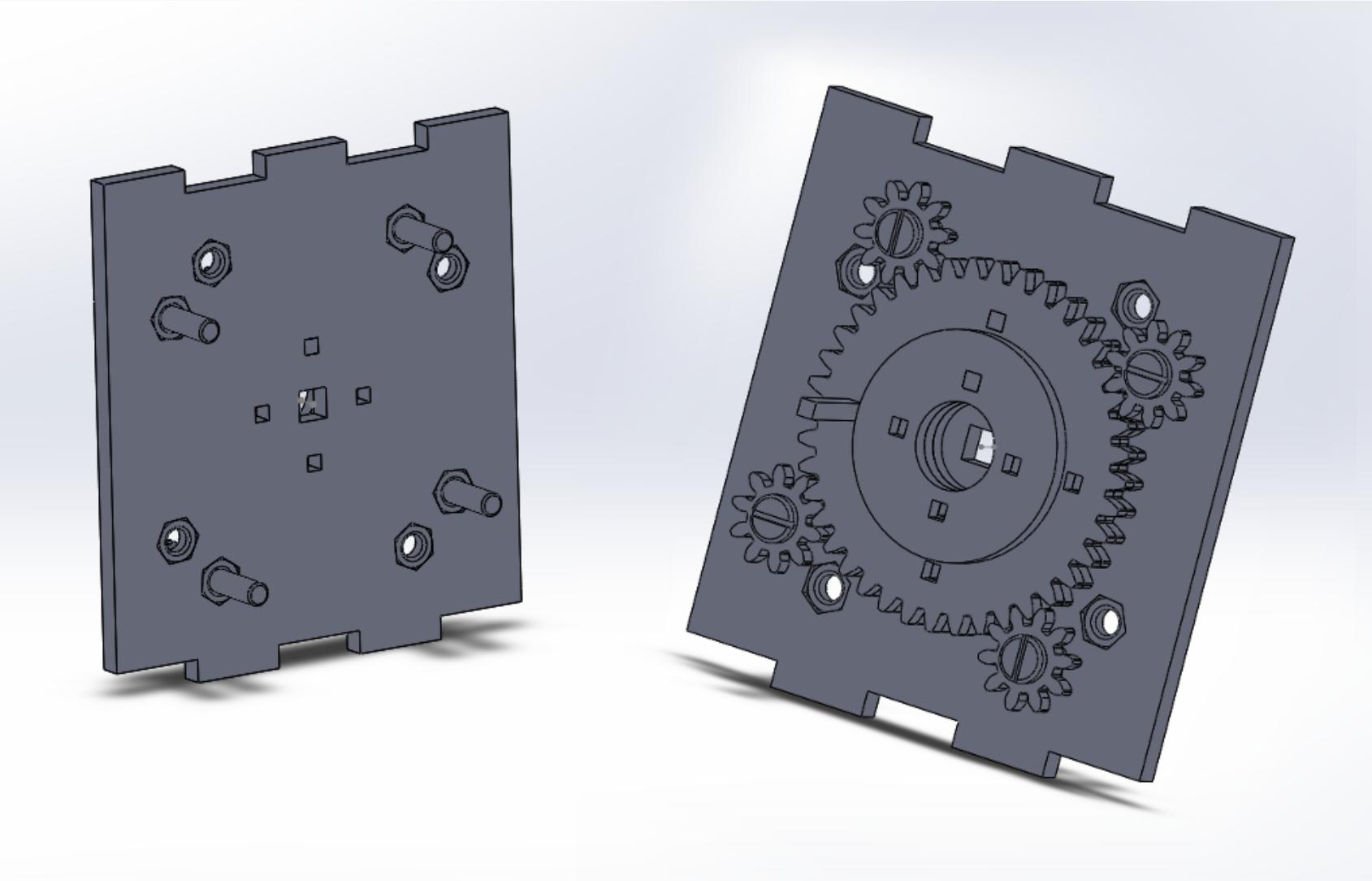


Možné zamykací systémy

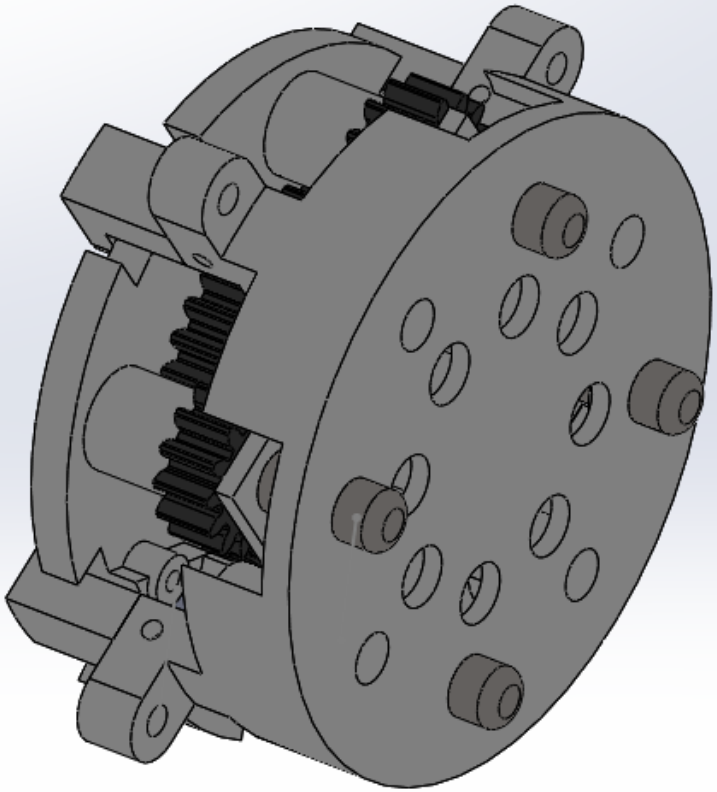
Permaelektrické magnety



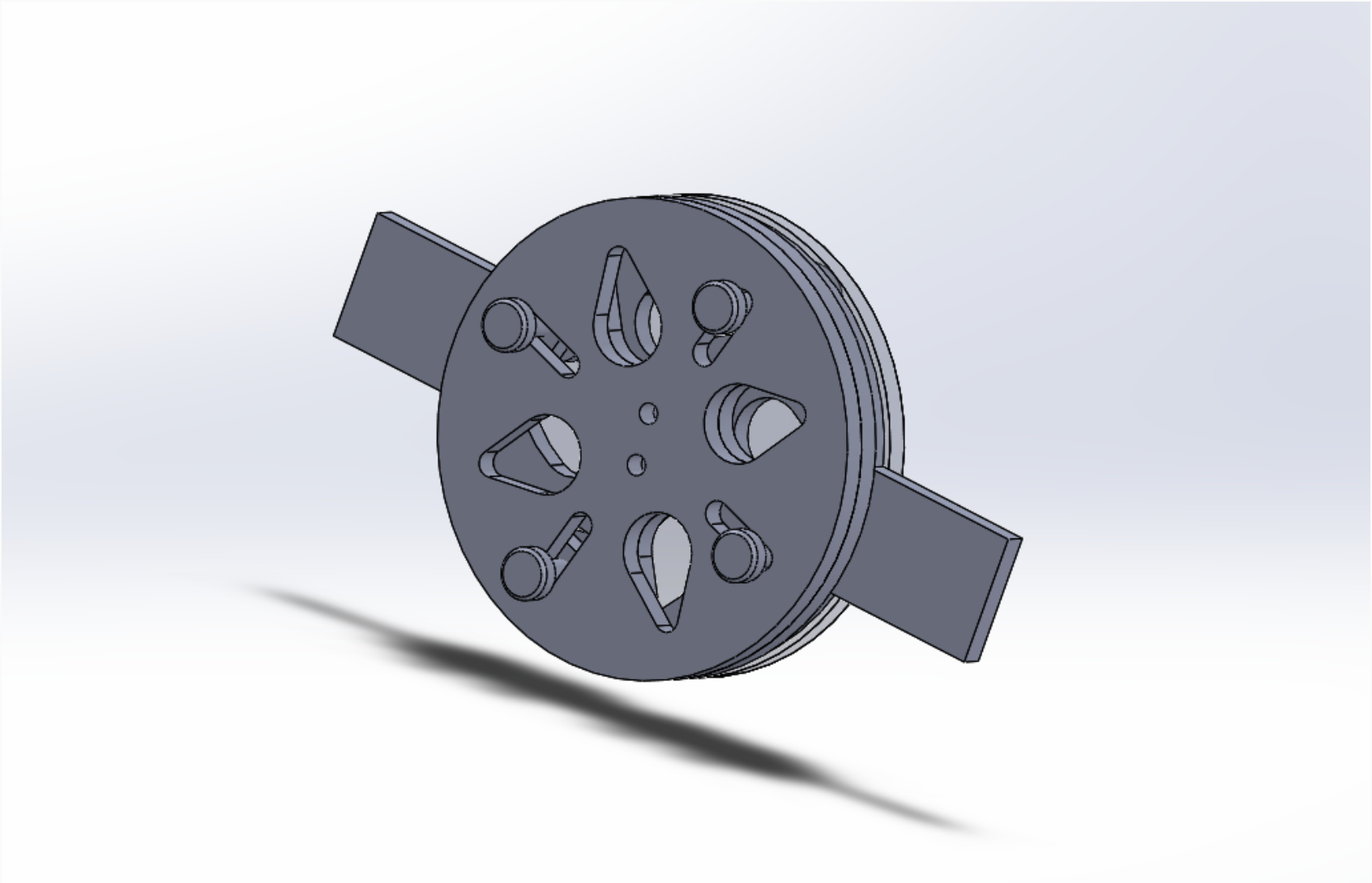
Šroubovací systém 1



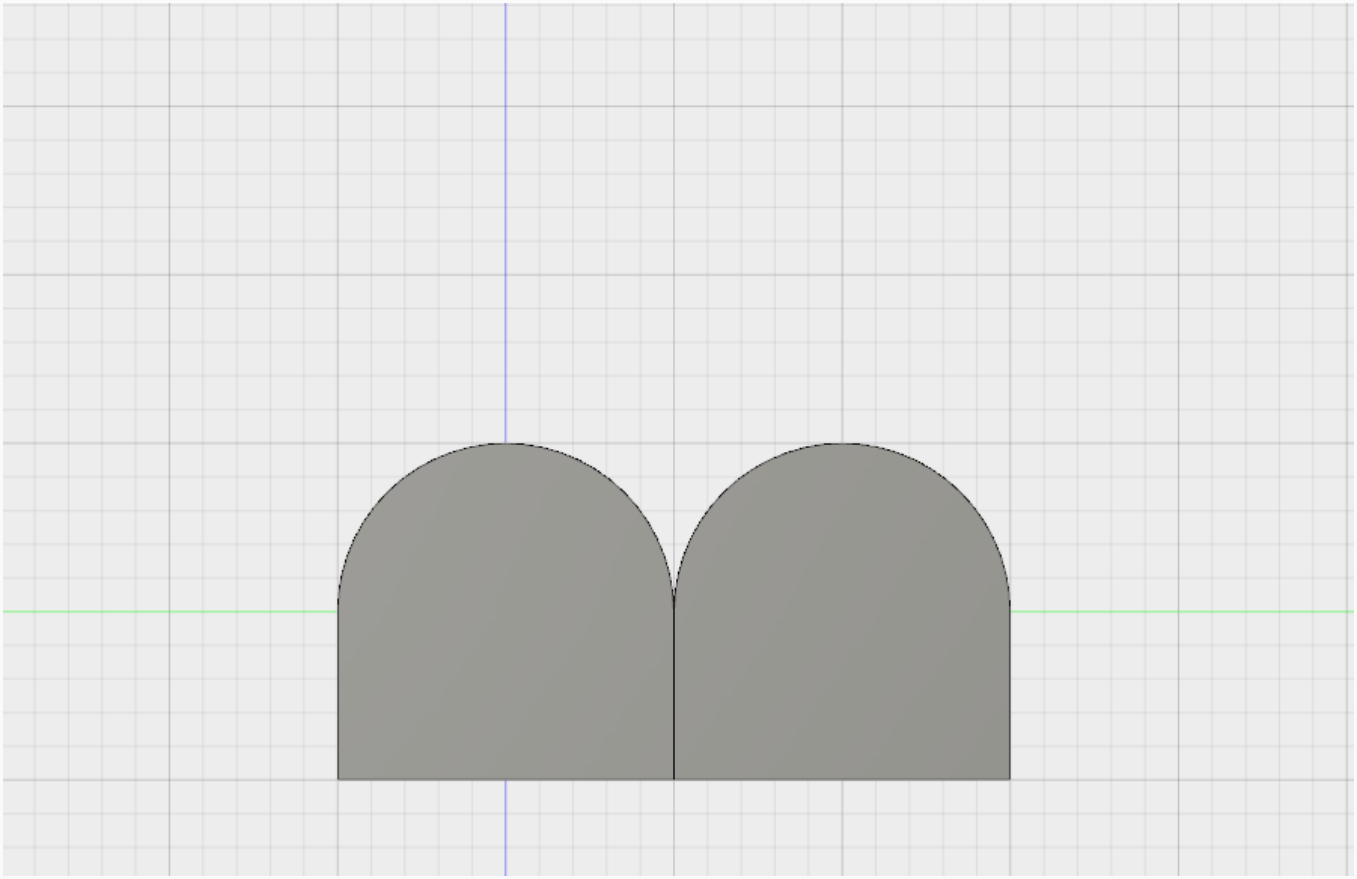
Šroubovací systém 2



Háčkový systém



Grid-awareness



