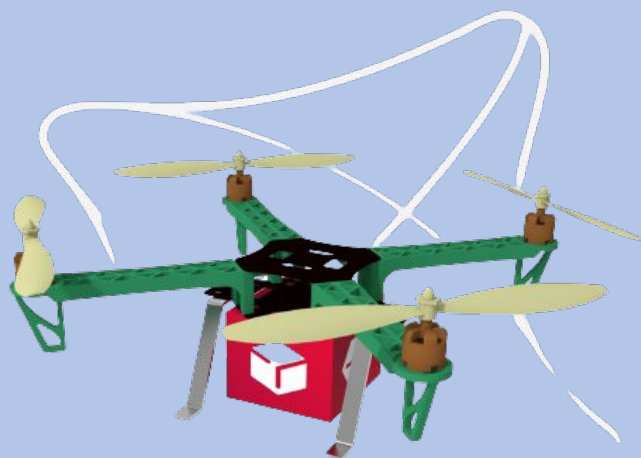


Možnosti využitia strojového učenia v procese konštruovania

Ing. BSc. Patrik Kováčik

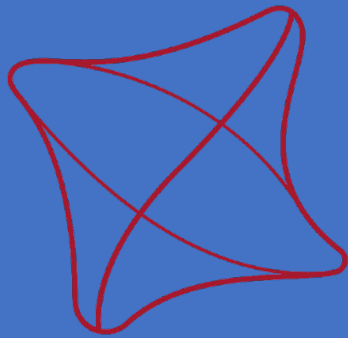
Ing. Jozef Jenis



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Úvod



Dizertačná práca

Možnosti využitia strojového učenia v procese konštruovania

Katedra Konštruovania a Časti strojov (KKČS)

- Podkladom pre ďalší výskum v oblasti **3D grafiky, modelovania a výpočtov v strojnom konštruovaní.**
- V mechanickom konštruovaní sa vyskytuje **veľmi zriedka**
- Nový spôsob aplikácie a vzdelania metodiky umelej inteligencie

Ing. Jozef Jenis



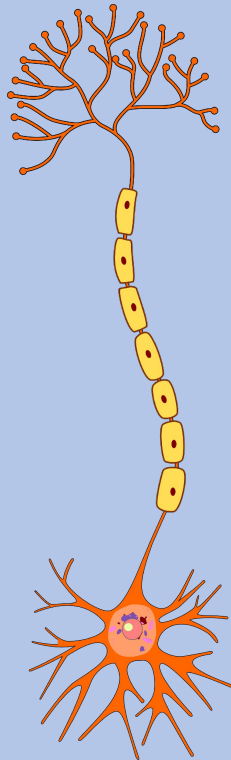
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Engineering



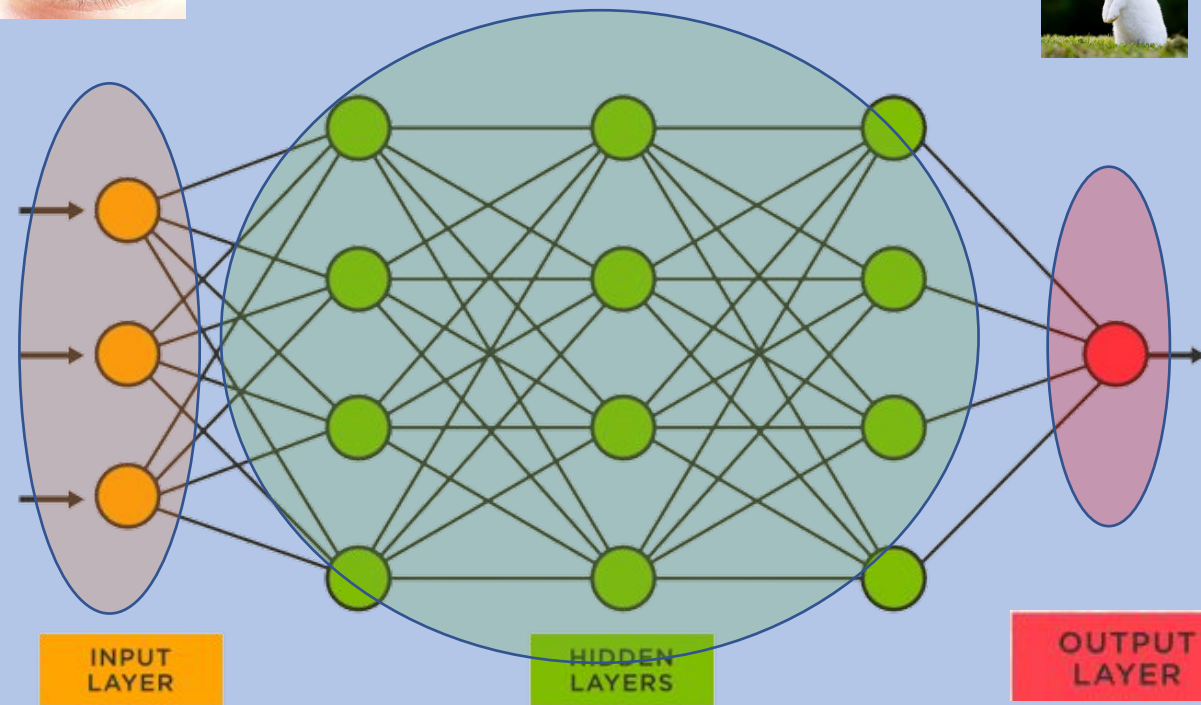
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Čo je to neuronová sieť?

