



ئۇيغۇر ئاكادېمىيىسى

روبوتلارنىڭ بۈگۈنكى تەرەققىياتى

تېخنىكا، بىلىم ۋە كەلگۈسى

UYGHUR
STEM

تەييارلىغان

Autonomous Mobile Robots

ئاتالغۇنى بىر ئاتىۋالايلىمۇ؟

Autonomous??

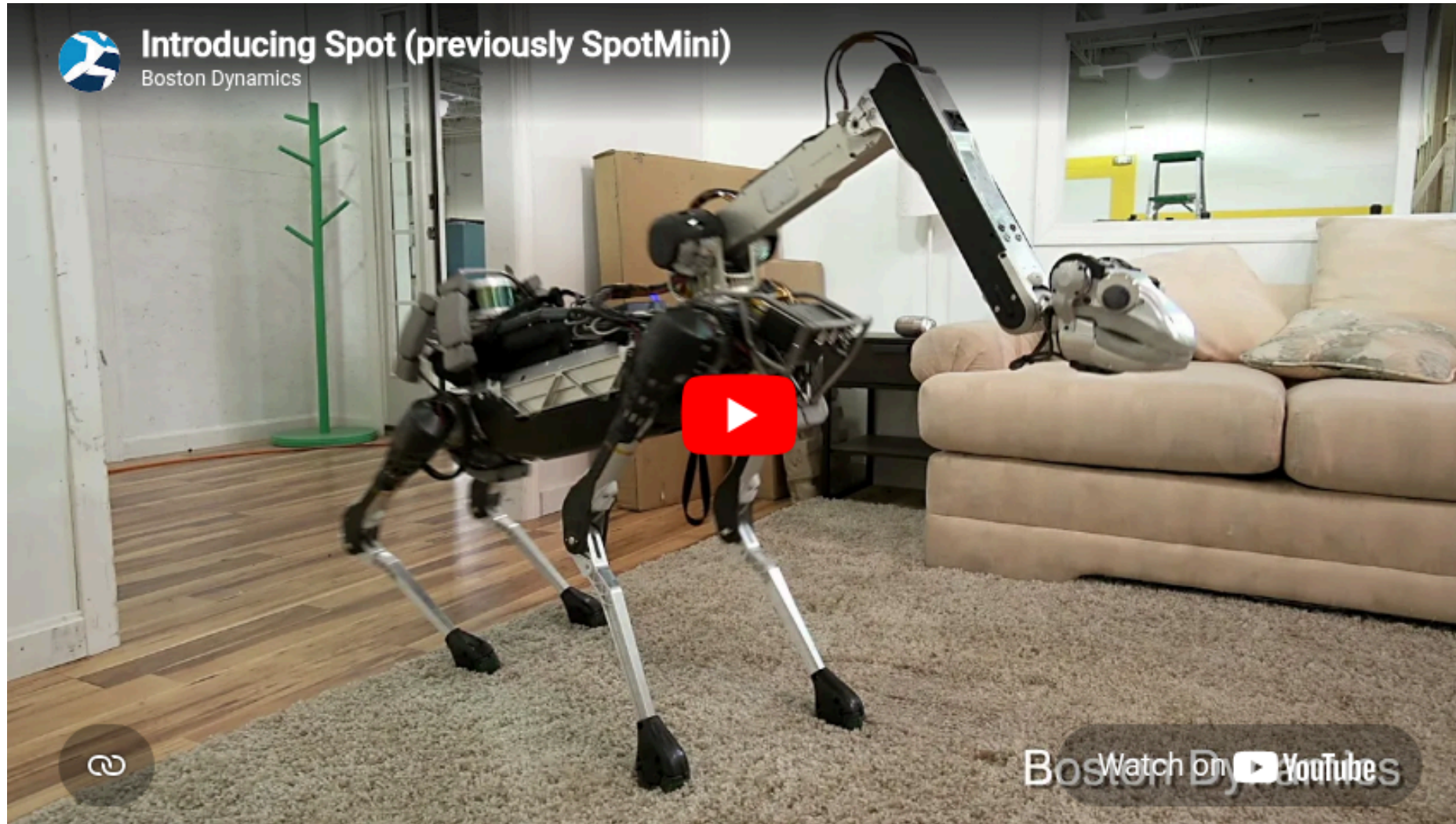
مۇستەقىل؟

ئاپتونوم؟

ئاپتونوموبىل

• تېما ھەققىدە

- روبوتلار دېگەن نېمە؟
- قانداق ئىشلەيدۇ؟
- تۆت پۈتلۈك روبوتلار ھەققىدە
- ماشىنا ئادەملەر
- يېقىنقى يىللاردىكى تەرەققىياتلار



