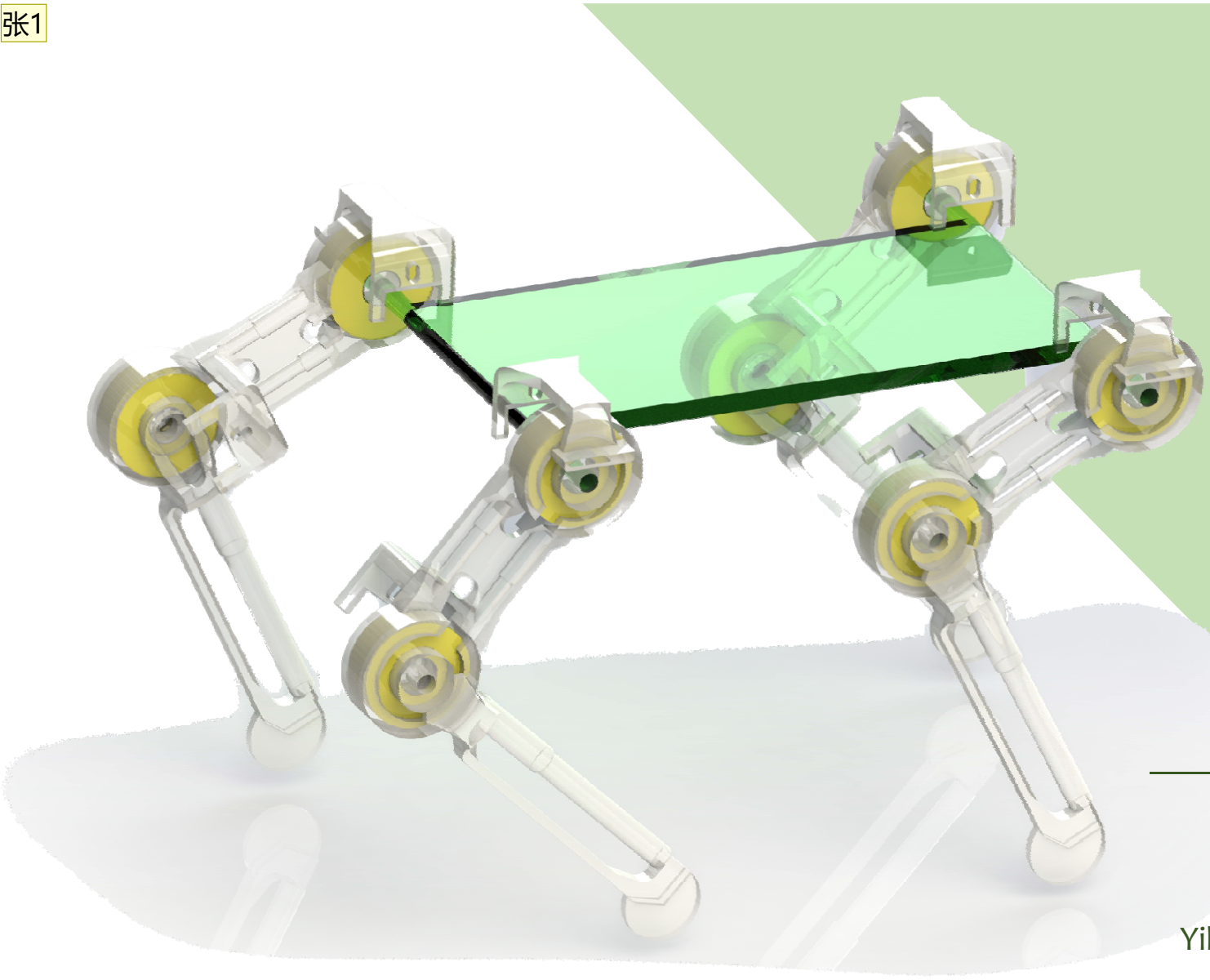

AlphaGǒu

Walking robot with reinforcement learning

By Green Team
Yike Li, Shuai Zhang, Ning Bi, Yang Zhang

幻灯片 1

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张 杨, 2018/6/11

Outline

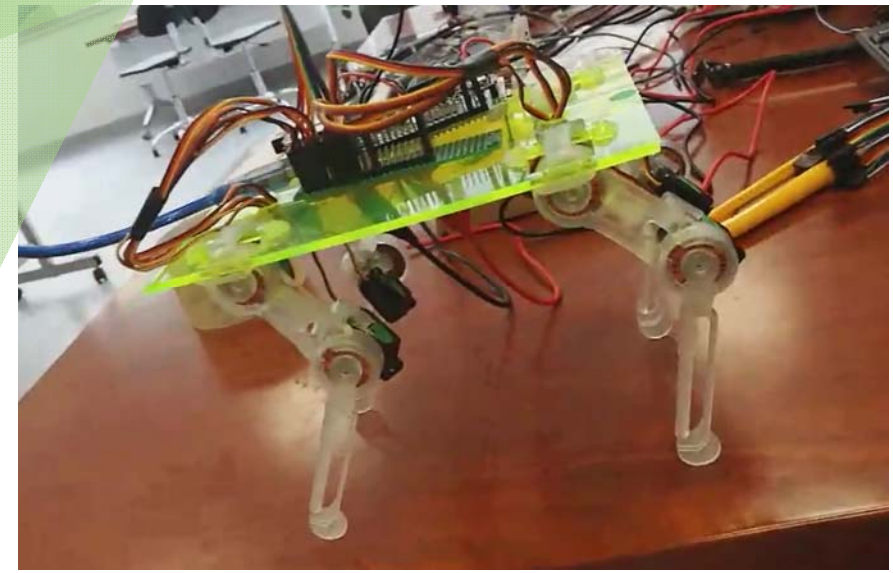
- Introduction
- Pipeline
- DEMO
- Conclusion
- Q & A