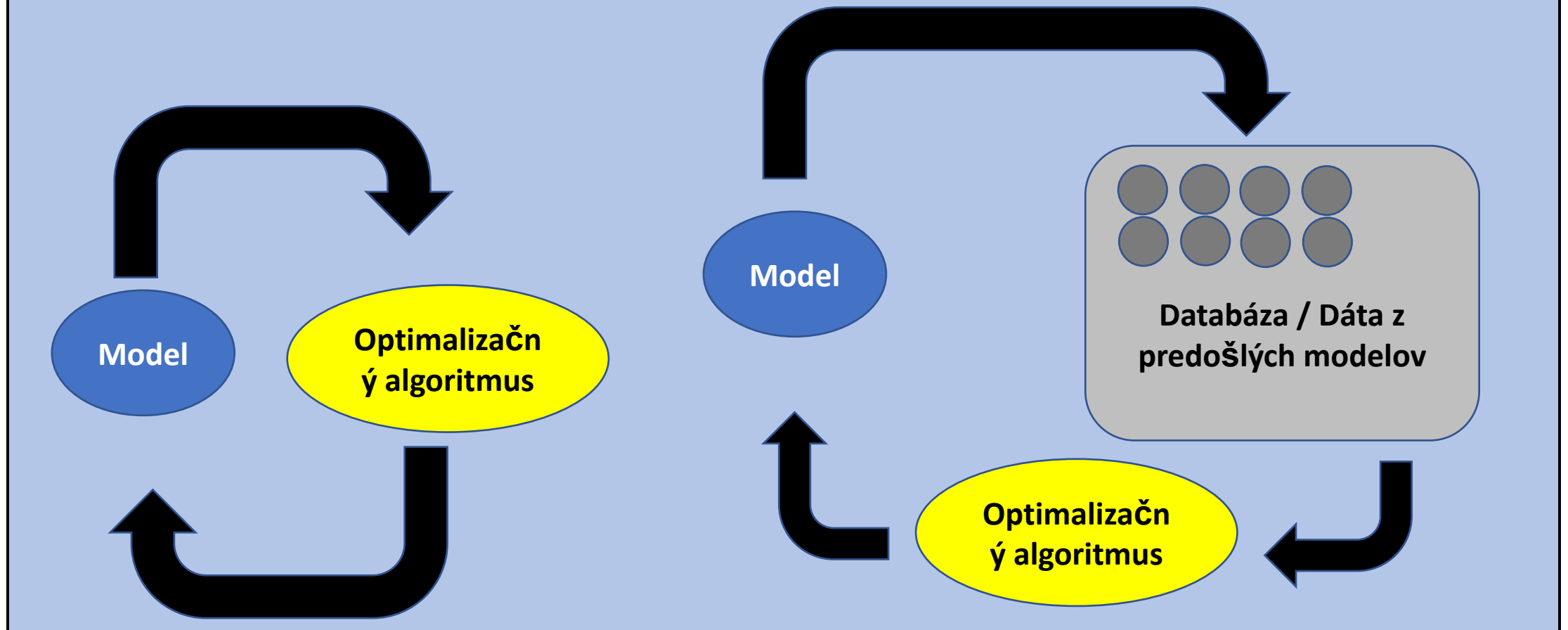
Biologický Neurón

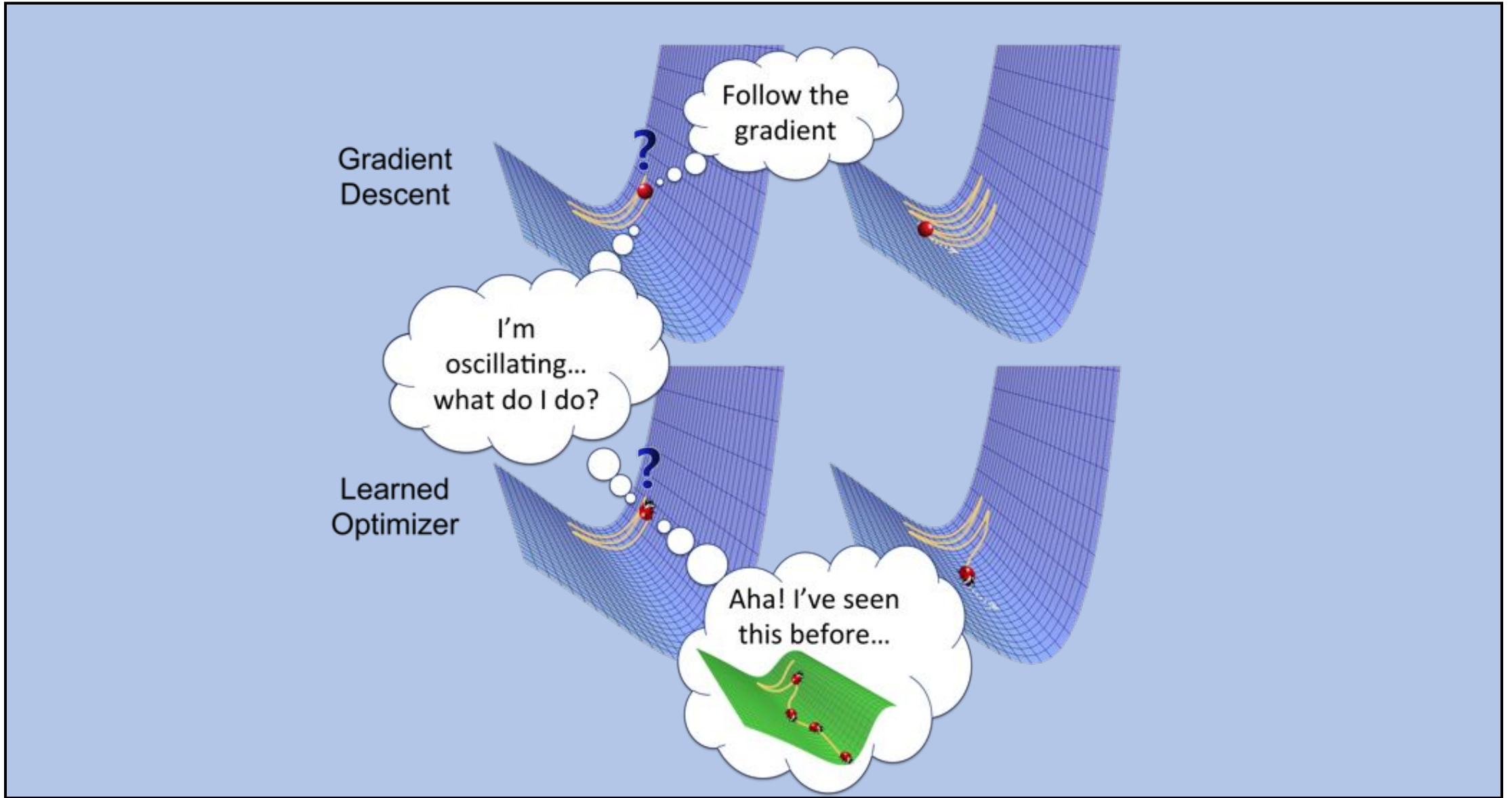


Neuronová sieť

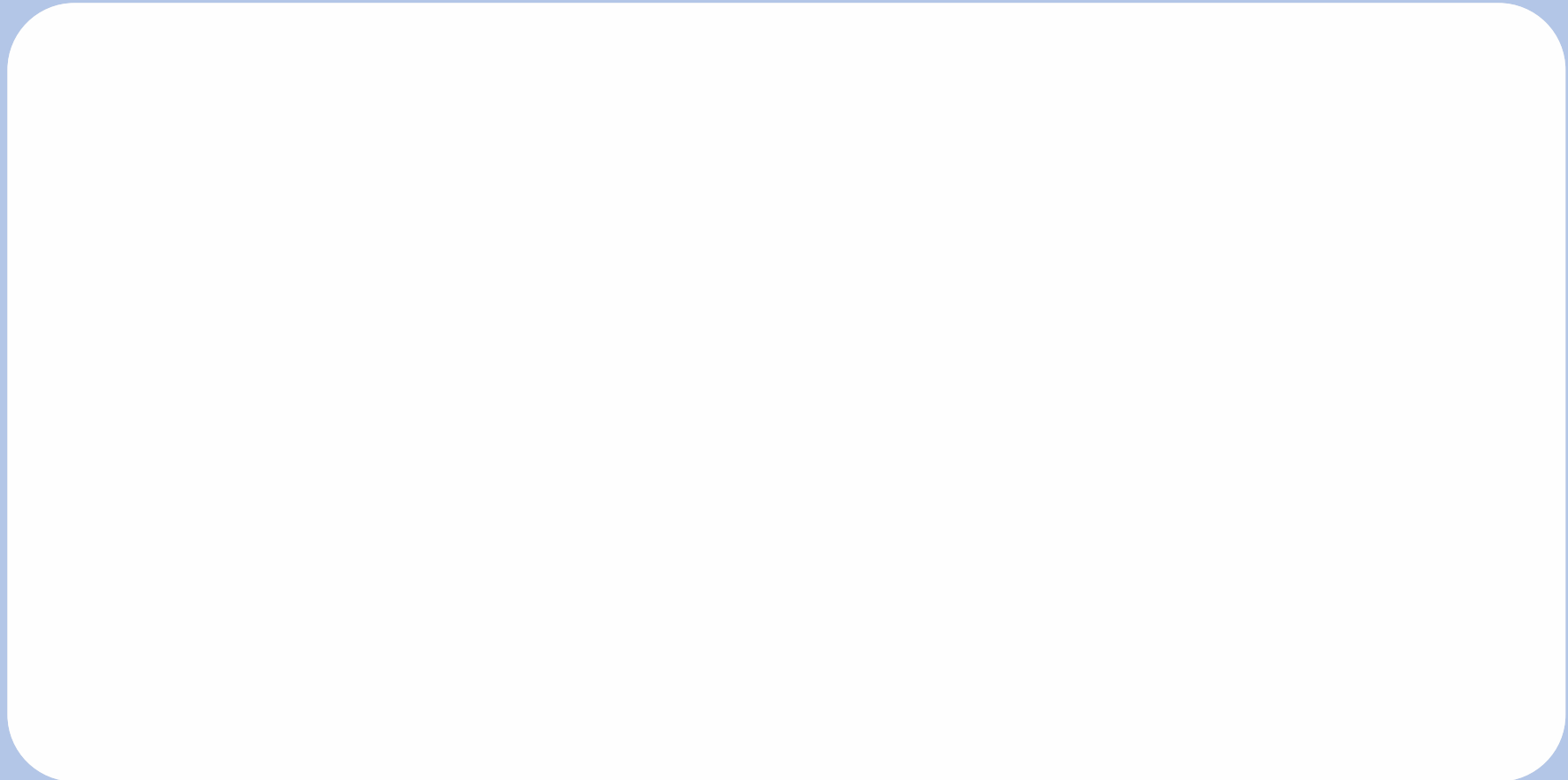


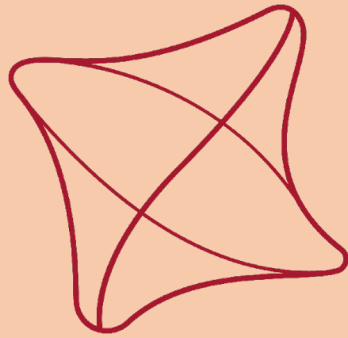
Klasická vs. neuronová optimalizácia





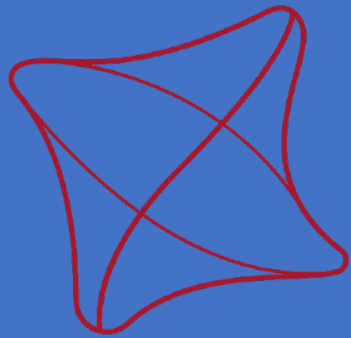
Particle Swarm Optimization (PSO)





Neuronová optimalizácia (machine learning)
dokáže využiť **predošlé dáta podobných
modelov** na zlepšenie a zrýchlenie optimalizácie