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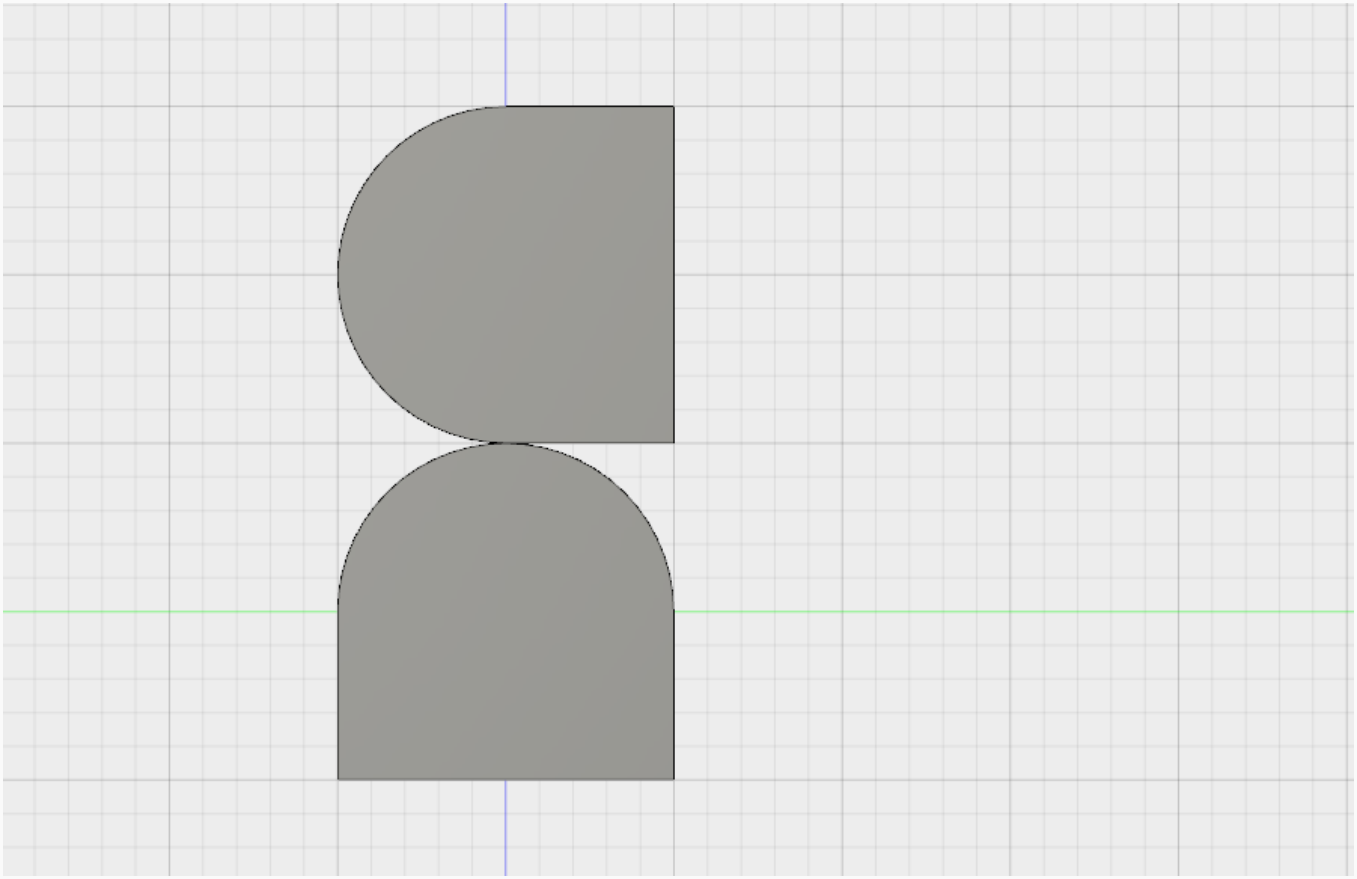

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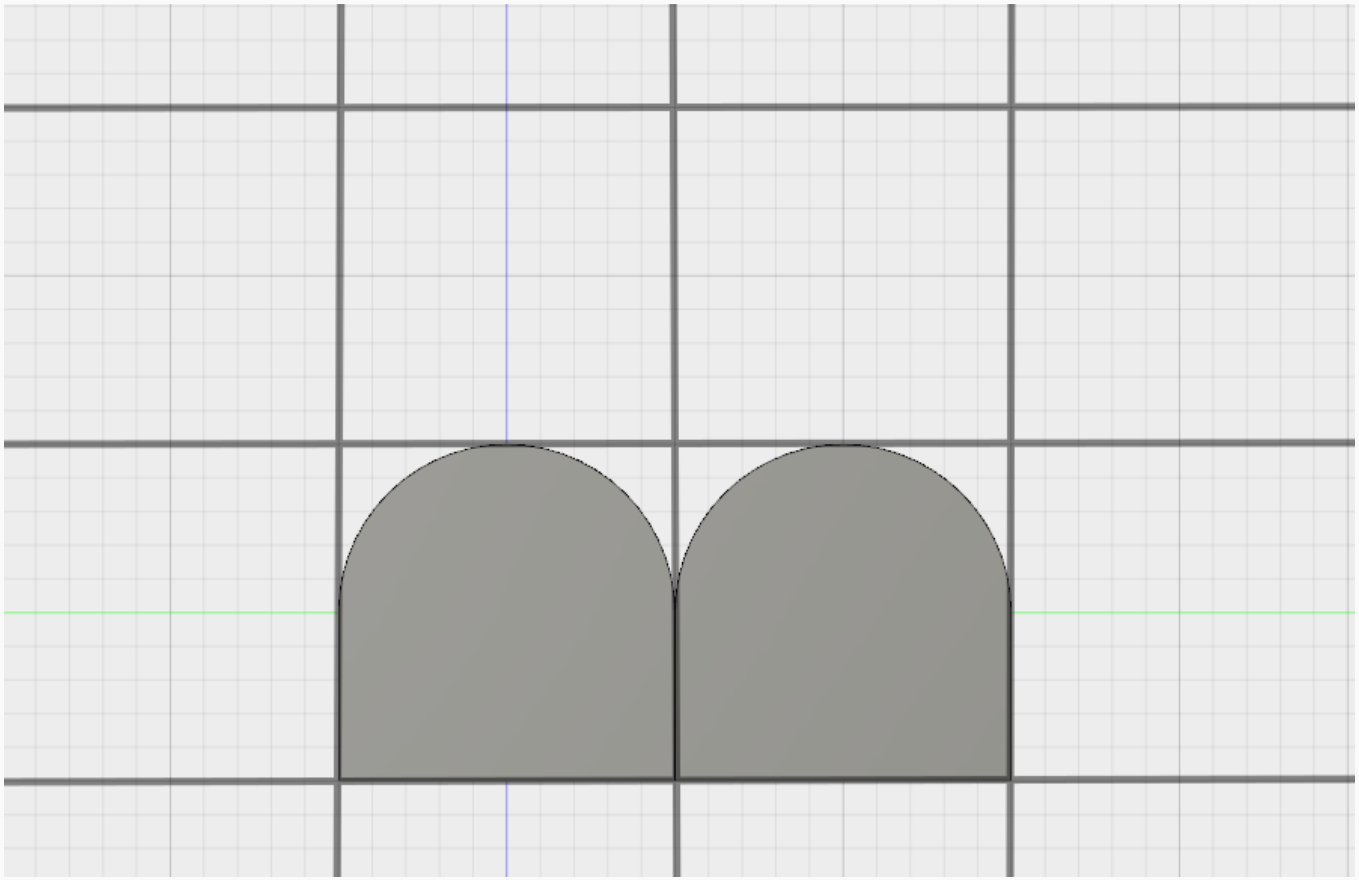

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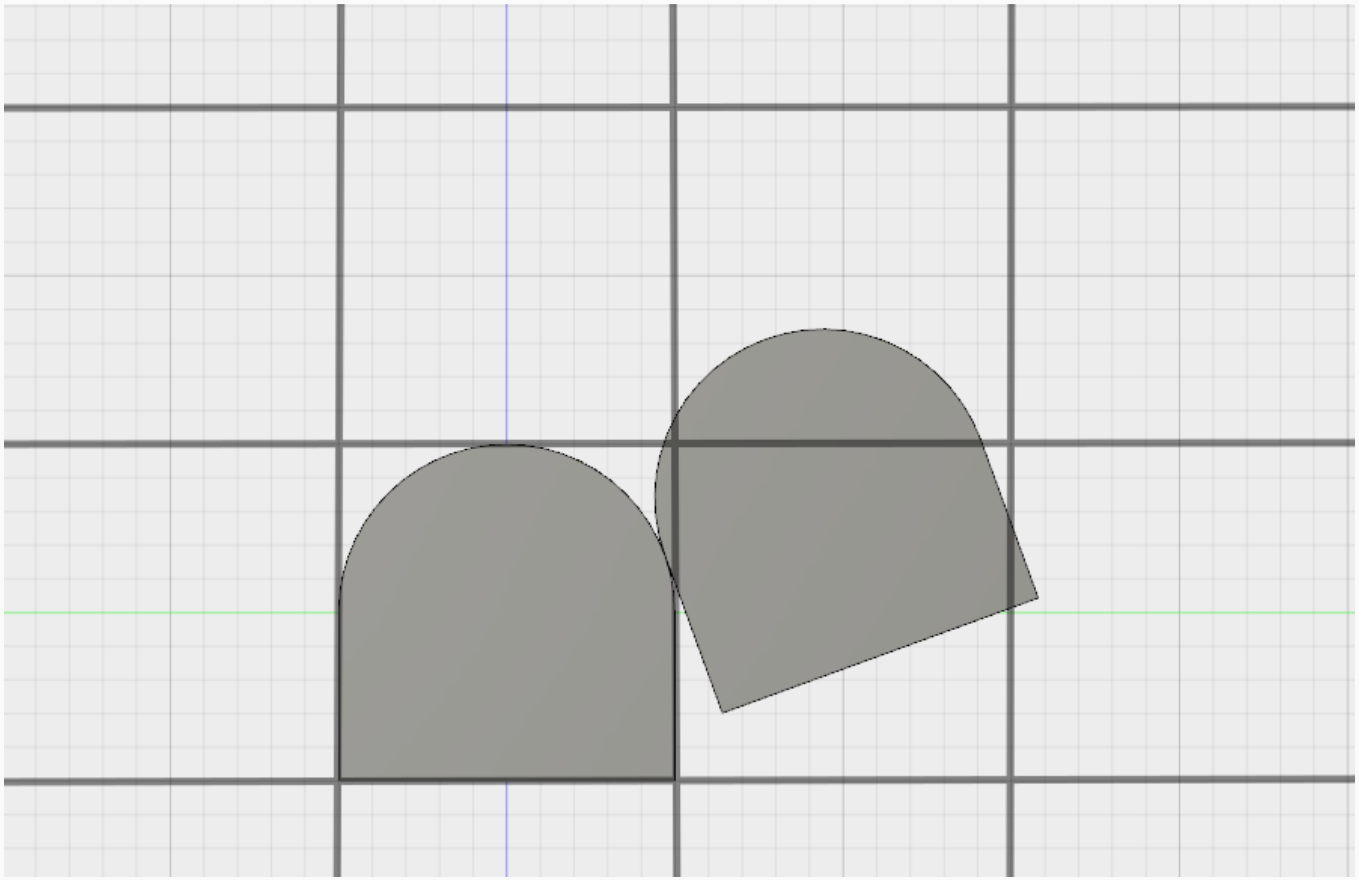