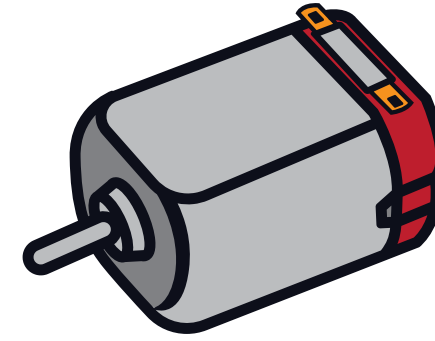
• روبوت دېگەن نېمە؟



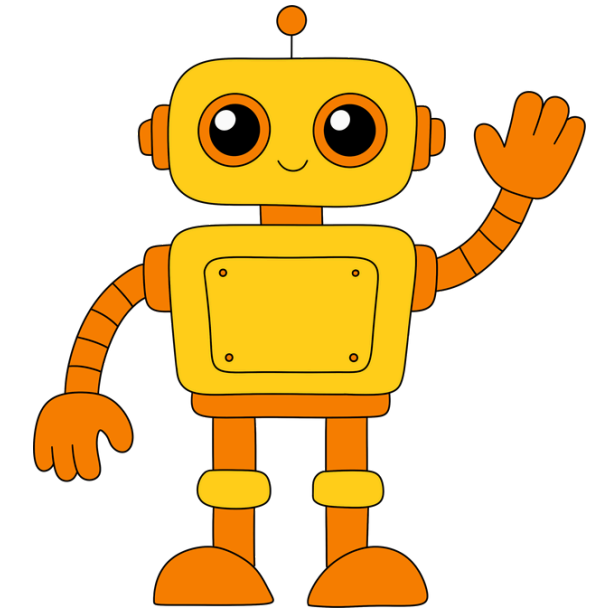
ئەتراپنى سېزىش
sense