Aplikácie IA v strojárstve



„Klasické príklady“

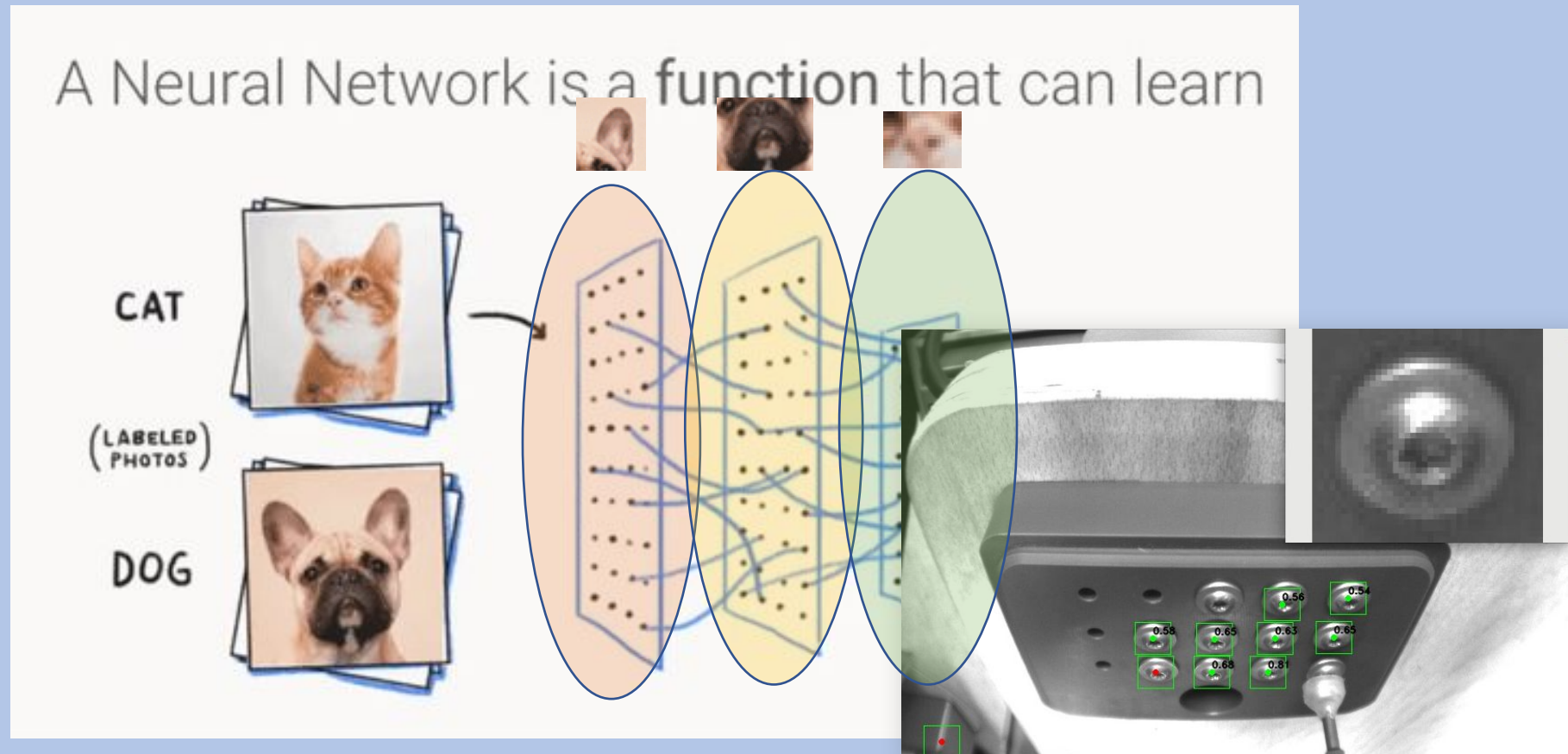
7

784

not your own
we're getting understood
maybe get in. In some
case & help. Derfust,
the more ppl trust
not pl trust. but
I don't know a.
Derfust, I can
I but I never

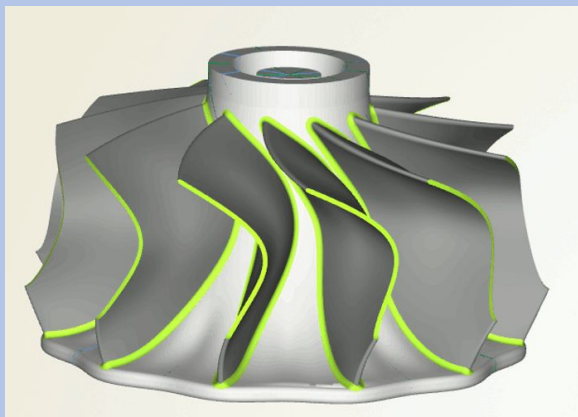


„Klasické príklady strojového učenia“

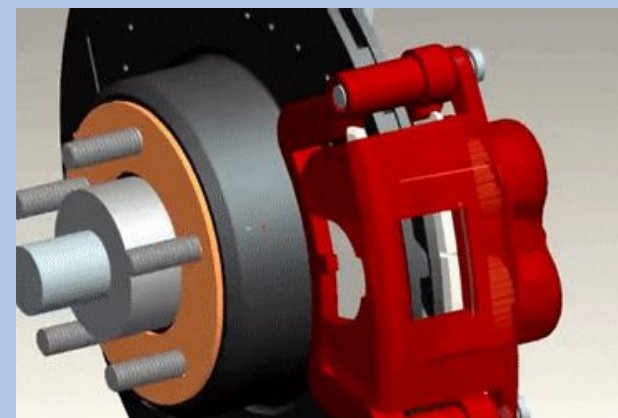


Potenciál AI v strojárstve

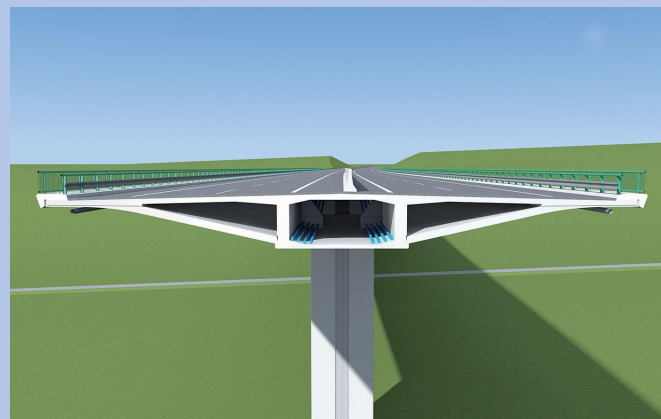
Maximalizovať koeficient vztlaku
– Tvar turbínových lopatiek