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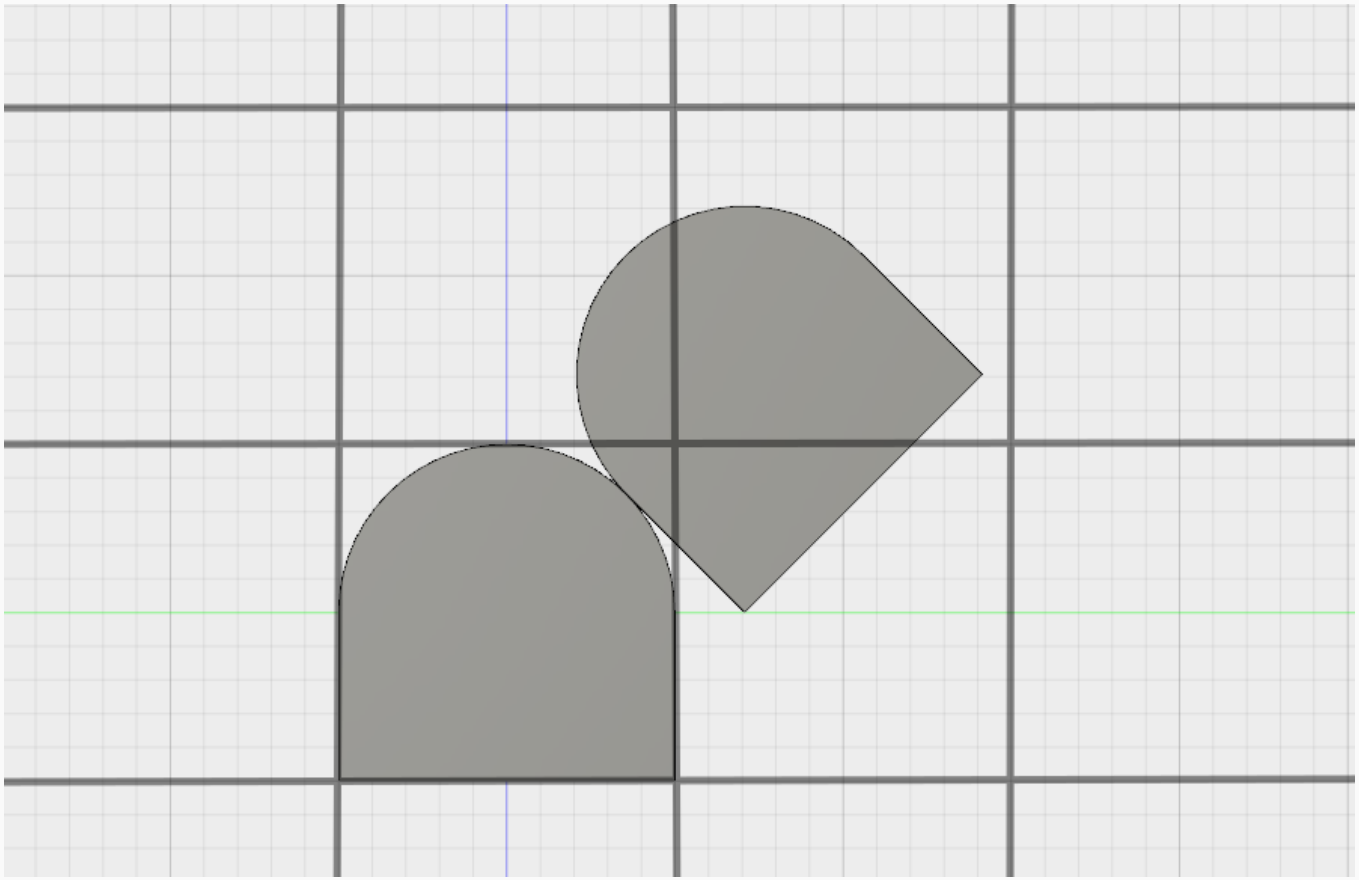

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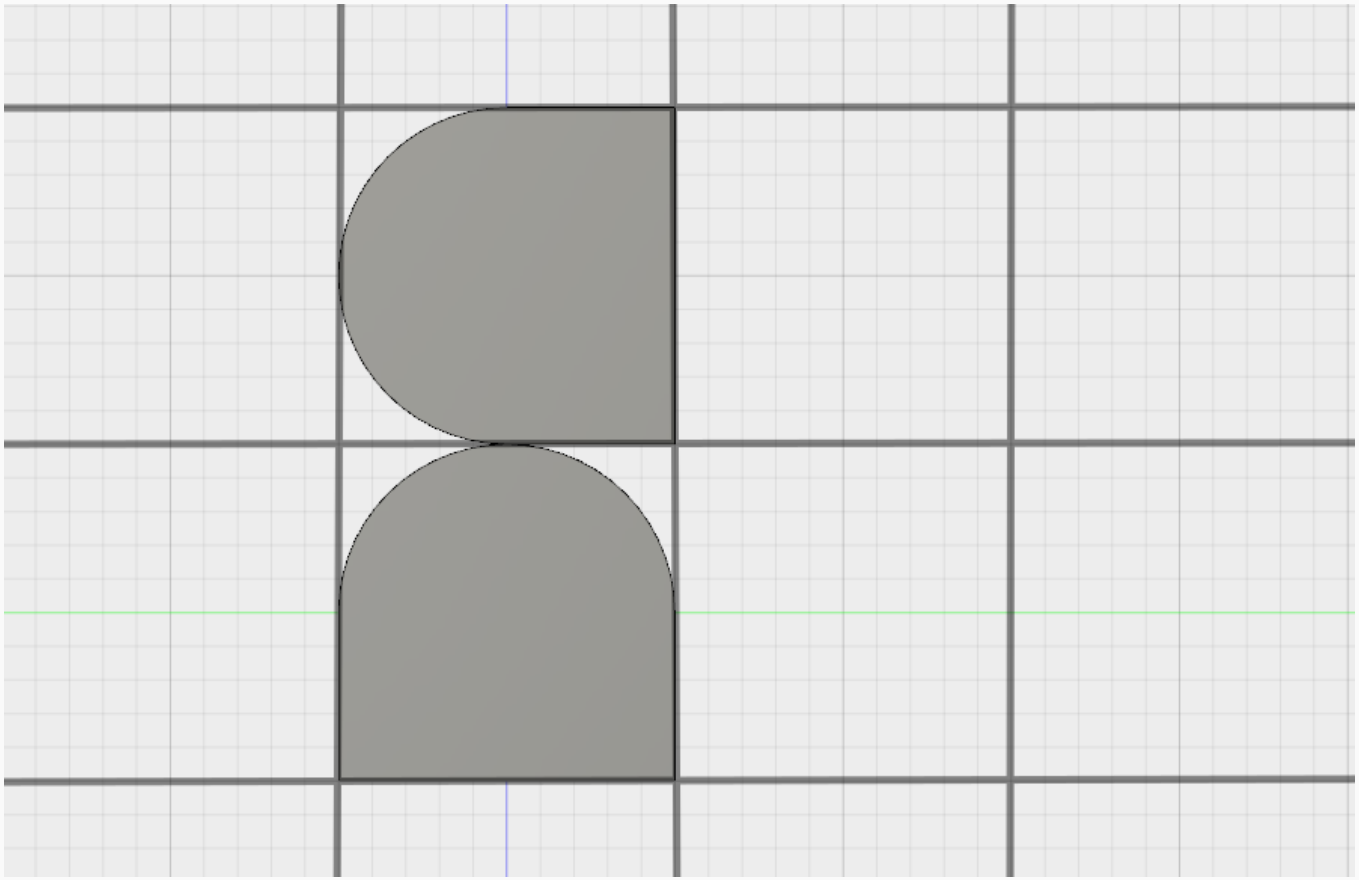

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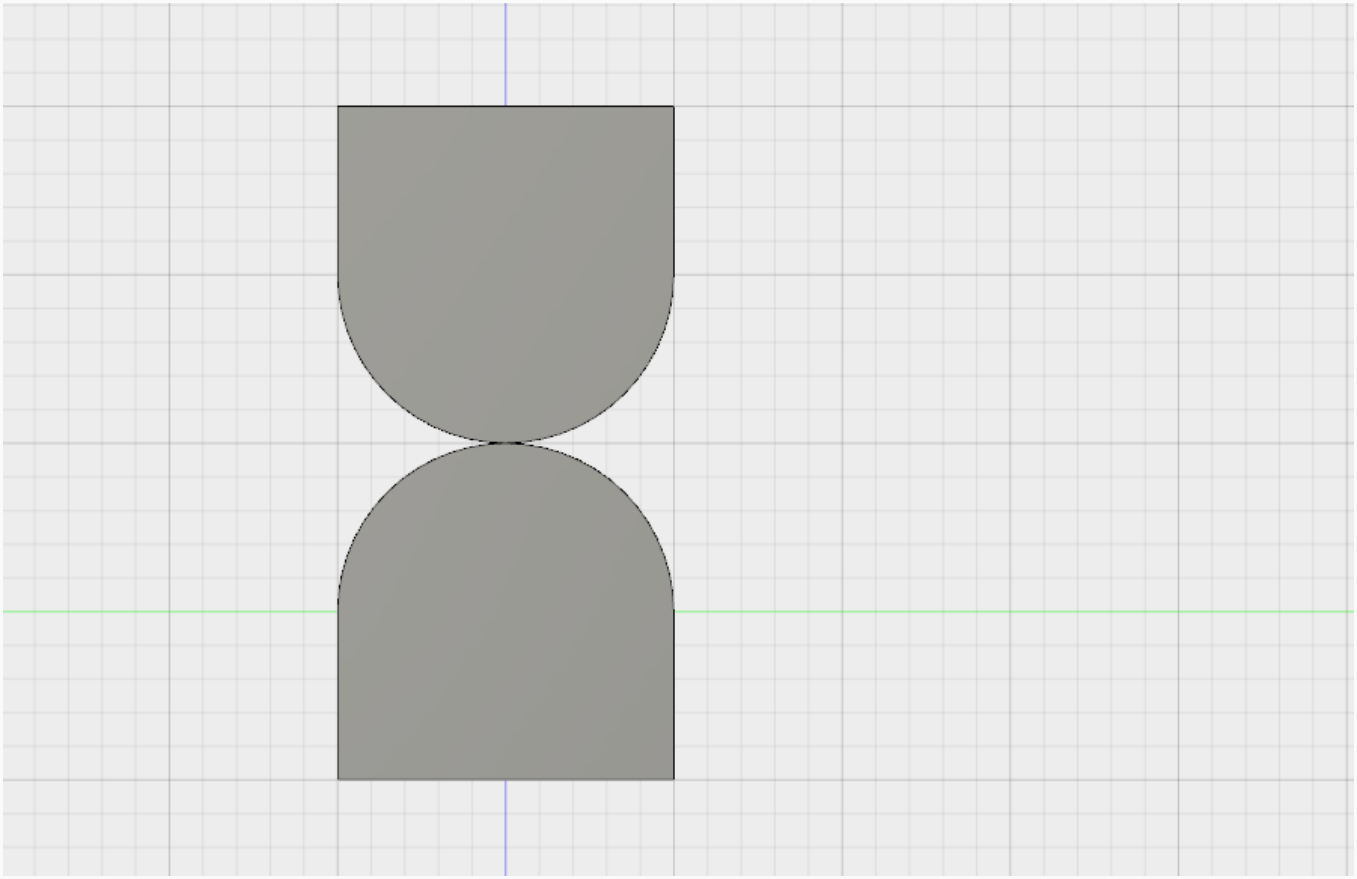
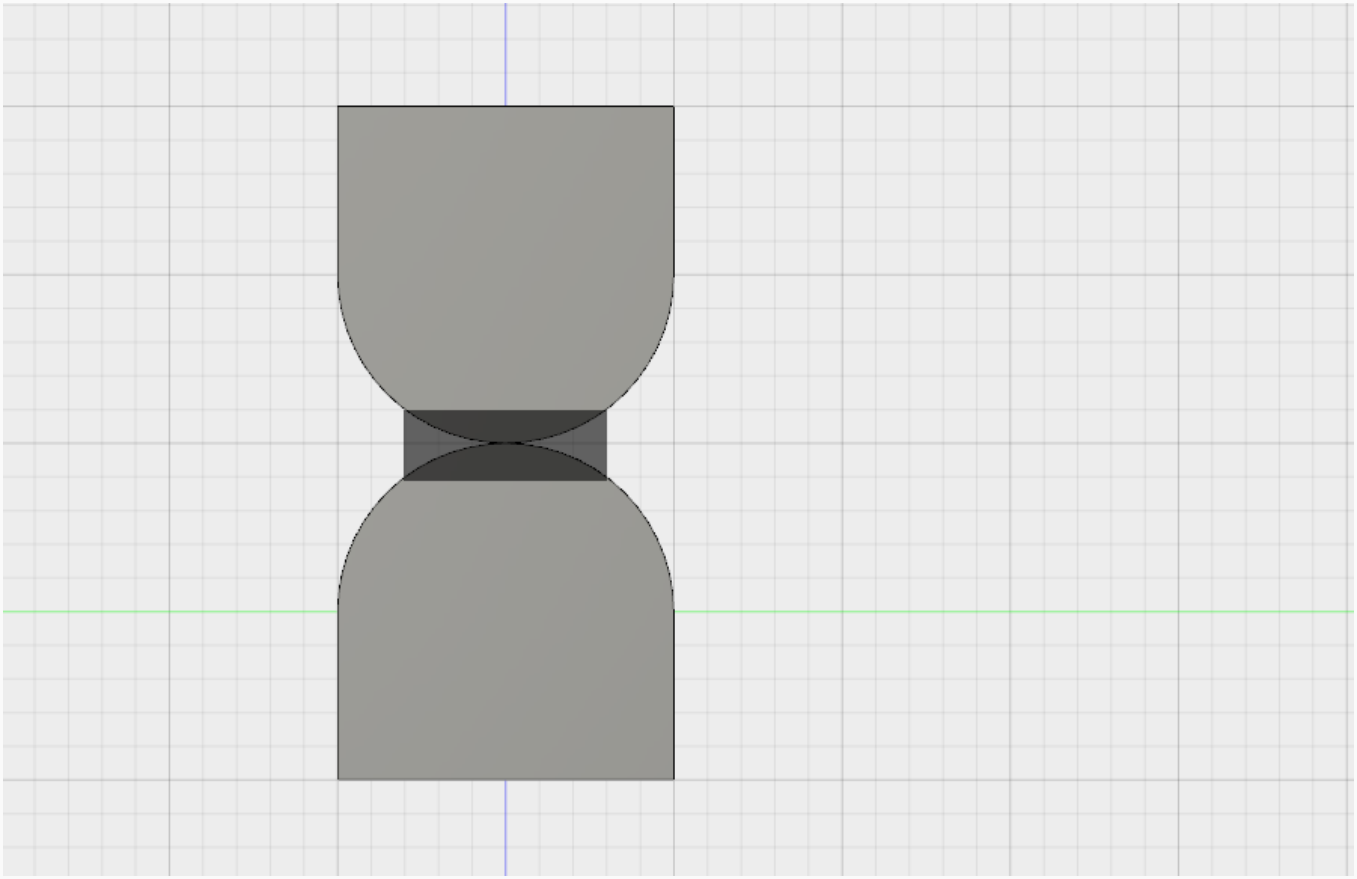