Motivation

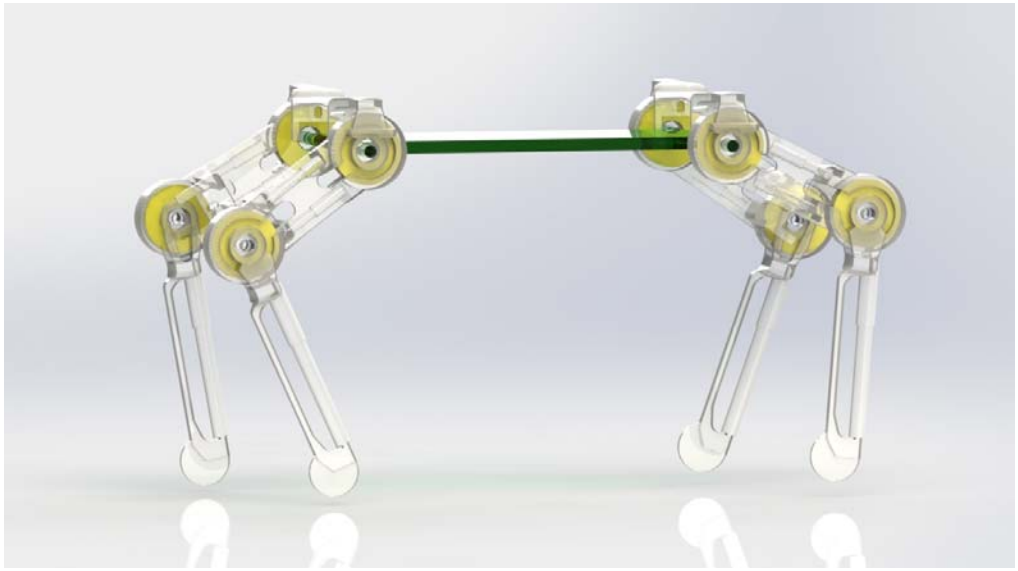
Empire's walking war machines

AlphaGŏu

Design

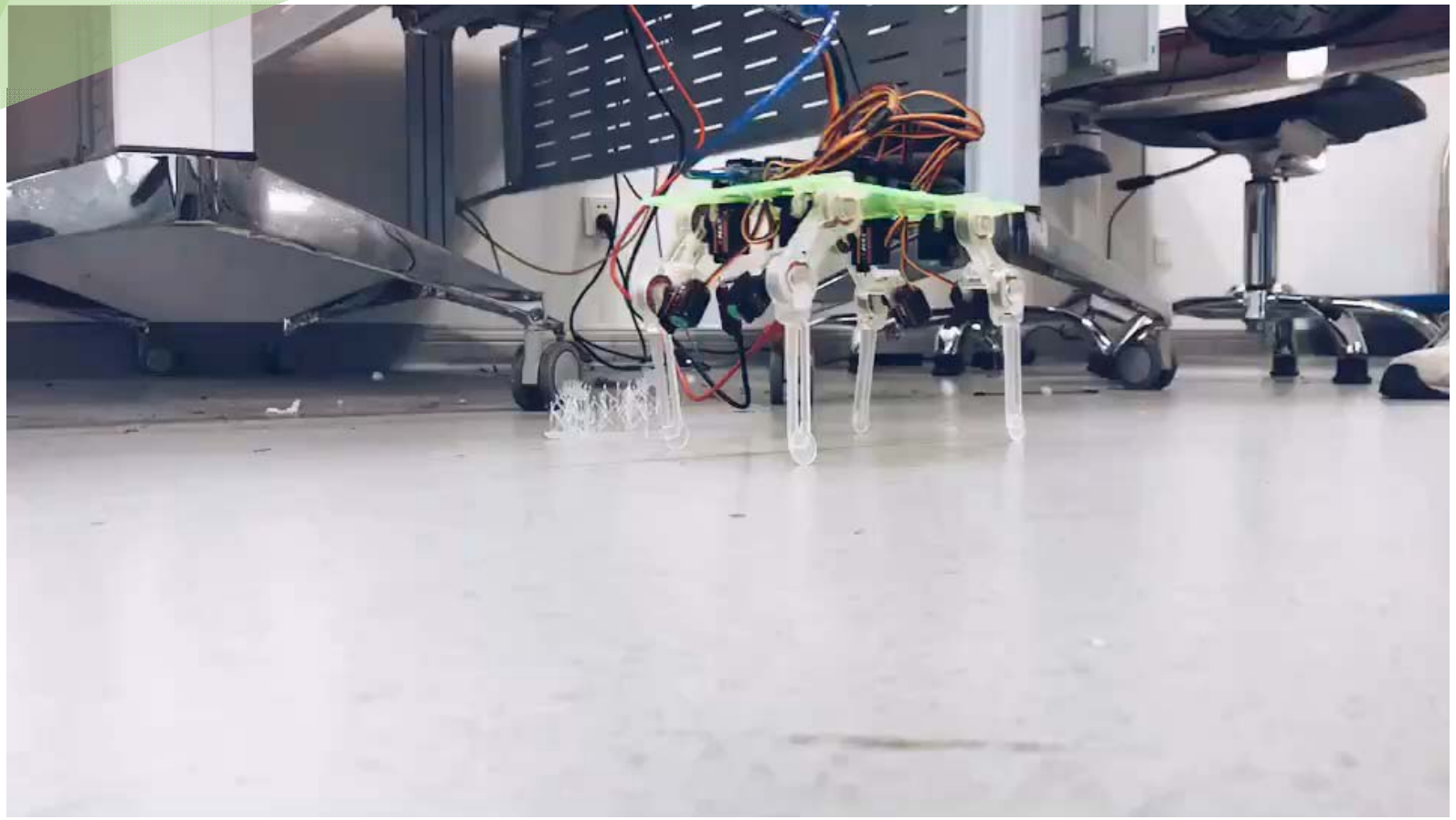


AlphaGŏu 1.0

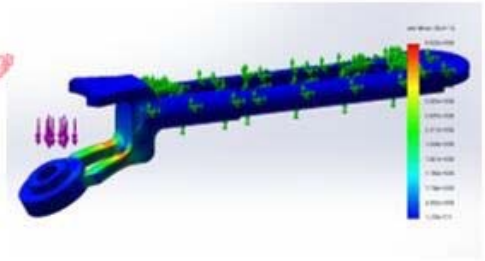


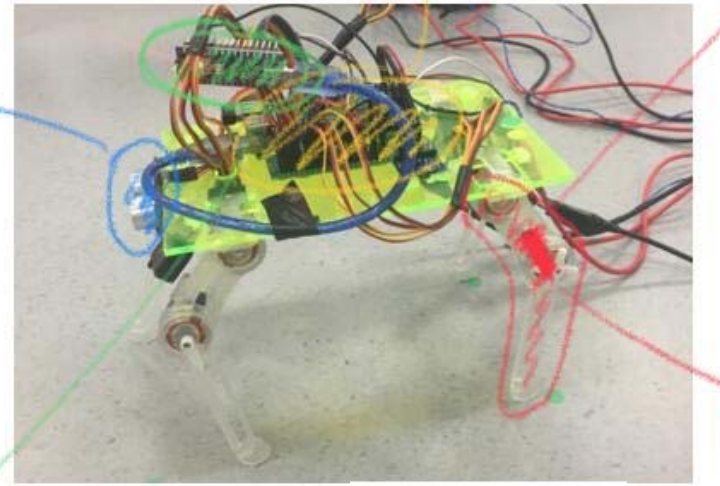
Redesigned AlphaGŏu

Demo

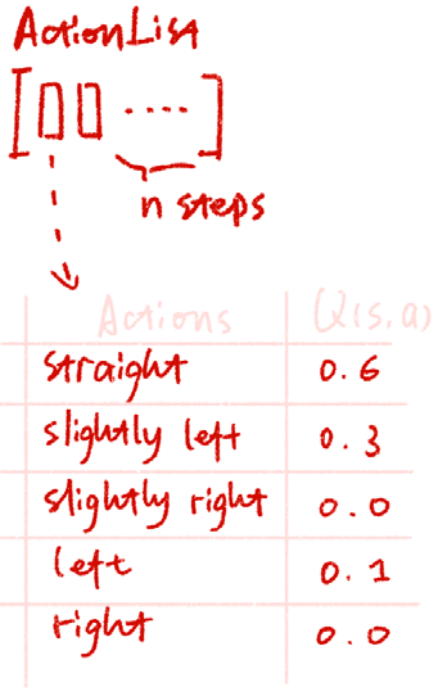