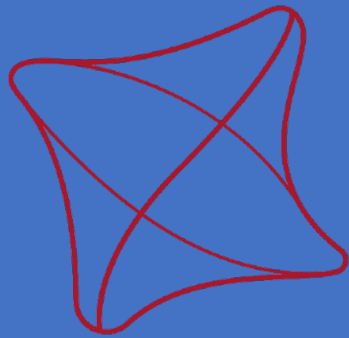


Maximalizovať životnosť – Tvar
a tlak brzdovej platničky



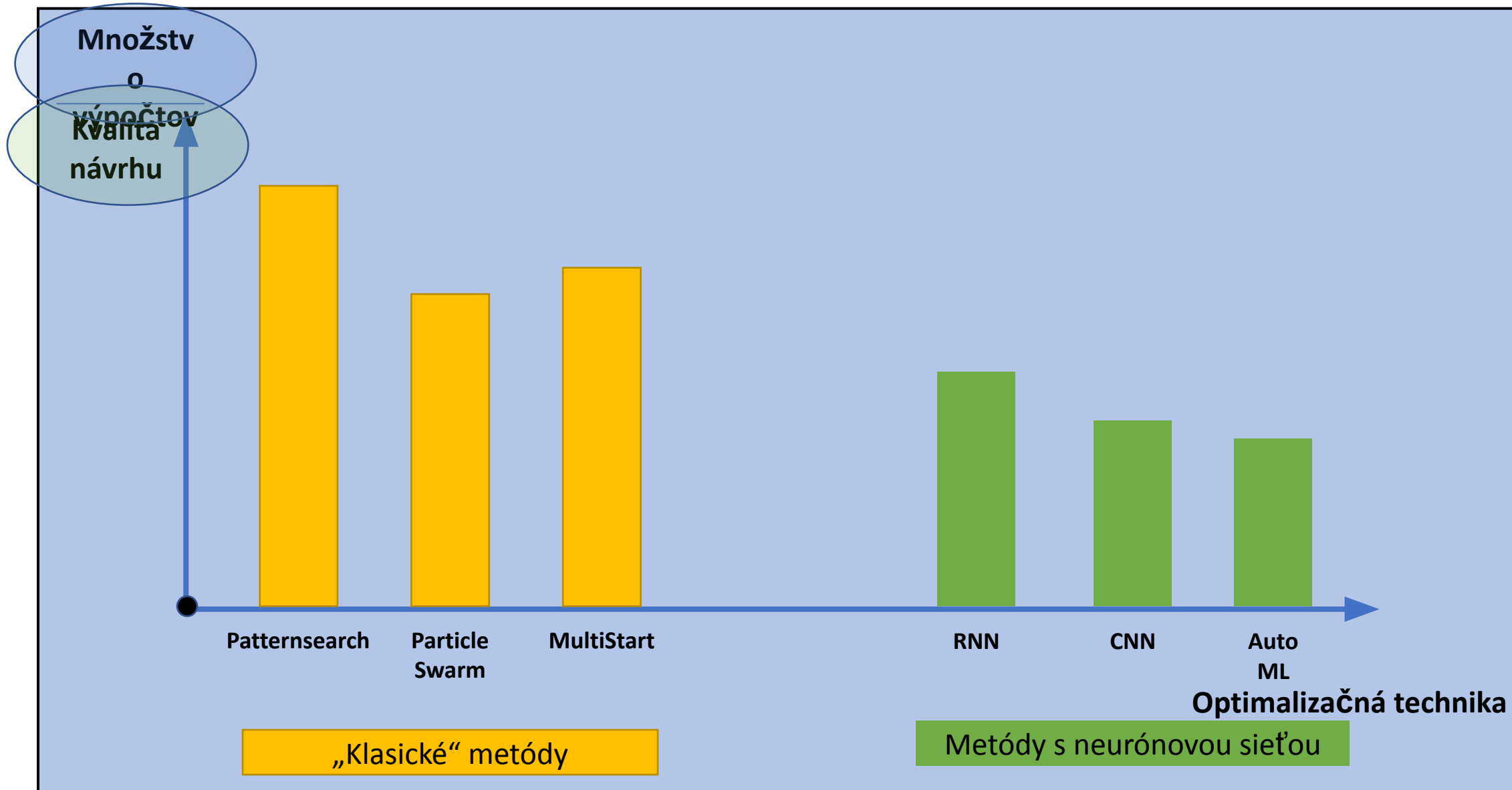
Maximalizovať hmotnosť –
Rozloženie nosníka mosta