ئويلاش
think



ھەرىكەت قىلىش
act



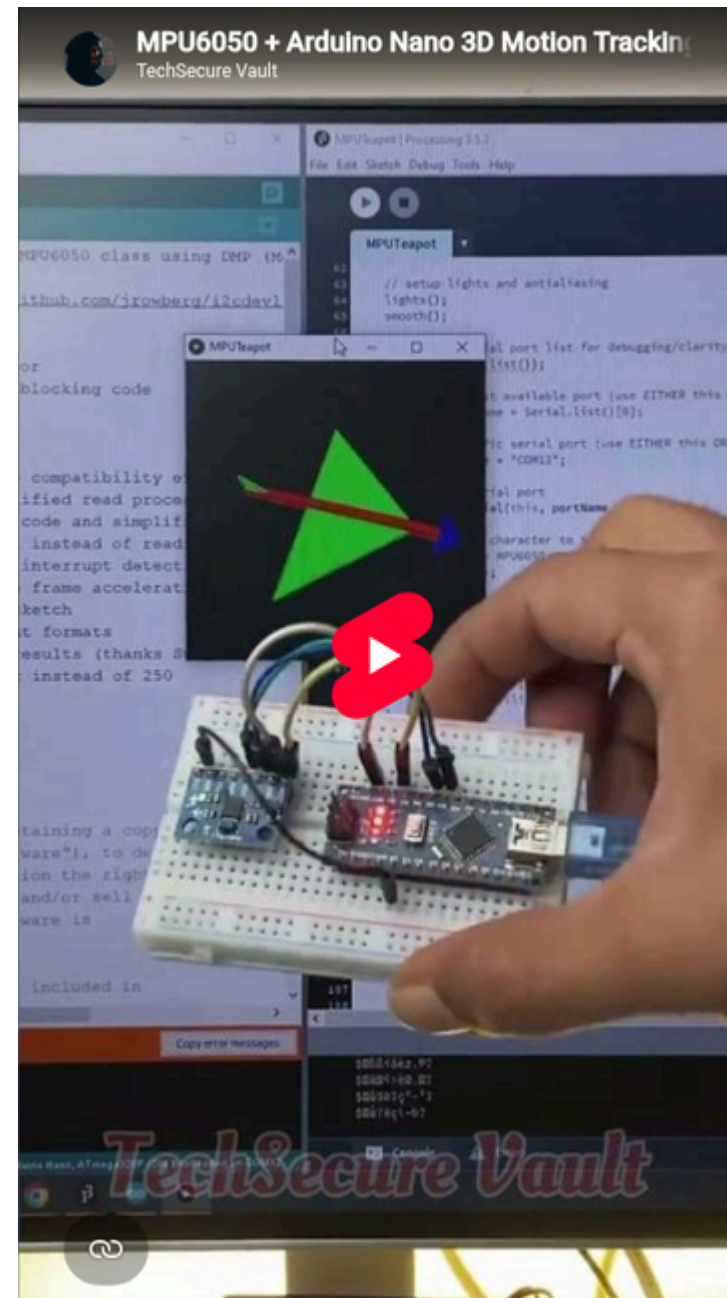
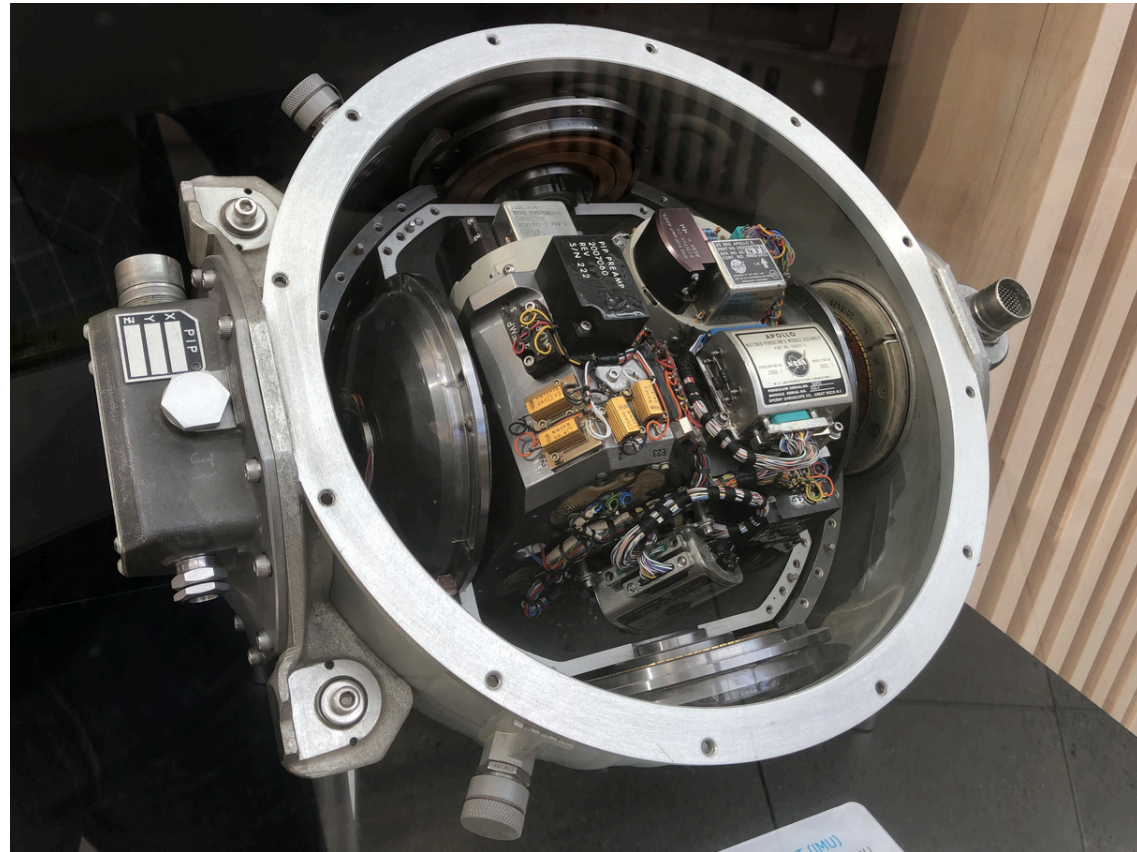
روبوت
Robot