Design

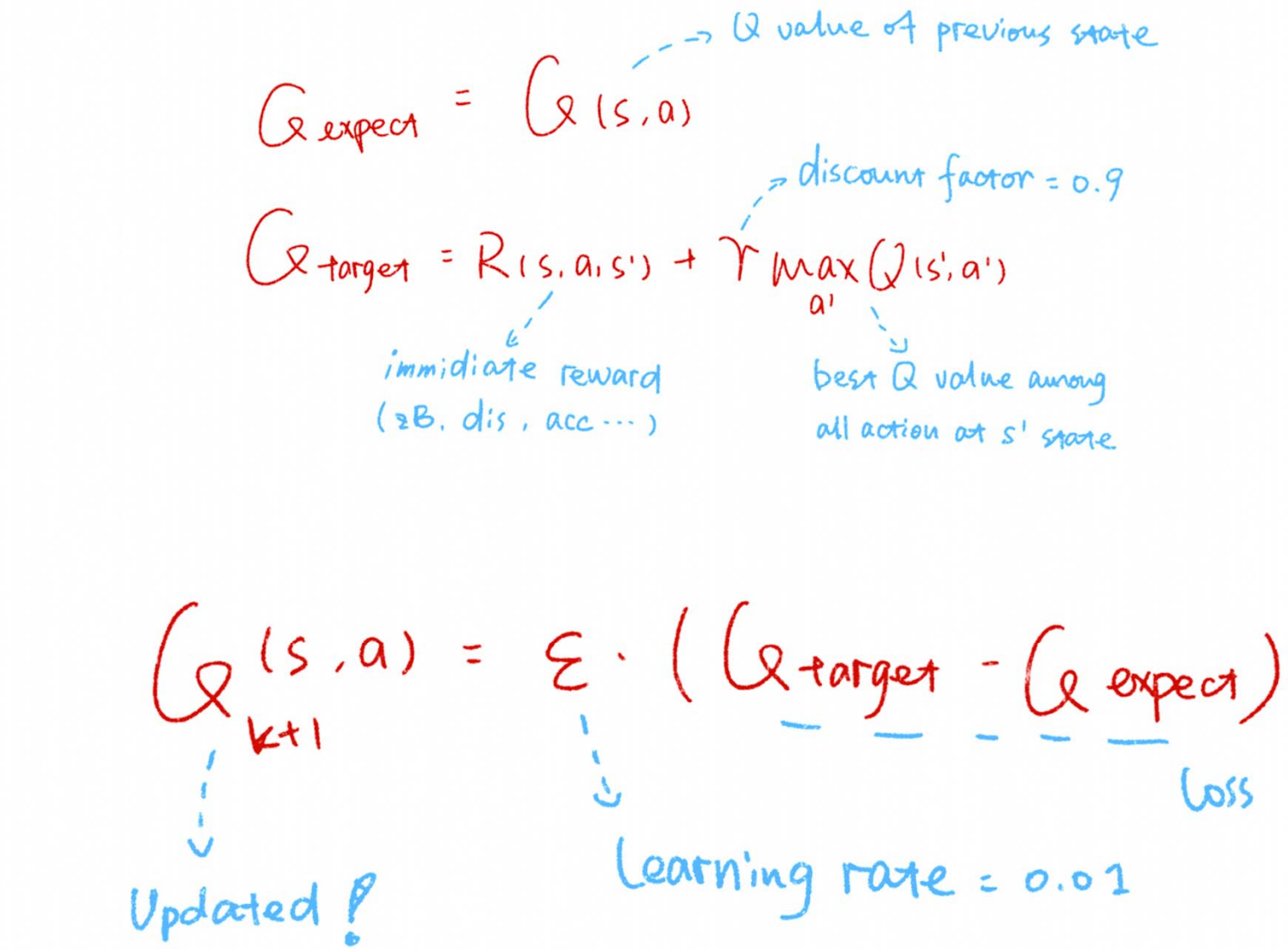




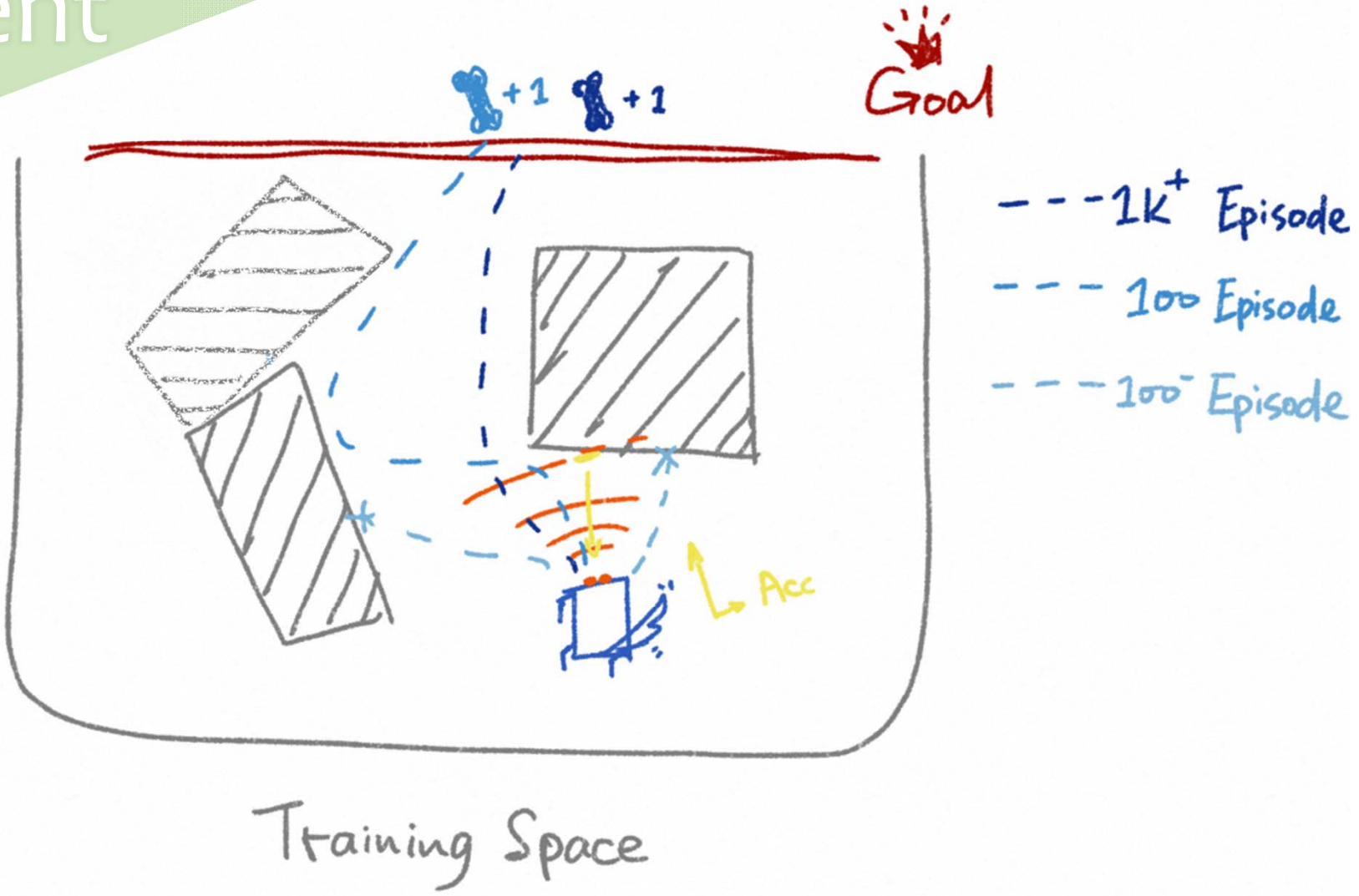
Algorithm


ActionList
n steps
Actions
Q(s,a)
0 straight 0.6
1 slightly left 0.3
2 slightly right 0.0
3 left 0.1
4 right 0.0


Initialization
Take Action
exploration
exploitation