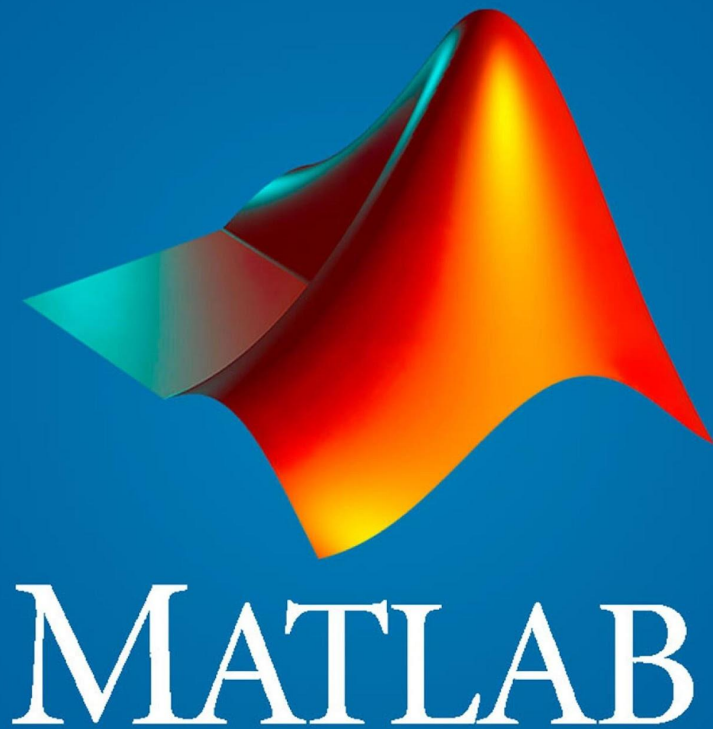


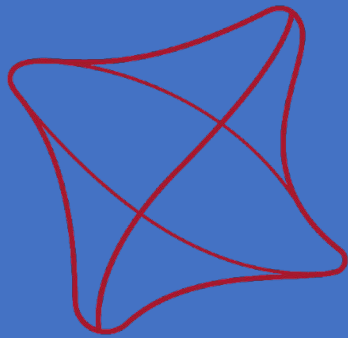
Optimalizácia





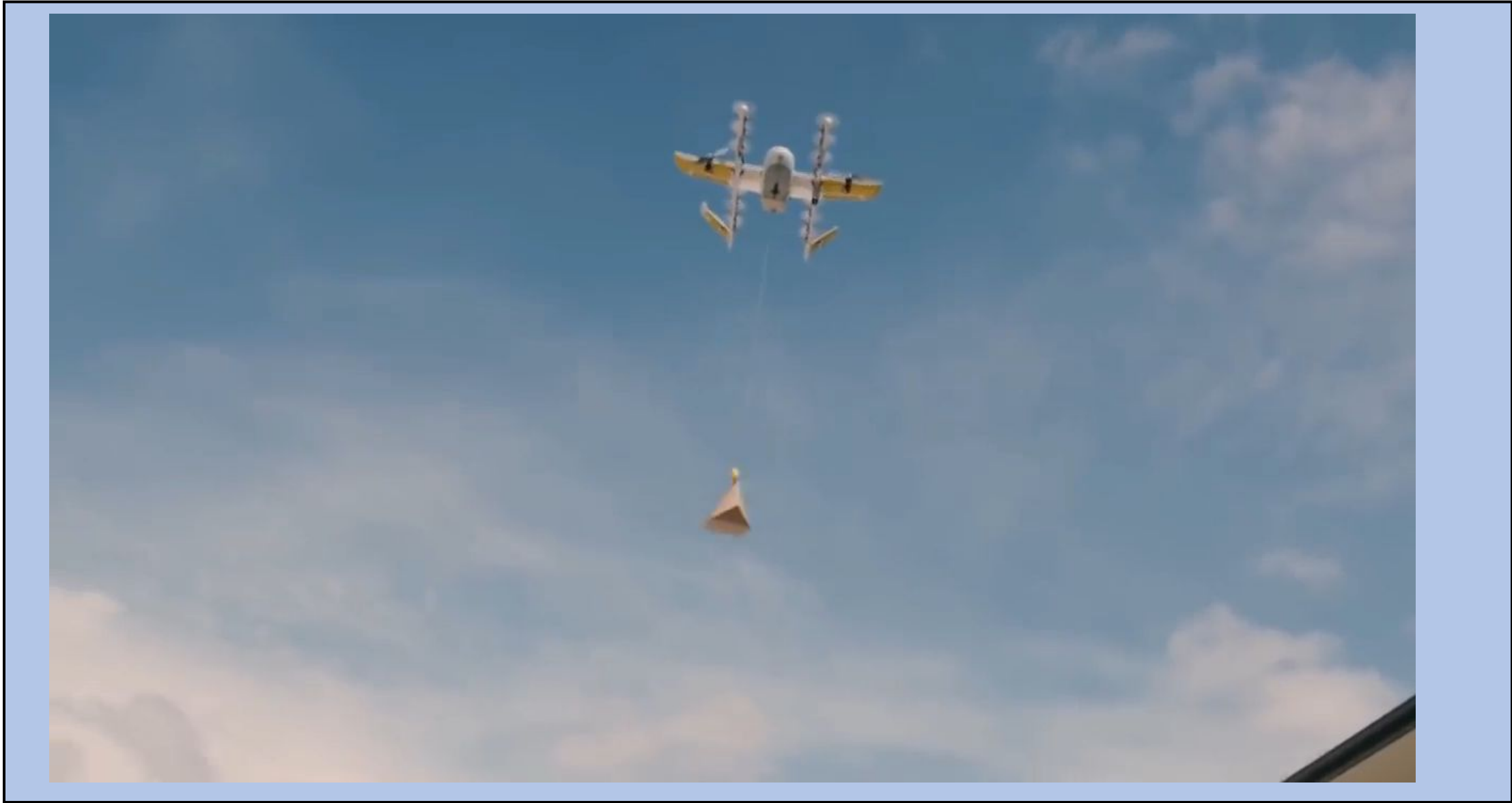
Live editor Optimizer





Delivery drón



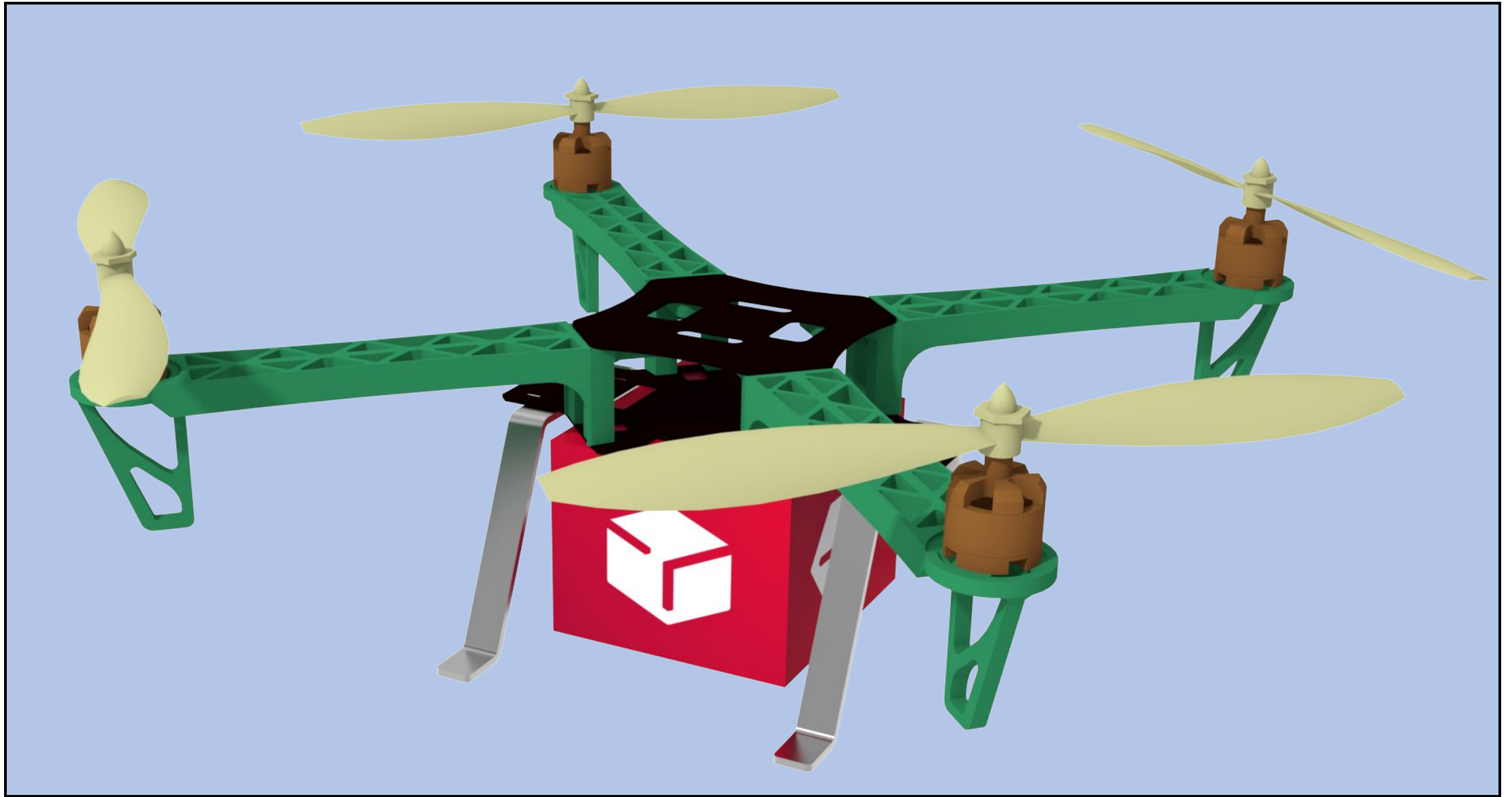


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amazon