Řešení: robot vepsaný do dvou koulí

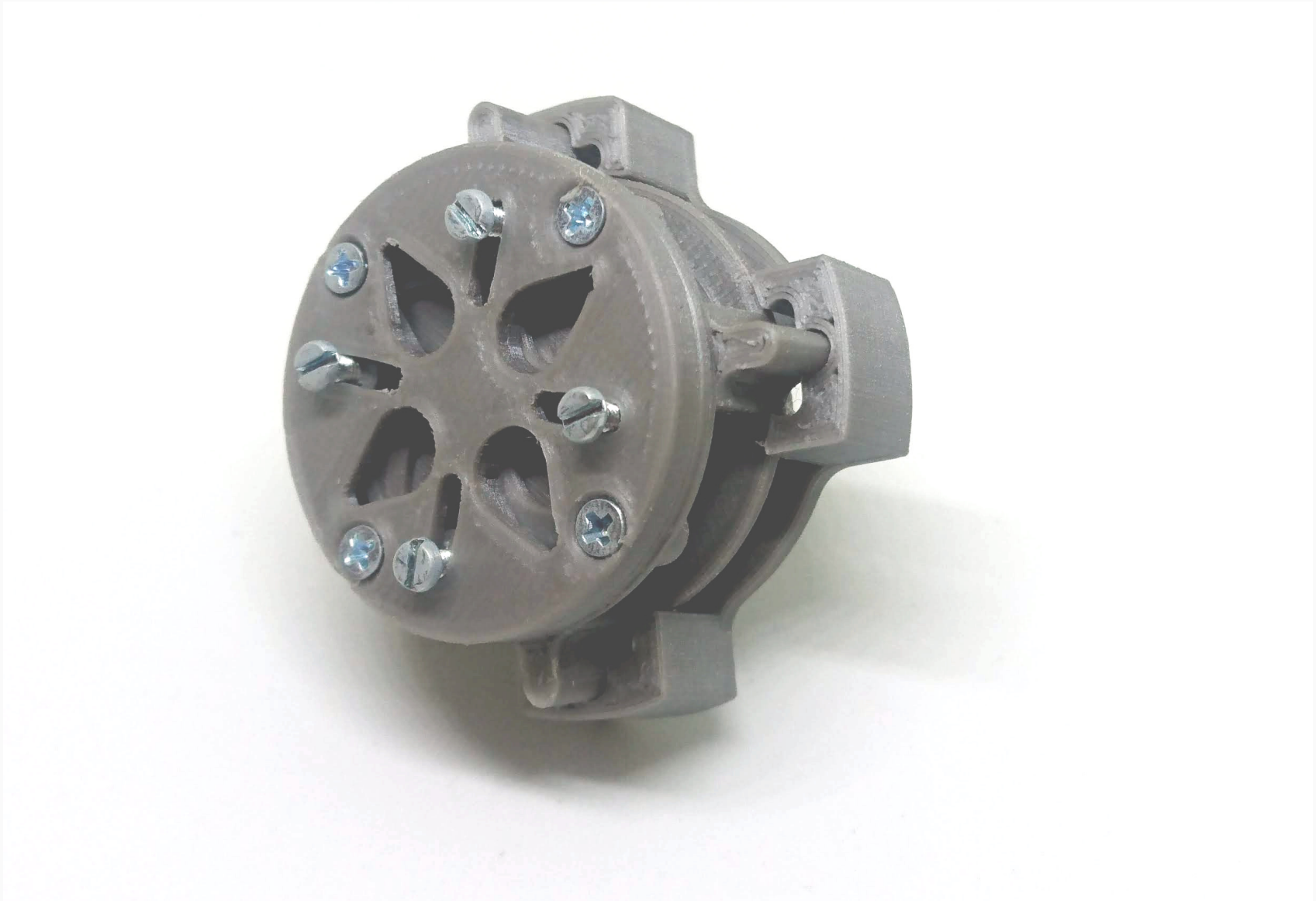
Grid-awareness



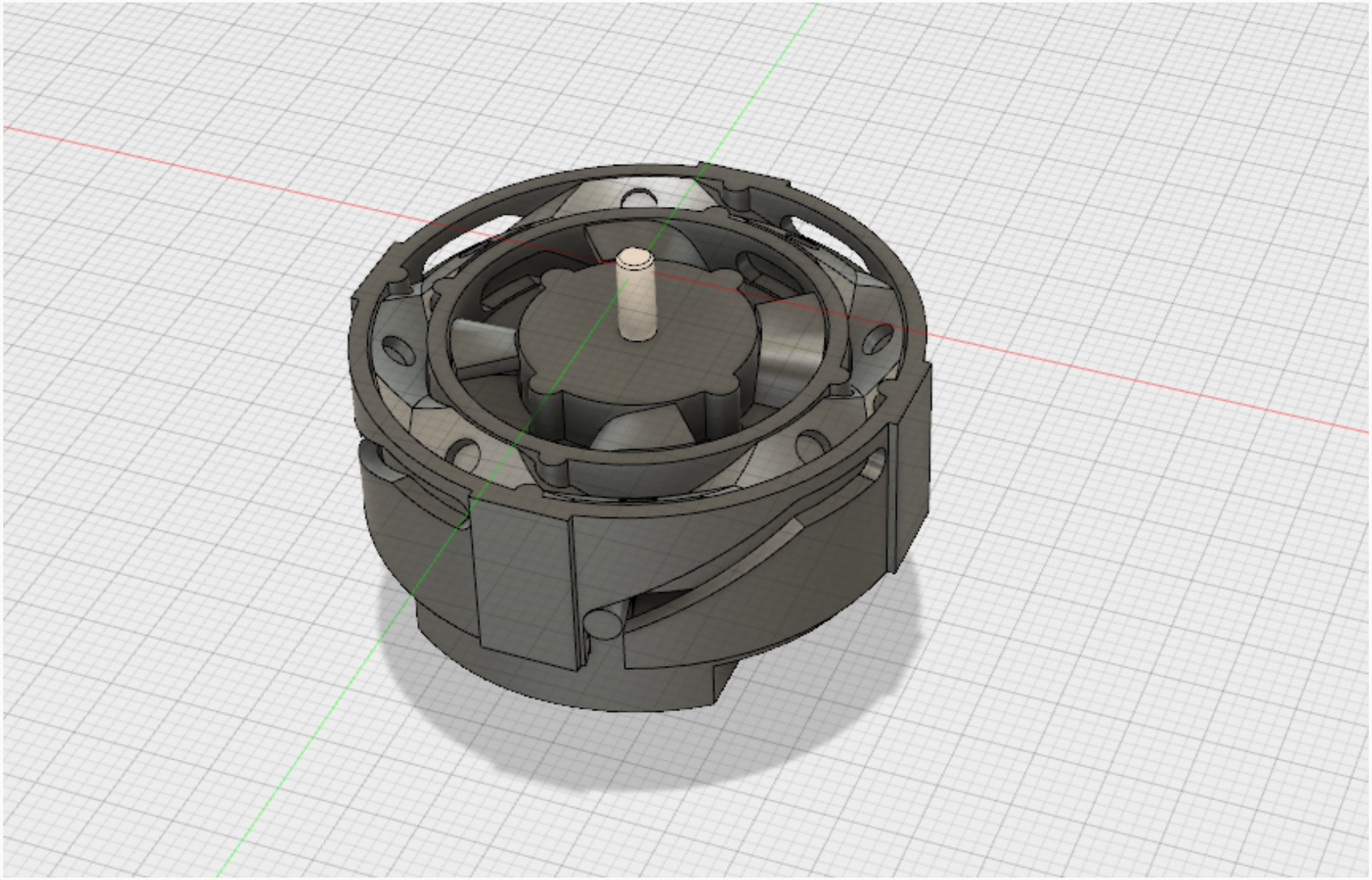
Řešení: robot vepsaný do dvou koulí

Problém: je třeba zamykat na dálku

Háčkový systém 2



Háčkový systém 3



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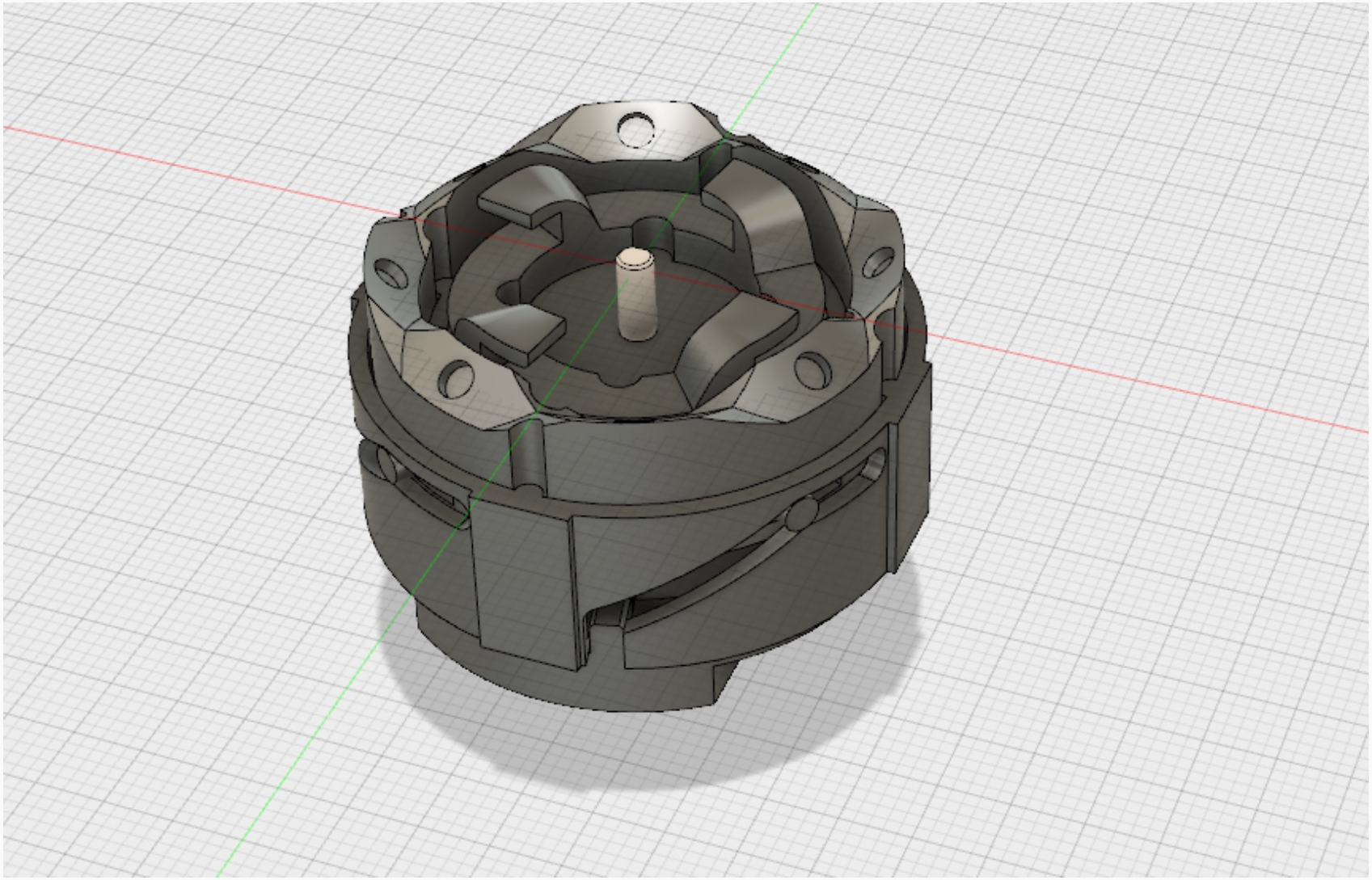