• سېزىش

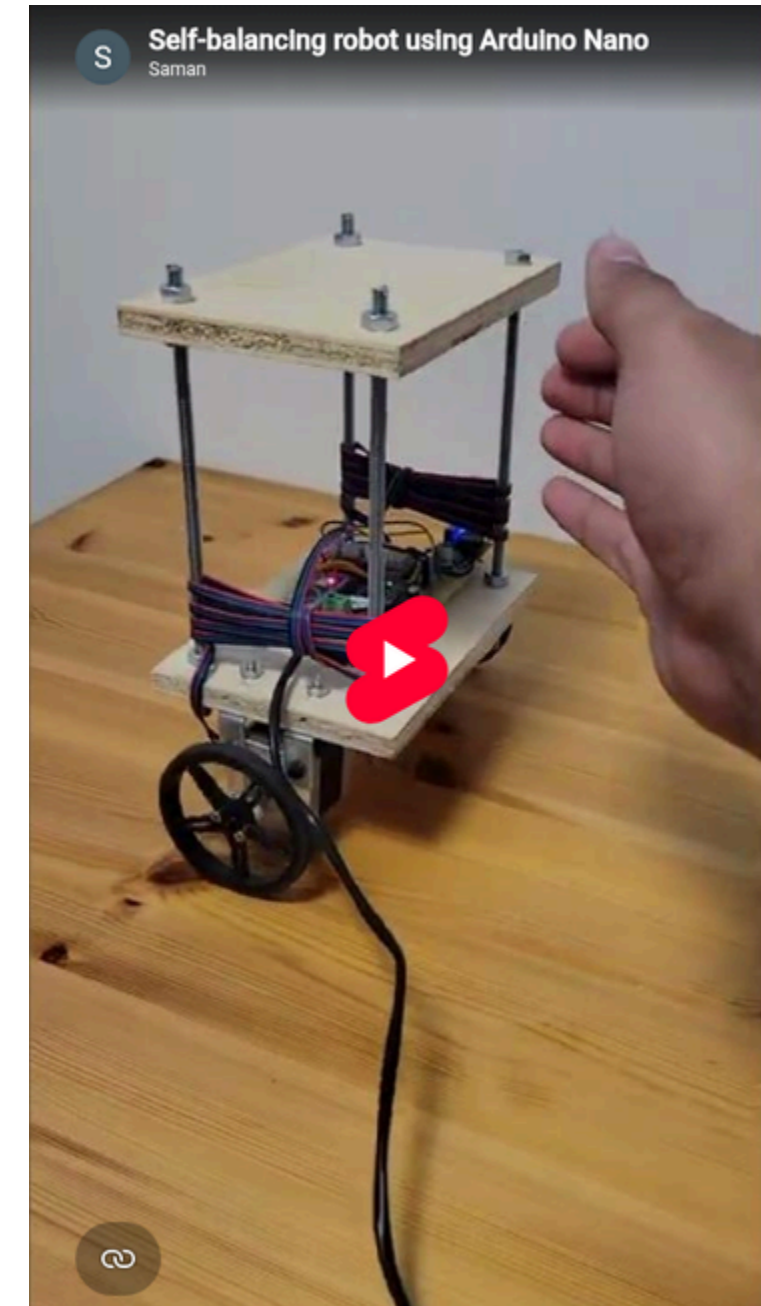