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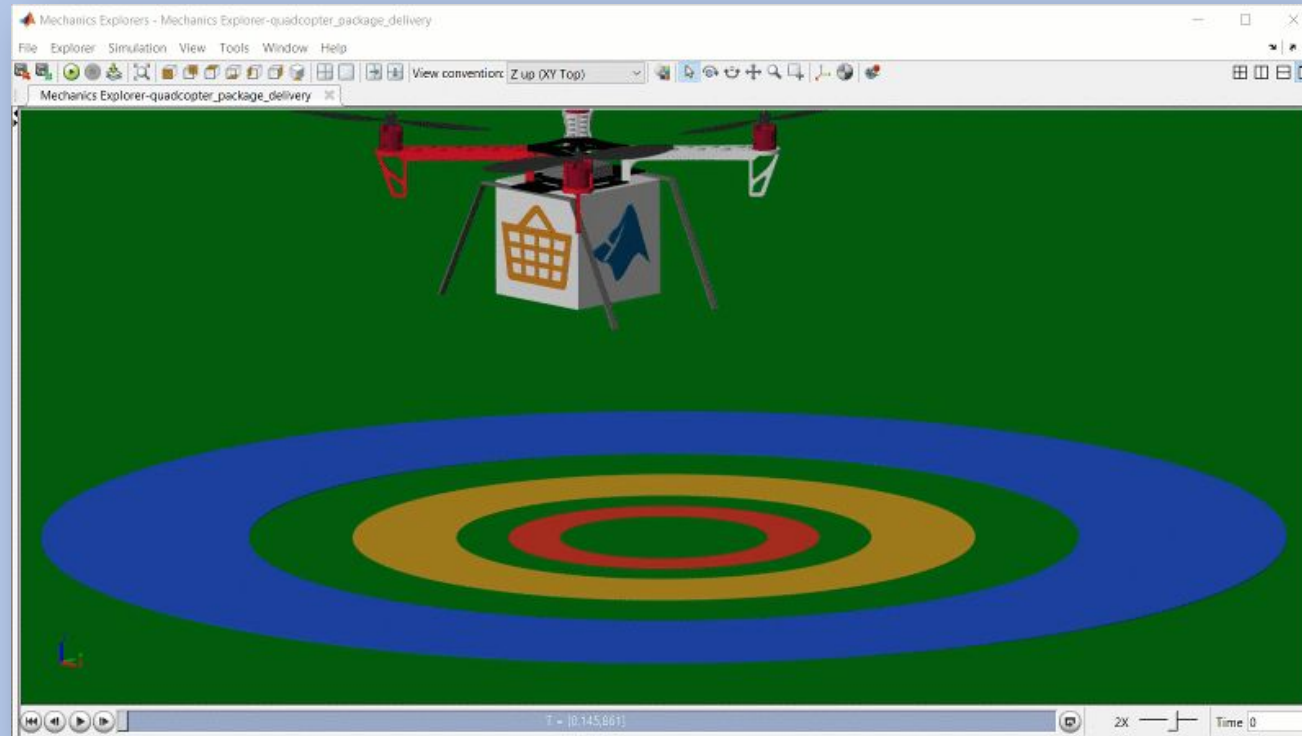


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Drón na doručovanie zásielok

Geometria

Ovládanie
drónu PID



Výkon
motorov

Váha a veľkosť
zásielky



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Ako modelovať drón?