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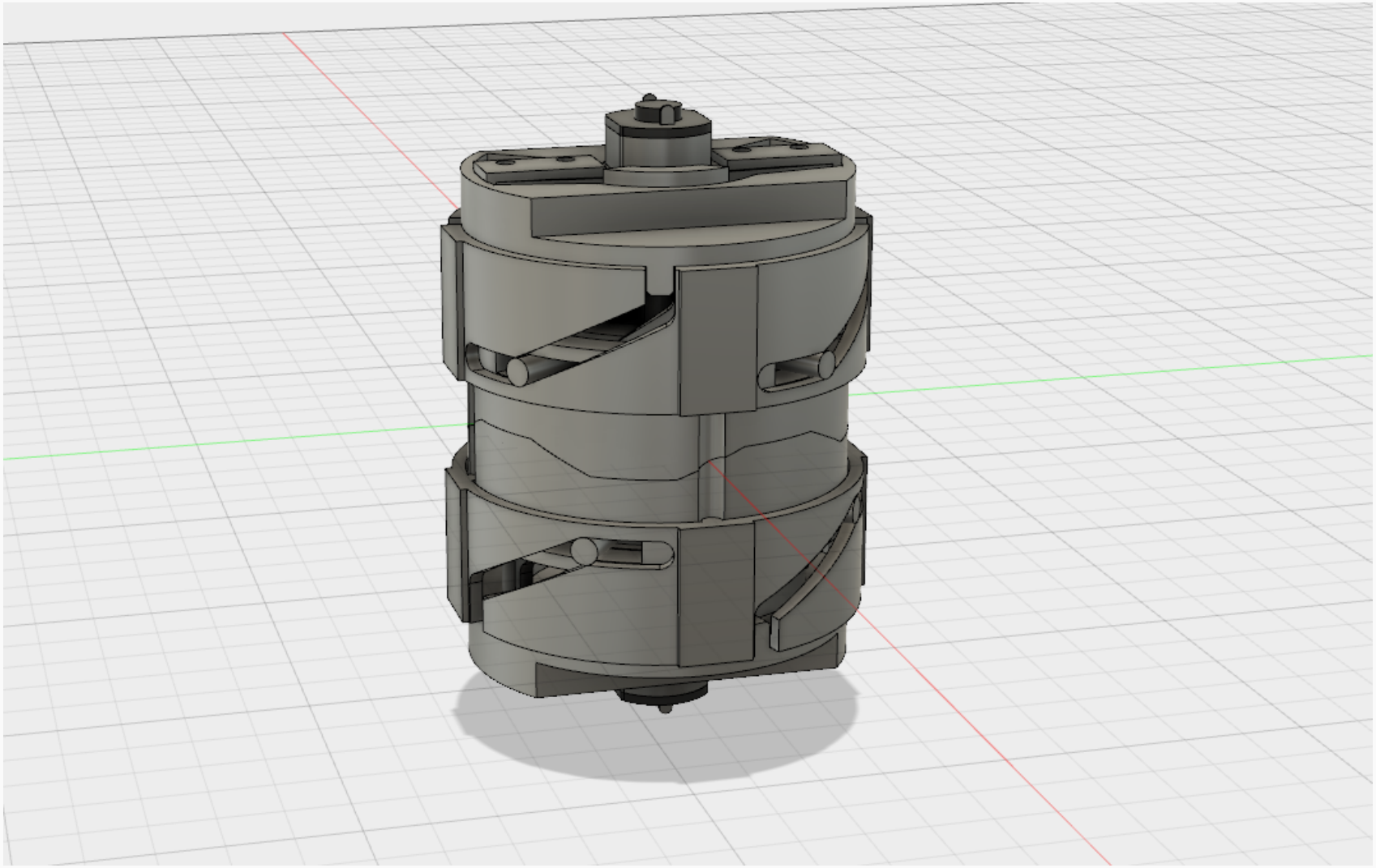

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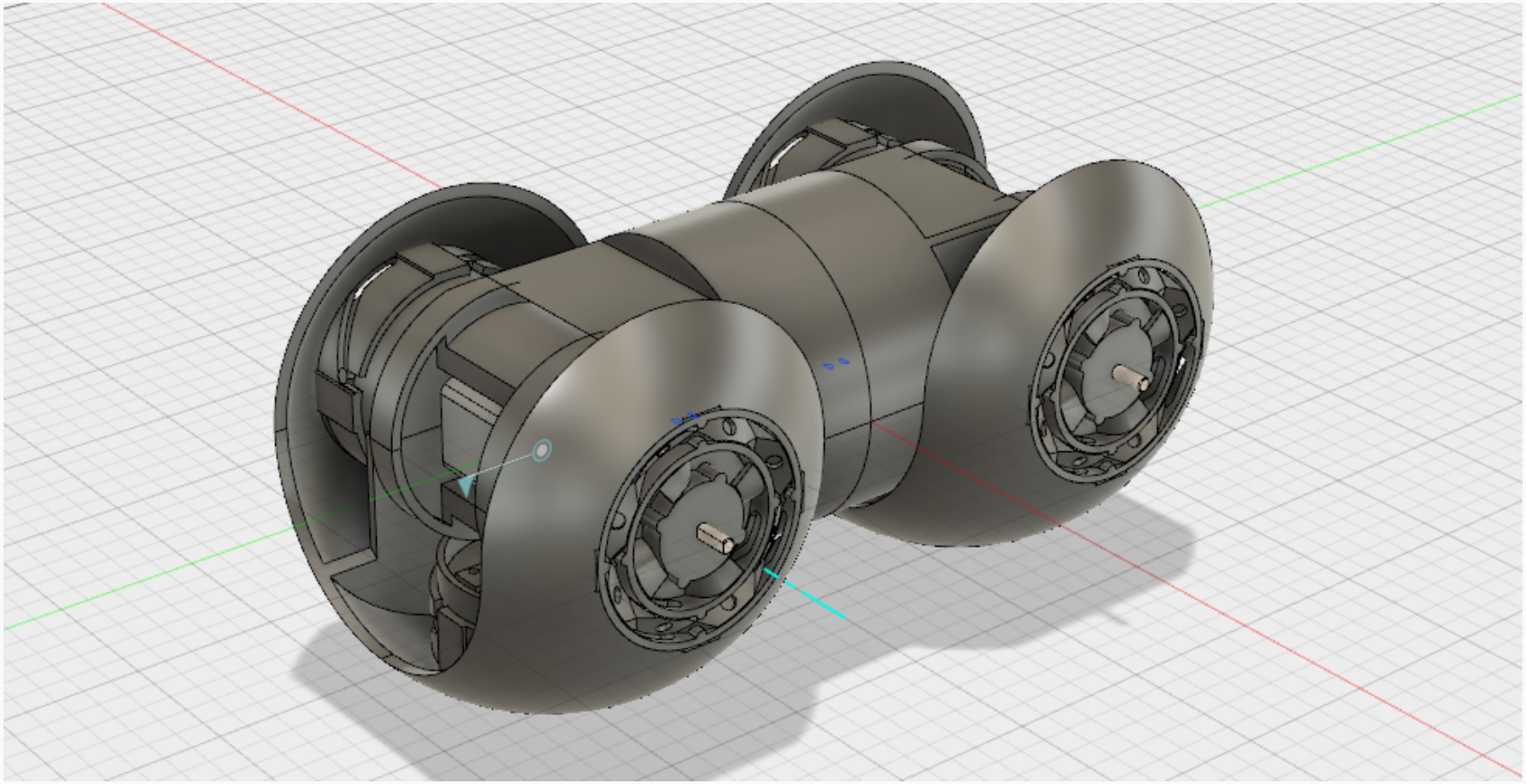
Aktuální stav



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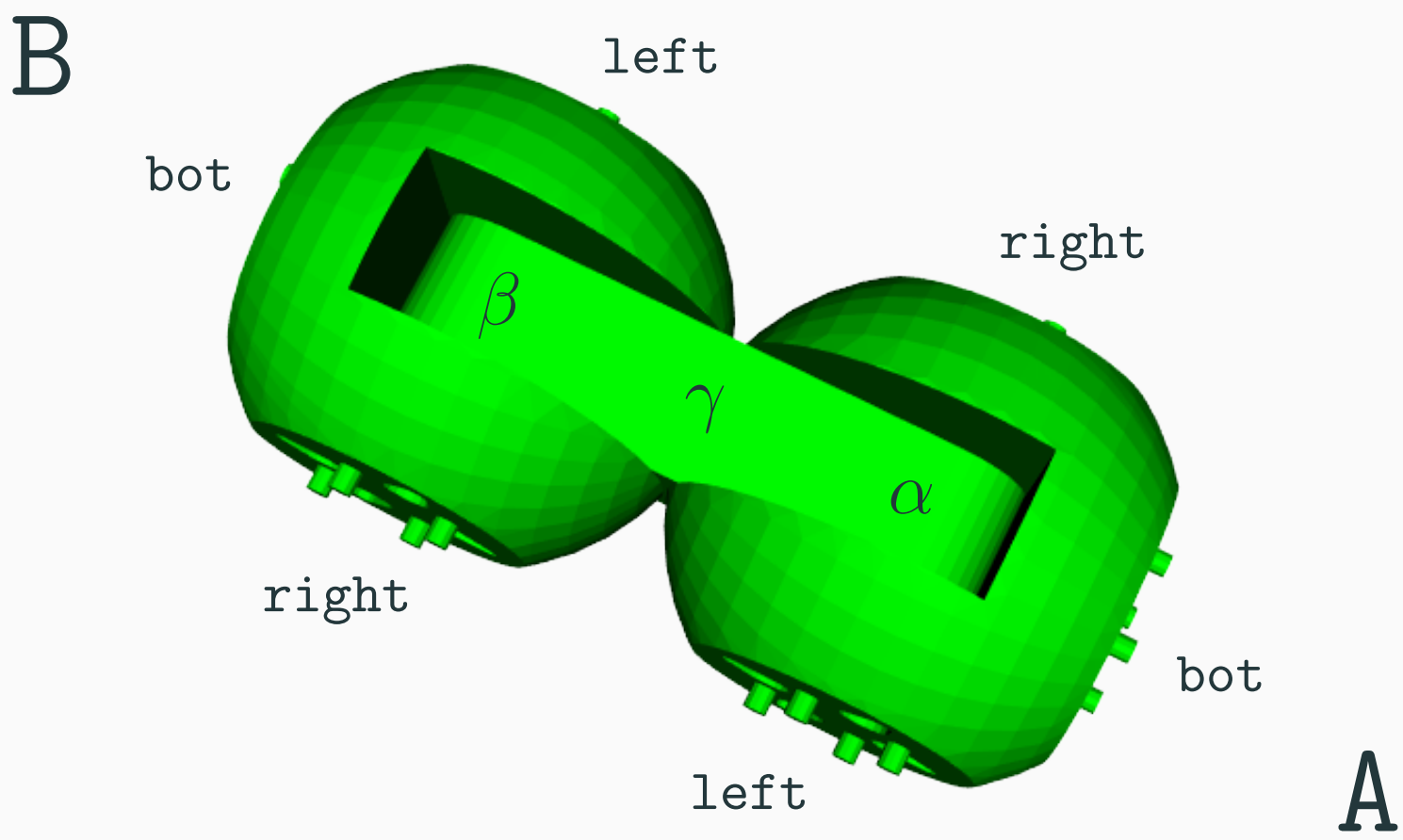
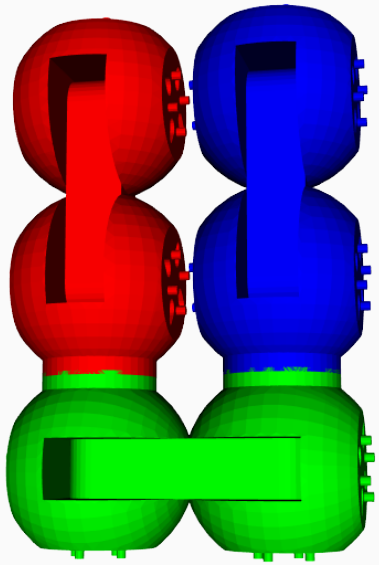
Jsme (snad) pár týdnů od prvních pohybů a vývoj RoFIOS začíná.