observations
isArrived
Distance
Acceleration
Validation
reward
done
loss
Update ActionList
$(Q_{k+1}(s,a)$


Q value of previous state
$Q_{expect} = Q(s,a)$
discount factor = 0.9
$Q_{target} = R(s,a,s') + \gamma \max_{a'} Q(s',a')$
immidiate reward
(eg. dis, acc ···)
best Q value among
all action at s' state
$Q^{(s,a)}_{k+1} = \varepsilon \cdot (Q_{target} - Q_{expect})$
Loss
Learning rate = 0.01
Updated!

Experiment


+1
+1
Goal
1k+ Episode
100 Episode
100- Episode
Acc
Training Space

Q-Learning
100 Episodes Test

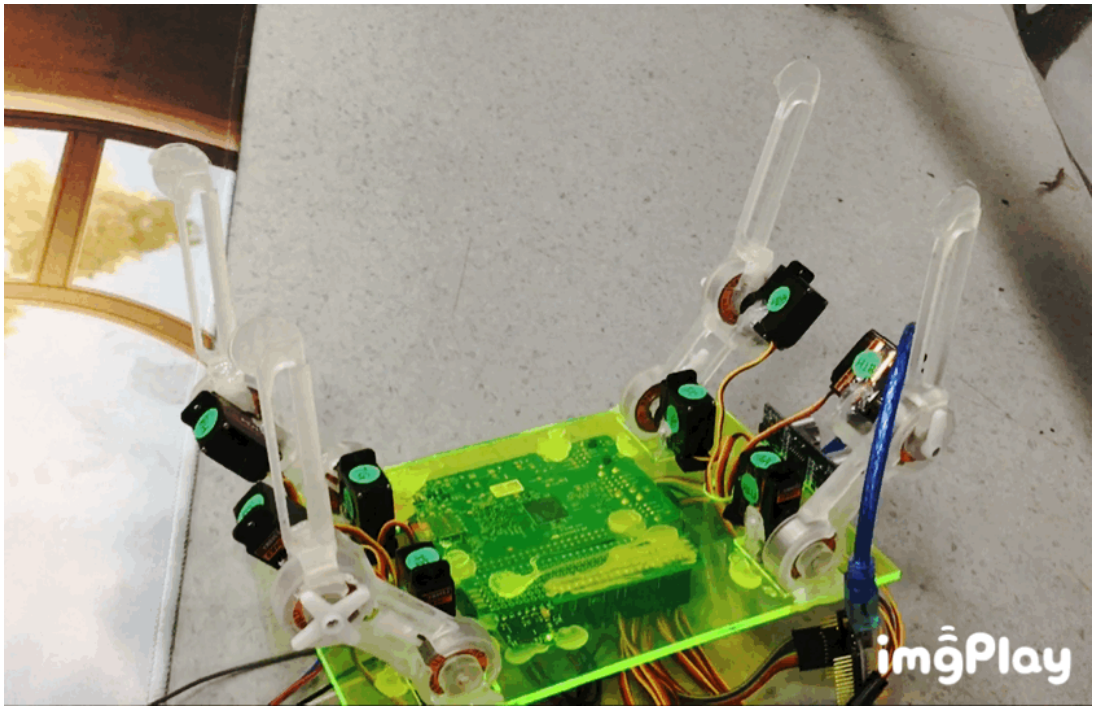
ShanghaiTech CS285

Green Group

Conclusion

A 4 legs walking robot that learn to avoid obstacles using a reinforcement learning algorithm called Q-learning algorithm. Developed on Raspberry Pi and Arduino with Ultrasonic distance sensor and IMU etc.

Q&A



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Thank You!