Simulink® 3D Animation™

<https://www.mathworks.com/help/aeroblks/quadcopter-project.html>



Quadcopter Project

R2022a

This example shows how to use Simulink® to model a quadcopter, based on the Parrot® series of mini-drones.

- To manage the model and source files, it uses [Project Management](#).
- To show the quadcopter in a three-dimensional environment, it uses Simulink 3D Animation.
- For the collaborative development of a flight simulation application, it provides an implementation of the Flight Simulation application template.

This example works with the [Simulink Support Package for Parrot Minidrones](#).

Note: To successfully run this example you must have a C/C++ compiler installed.

Open the Quadcopter Project

Run the following command to create and open a working copy of the project files for this example:

```
asbQuadcopterStart
```

This example uses:

[Aerospace Blockset](#)
[Optimization Toolbox](#)
[Simulink Control Design](#)
[Signal Processing Toolbox](#)
[Computer Vision Toolbox](#)
[Simulink 3D Animation](#)

Copy Command

[asbQuadcopterStart](#)
[asbTrajectoryTo](#)
[ol](#)



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SIMULATION **DEBUG** **MODELING** **FORMAT** **APPS**

Stop Time: 20

Normal

Fast Restart

Step Back Run Step Forward Stop REVIEW RESULTS

SIMULATE

Instrument Panel

asbQuadcopter ▶ Instrument Panel



Quad... — □ ×

File Tools View Simulator Help

100% RGB:160x120 T=20.000

Ready

Debut Professional by NCH Software - Licensed software

File Screen Capture View Tools Help

Menu

Screen Webcam Device Network Recordings Share NCH Suite

Connecting to display(s)

Recording in

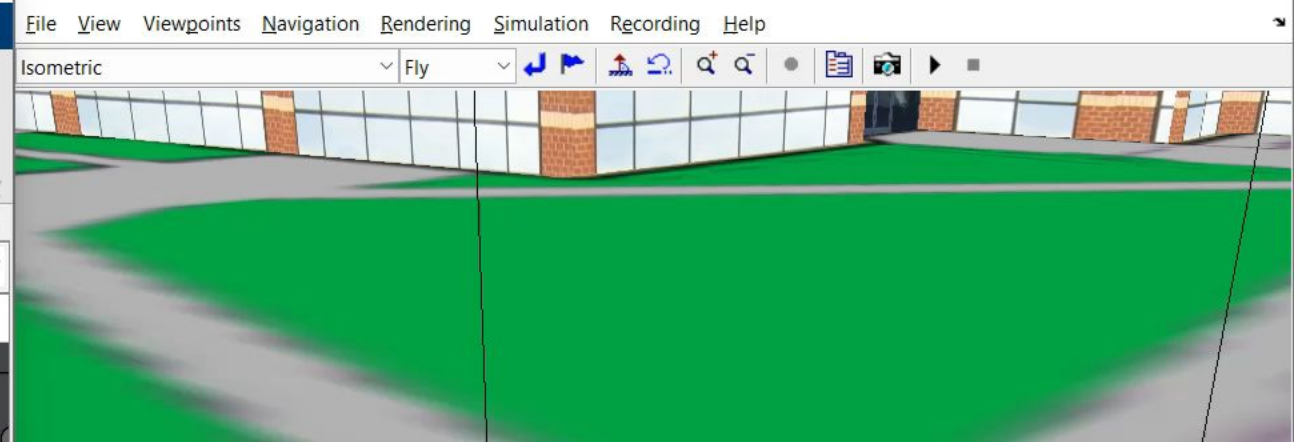
1

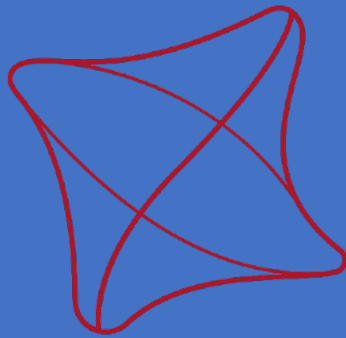
Select Recording Window: Optional Effects:

Record Screen as: Encoder Options... Video Options...

0:00:00.000 30 fps

Debut Professional v 7.83 © NCH Software

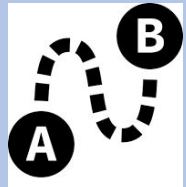




Plán PhD.



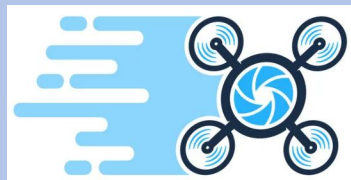
Ako definovať cieľovú funkciu drónu?



Počet kolíčok na jedno nabitie batérie

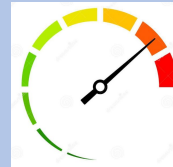


Hmotnosť balíčka

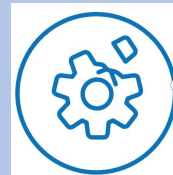


Rýchlosť doručenia

Ako definovať okrajové podmienky?



Maximálne zrýchlenie 1G
Nepoškodený balík



Maximálne napätie materiálu
 $\sigma_y = 50 \text{ MPa}$



Sledovať trajektóriu +
Netrafiť prekážky



Zhrnutie cieľu projektu

1. Vytvoriť program, ktorý vytvorí **syntetické data** na základe požiadaviek drónu
2. Program, ktorý dá strojárovi **odporúčané parametre a hodnoty veličín**
3. **Nový spôsob optimalizácie** strojárskych systémov





Ďakujem za pozornosť



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