O rekonfigurovatelnosti

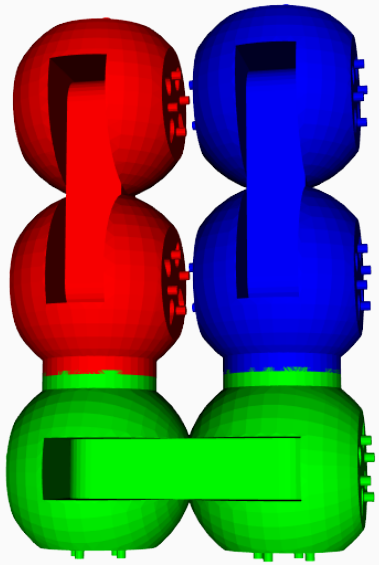
Atribúty jedného rofíka



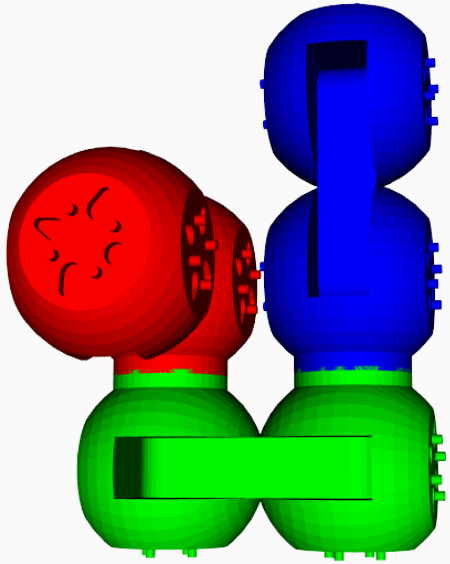
Rekonfigurácia



Rekonfigurácia

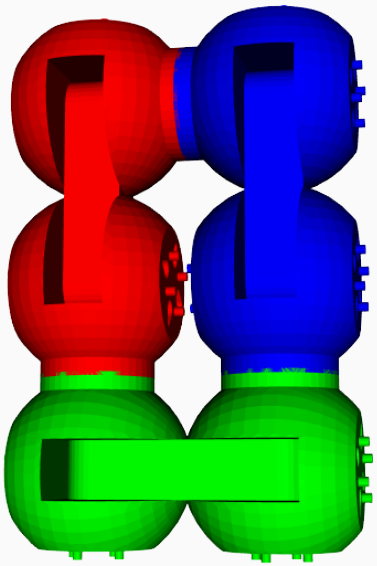


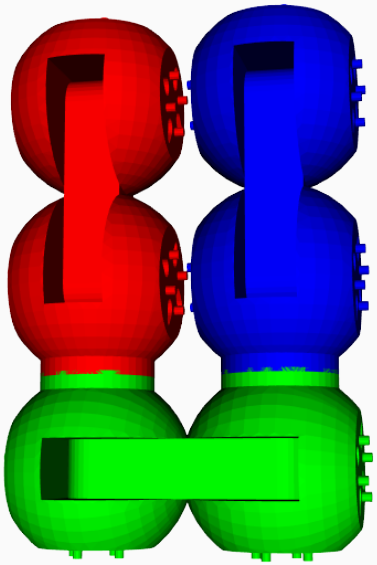
zmena otočení



Rekonfigurácia

zmena spojení





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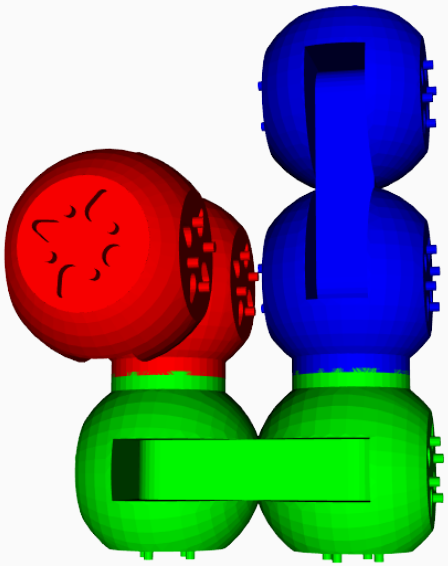

Príklad

Problém: Vyjdi po schodoch.

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Riešenie:

1. Vytvor spojenie na chodenie po schodoch.
2. Vykonaj sekvenciu otočení na vyjdenie jedného schodu.
3. Opakuj, kým nie si navrchu.

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Prejdi zo **spojenia** a otočenia **do iného spojenia** a otočenia.

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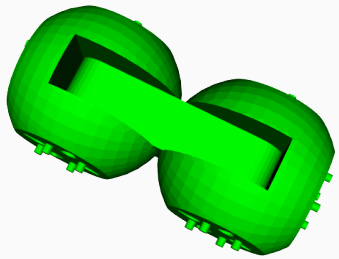
Podproblém 2:
Prejdi z **otočenia do iného otočenia** pri tom istom spojení.

Všetky pohyby jedného rofíka



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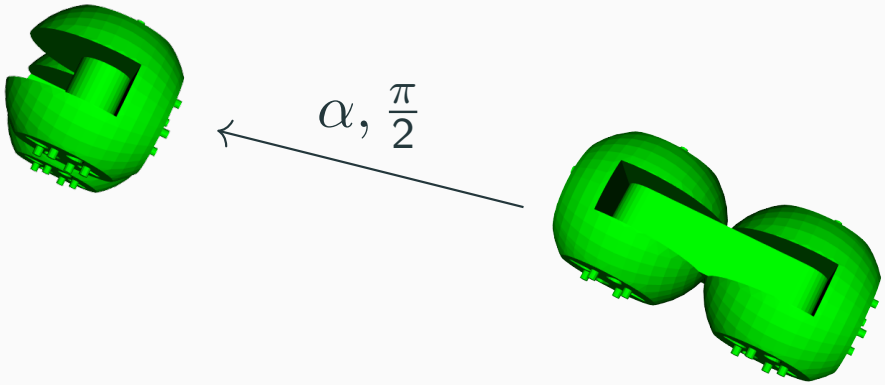

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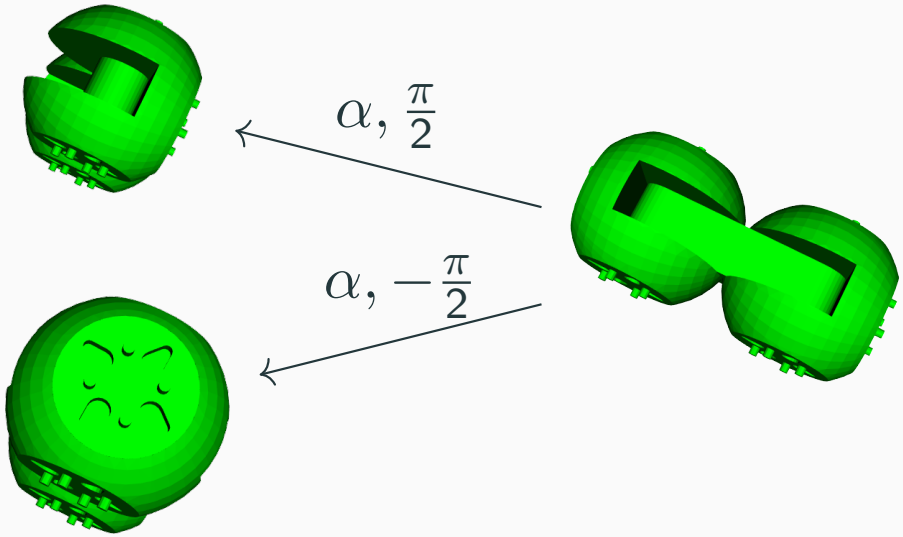

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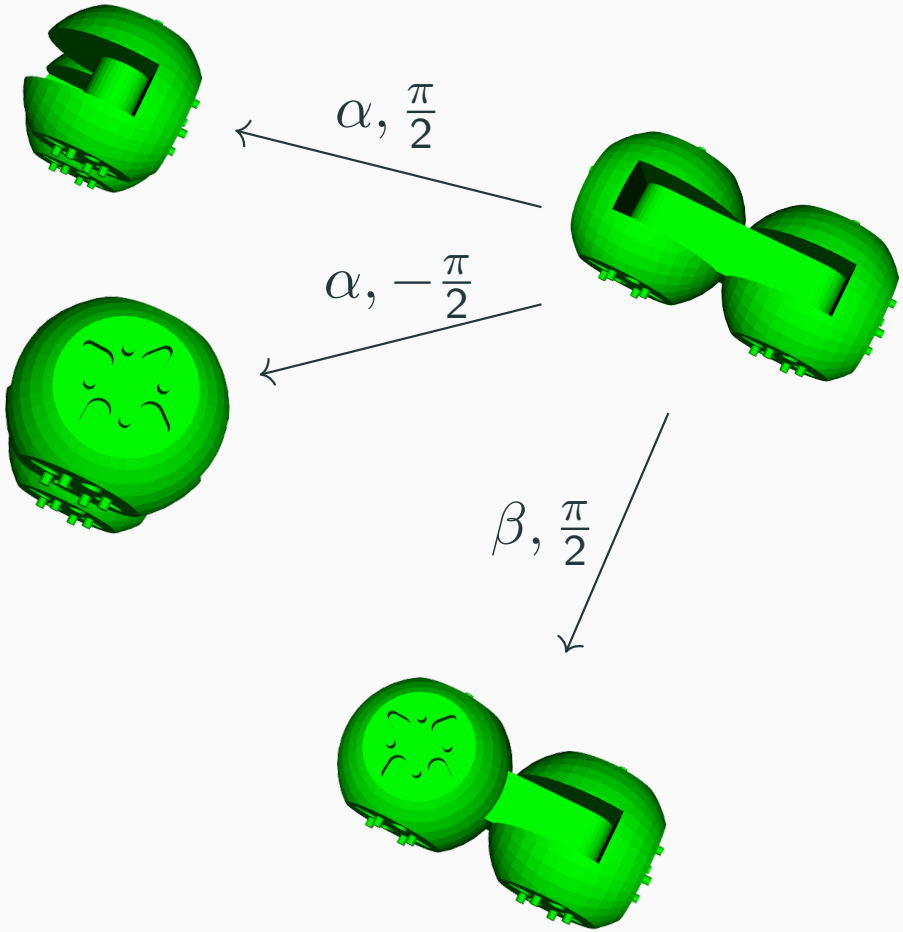

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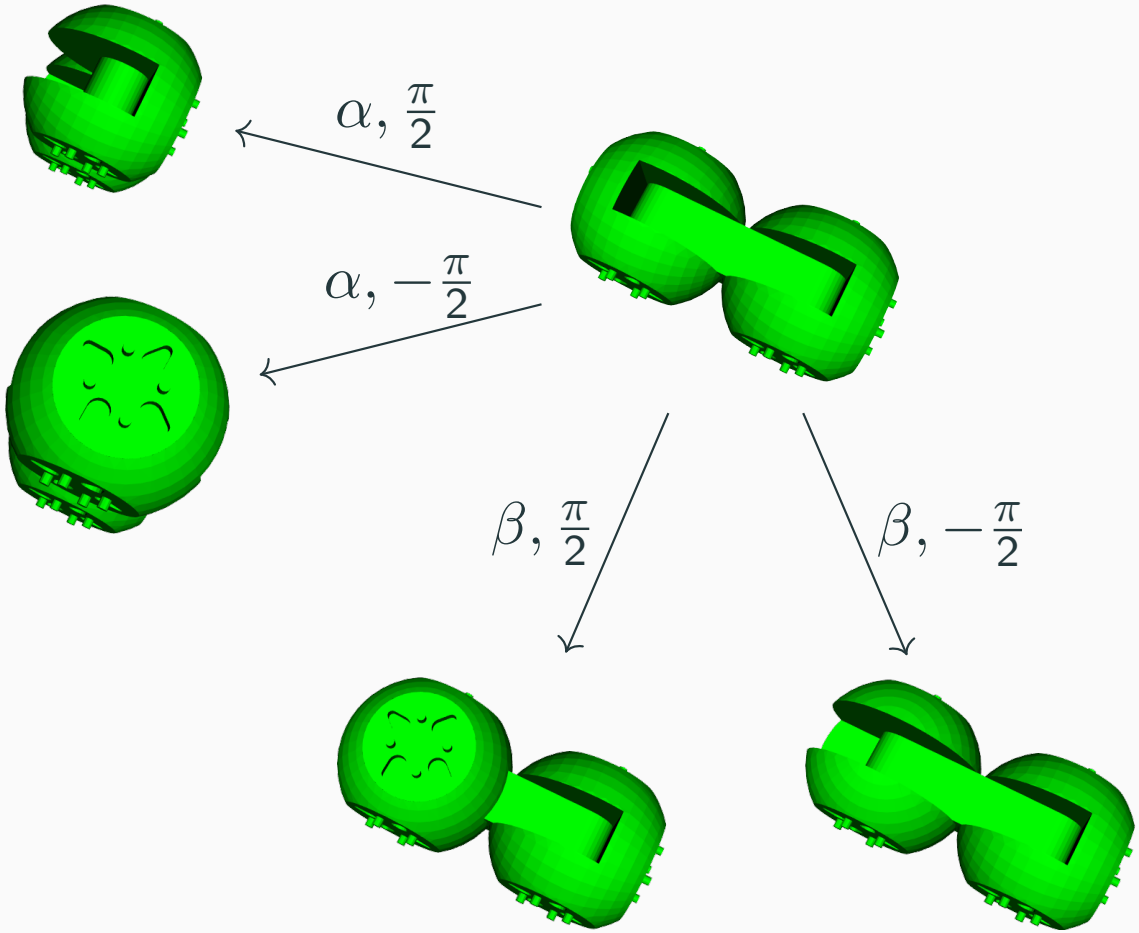

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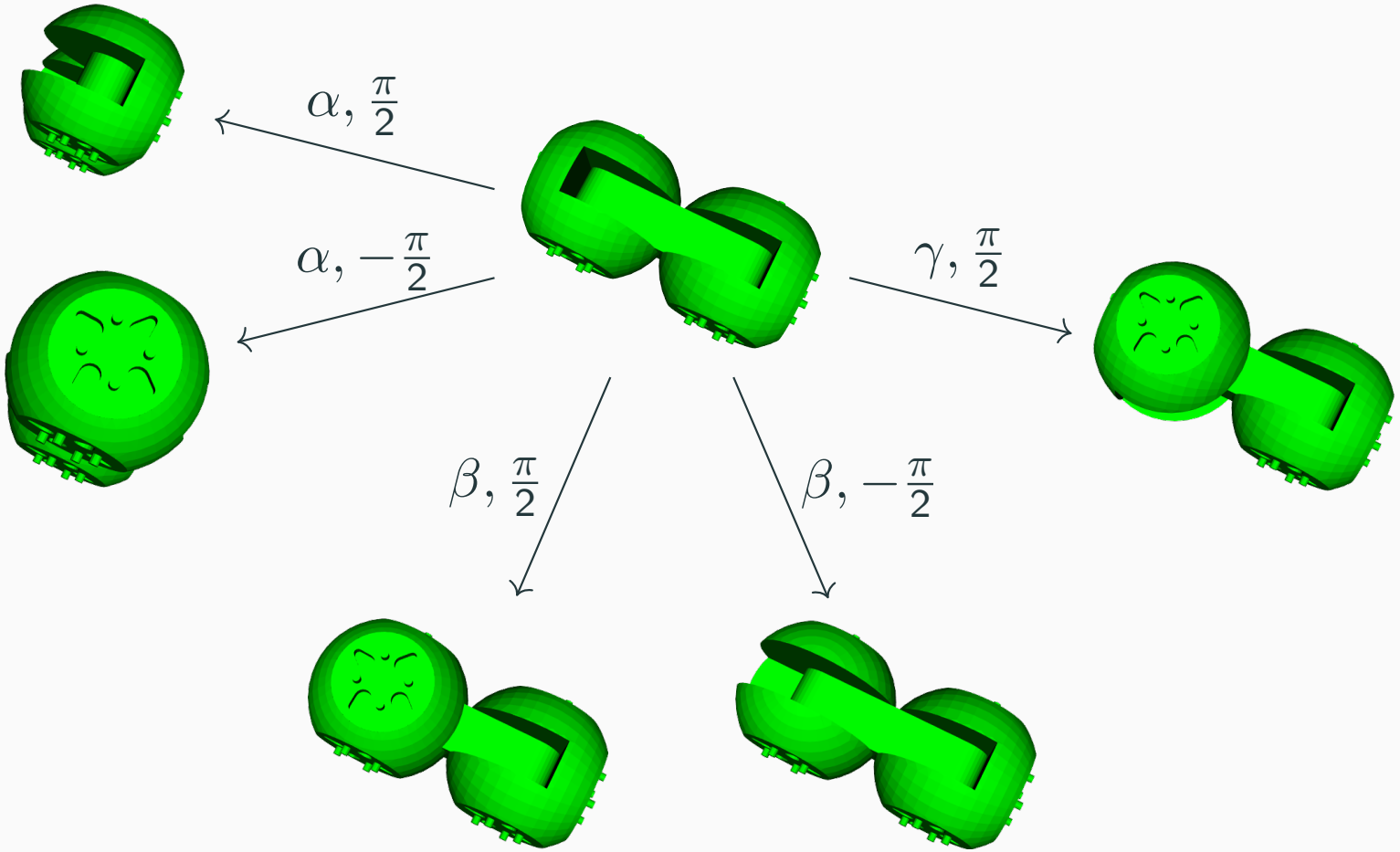

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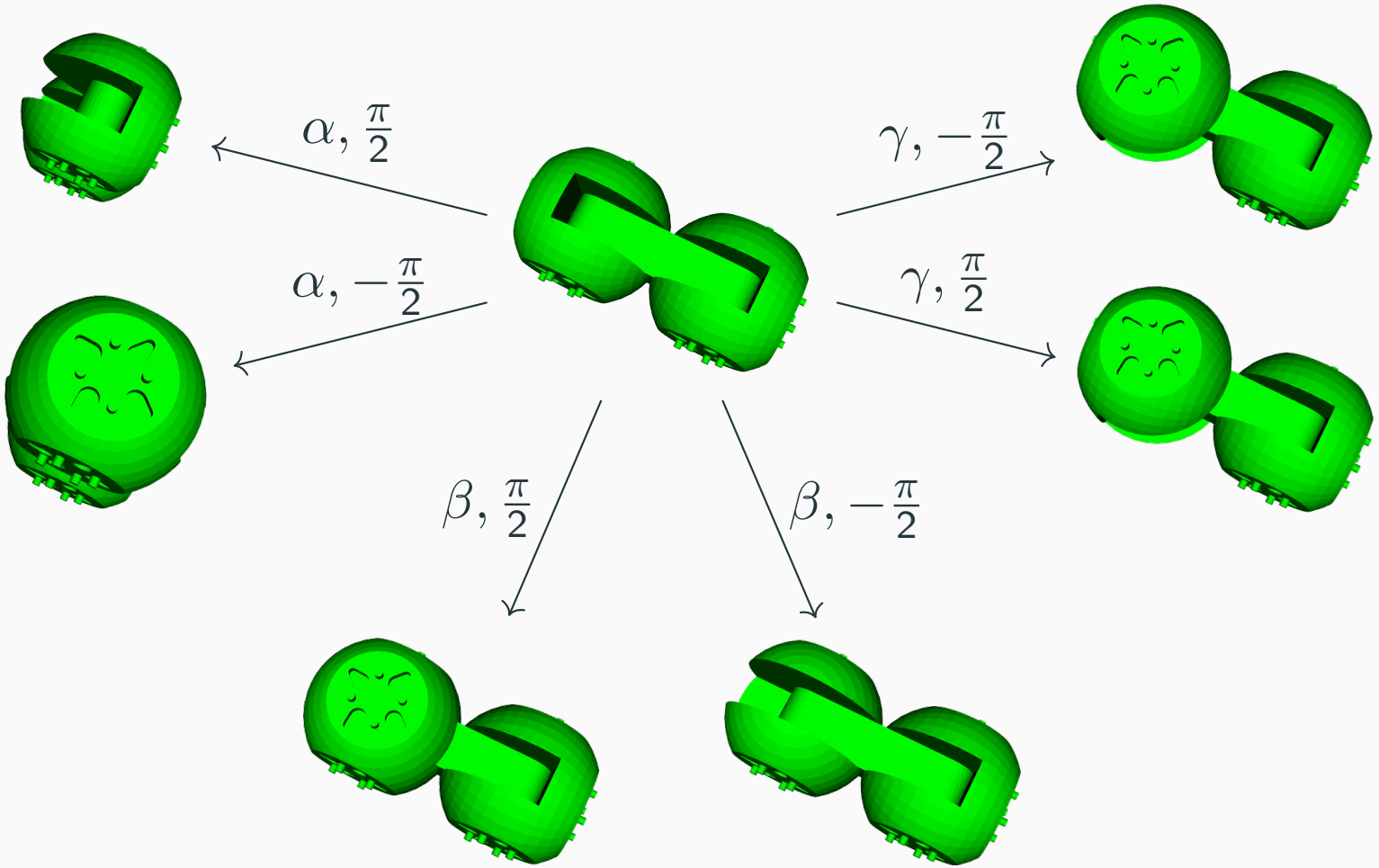
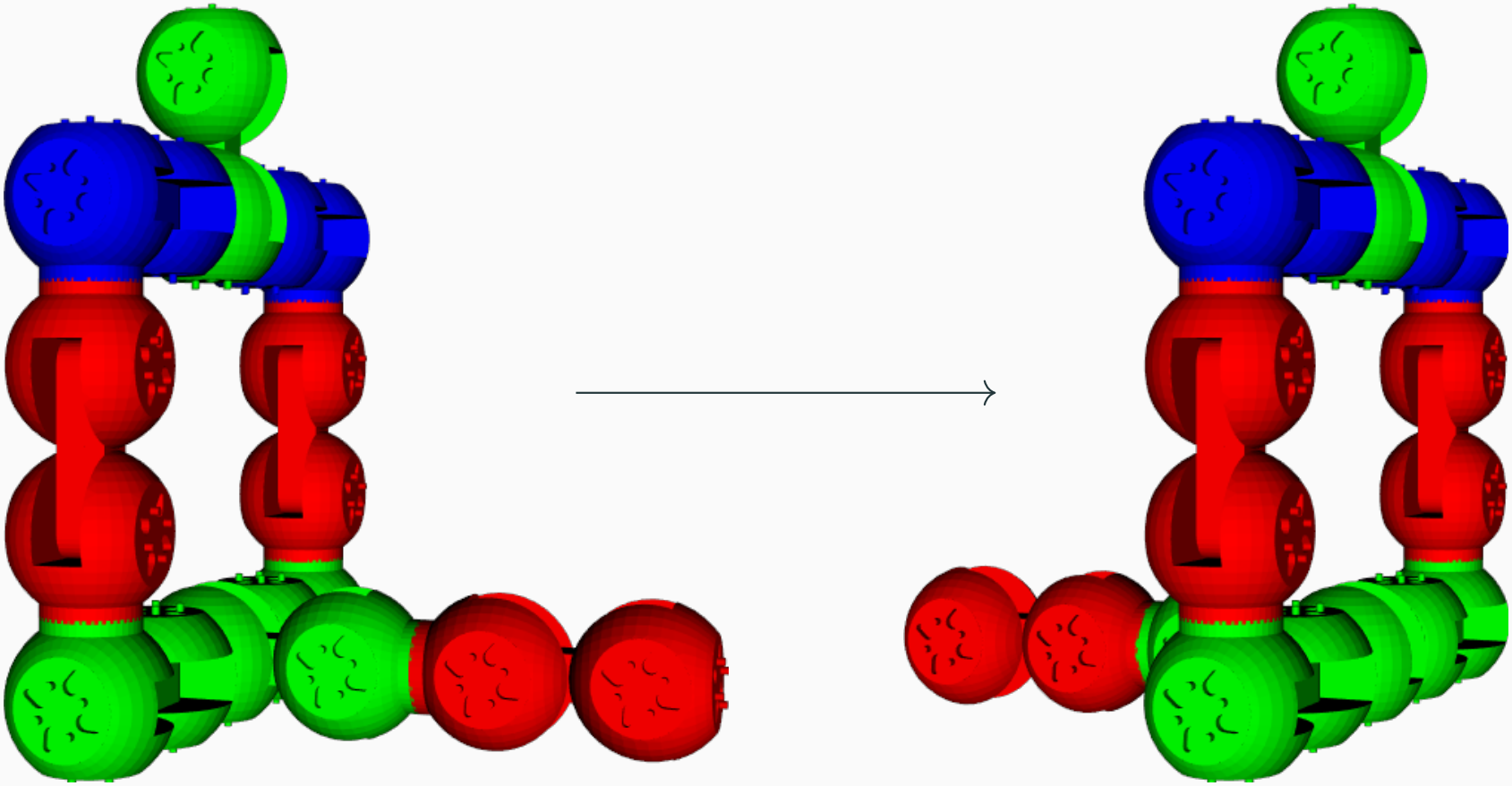


Ukážka rekonfigurácie



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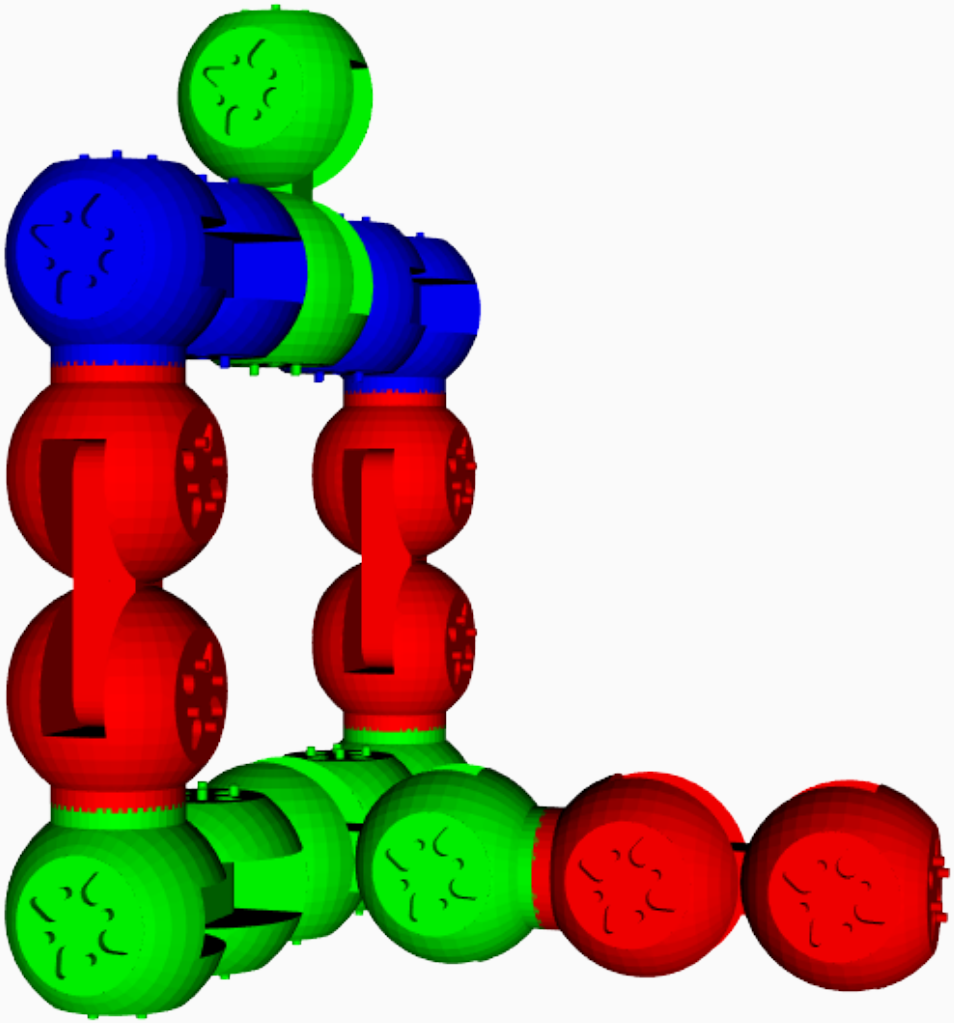

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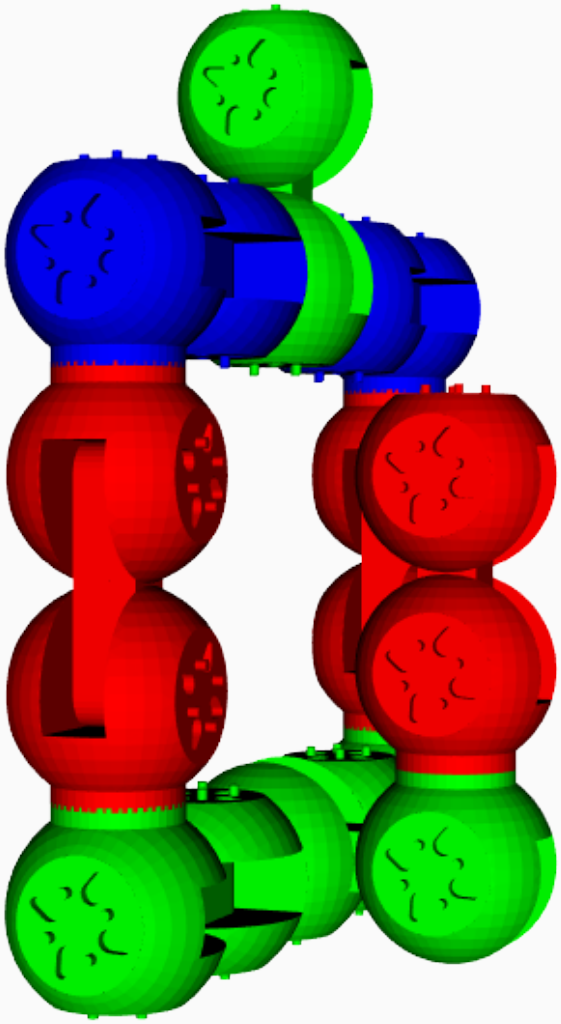

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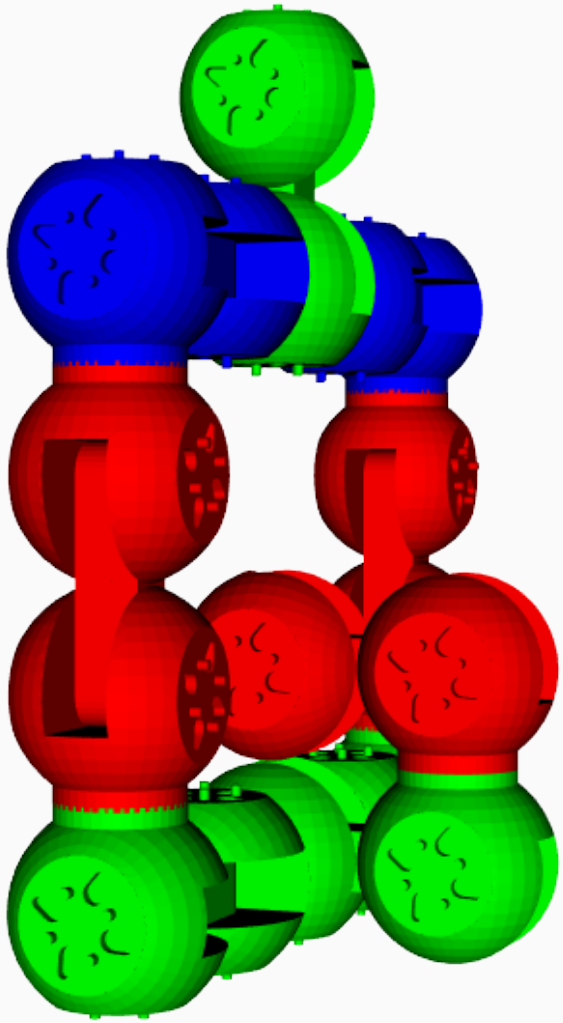

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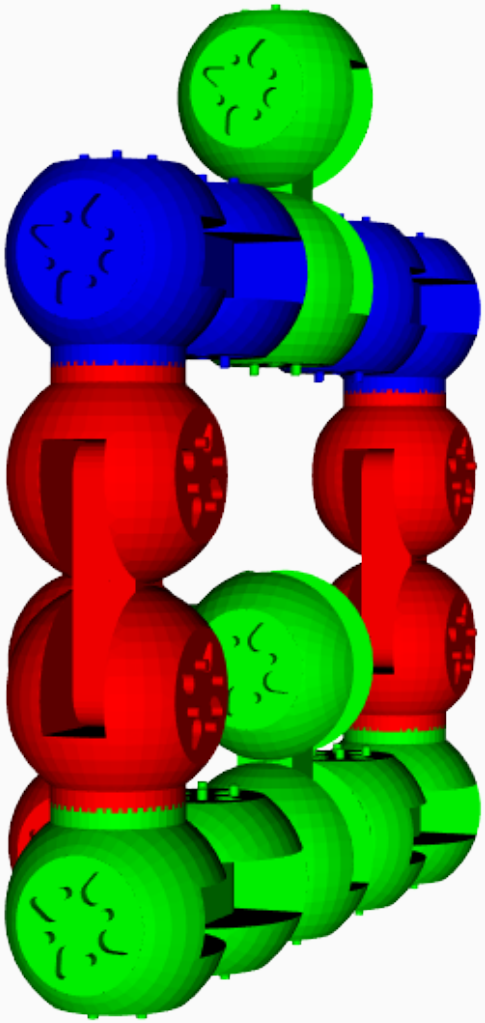

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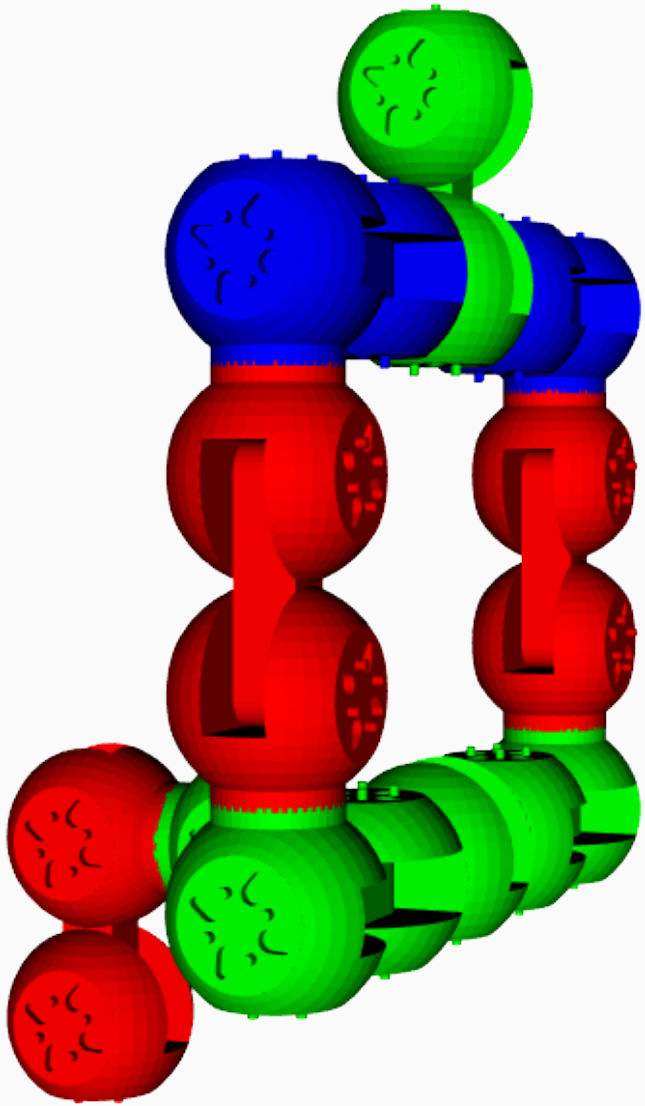
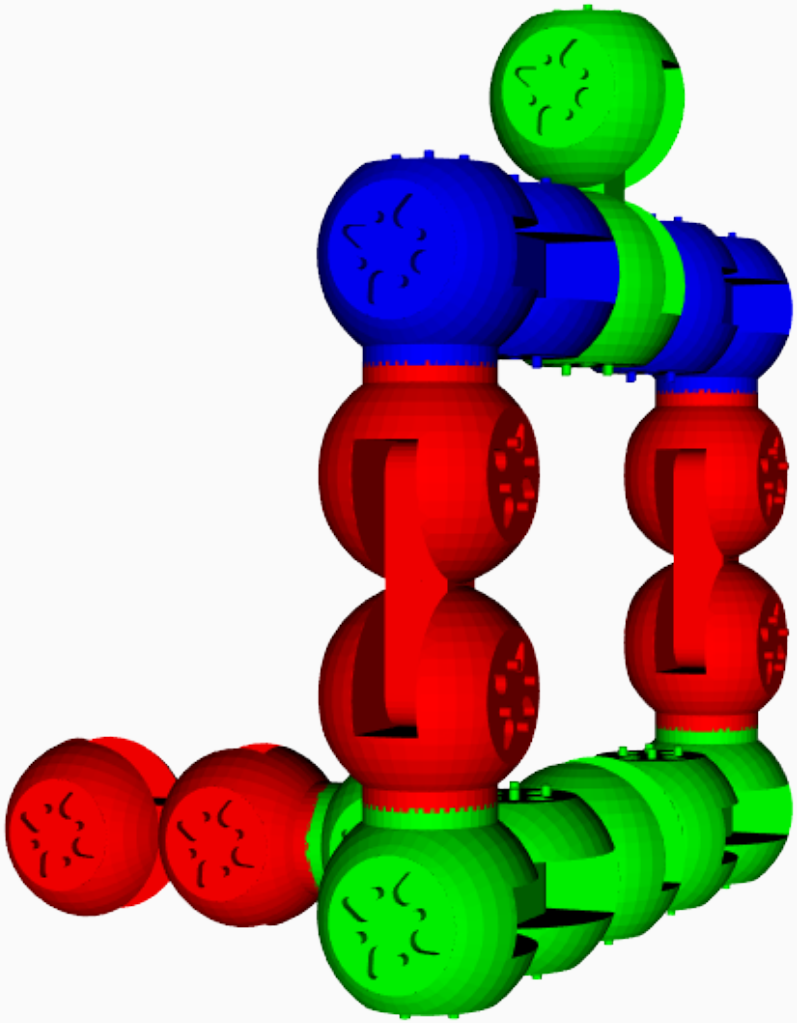


Ukážka rekonfigurácie



Prehľadávanie stavového priestoru

Stav = jedno otočenie

Hrana = pohyb jedného rofíka

Problém = hľadanie najkratšej cesty

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Možné riešenia:

- BFS (duh...)
- A* (rôzne ohodnotenia stavov)
- Rapidly-exploring Random Tree
- ...

Krátkodobé ciele

- otestovať možné algoritmy

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- vyskúšať algoritmy v distribuovanej podobe

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- otestovať možné algoritmy
- vyskúšať algoritmy v distribuovanej podobe
- implementovať algoritmy na robotoch

Závěr

Plány do bucoucna

Na čem pracujeme:

- Honza jde od HW k RoFIOS
- Viki jde od algorimické vrstvy k RoFIOS
- na ostatních částech zatím nikdo nepracuje

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