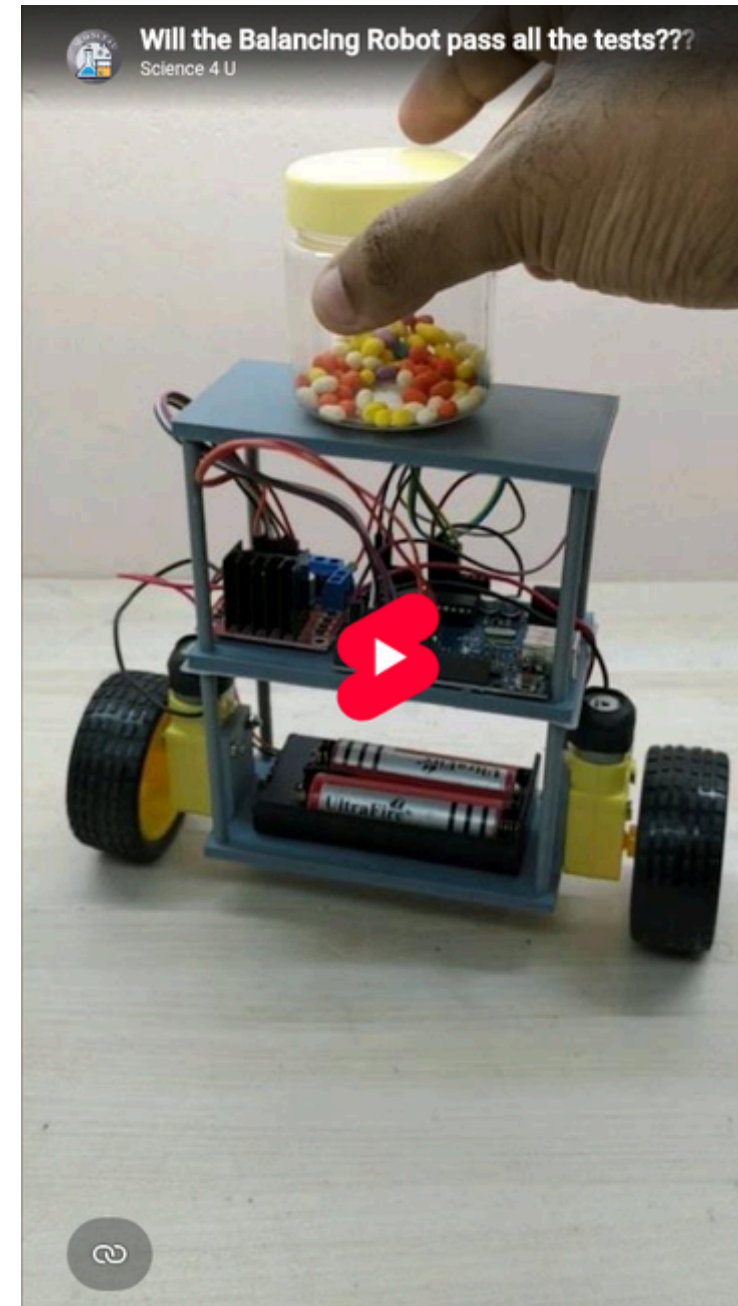
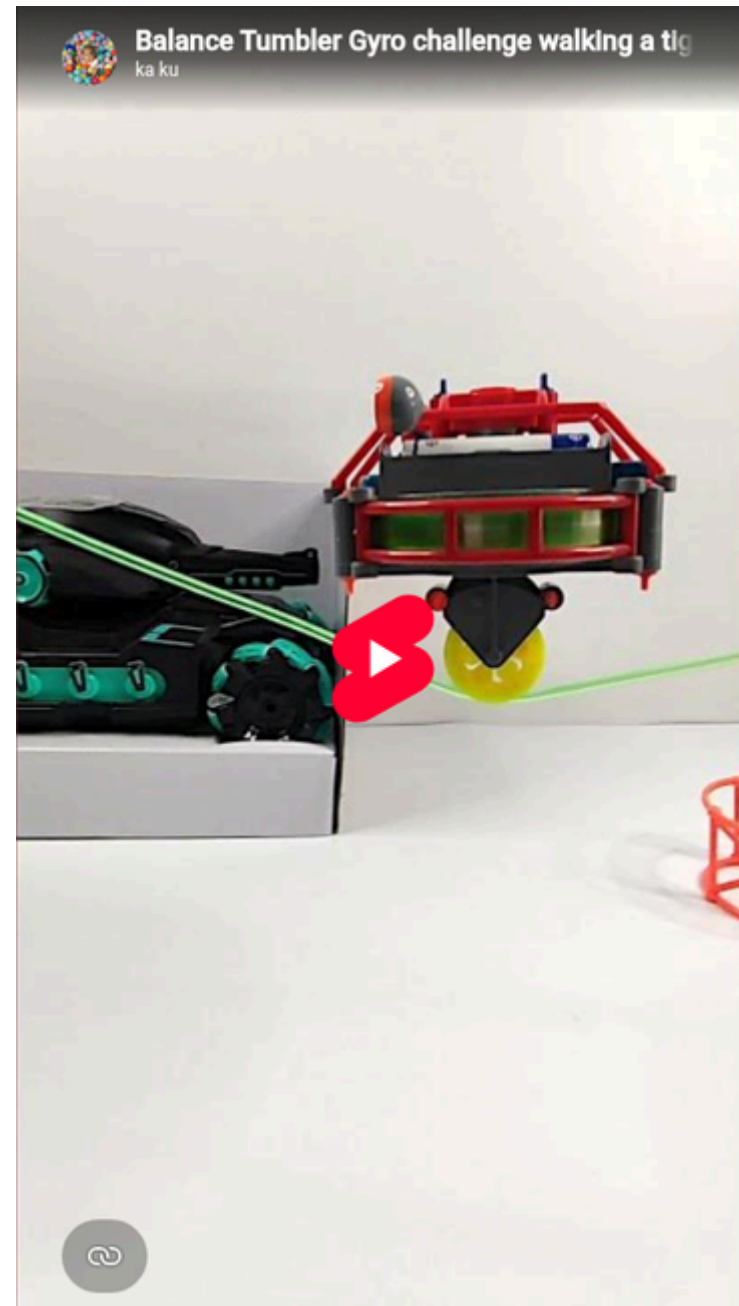
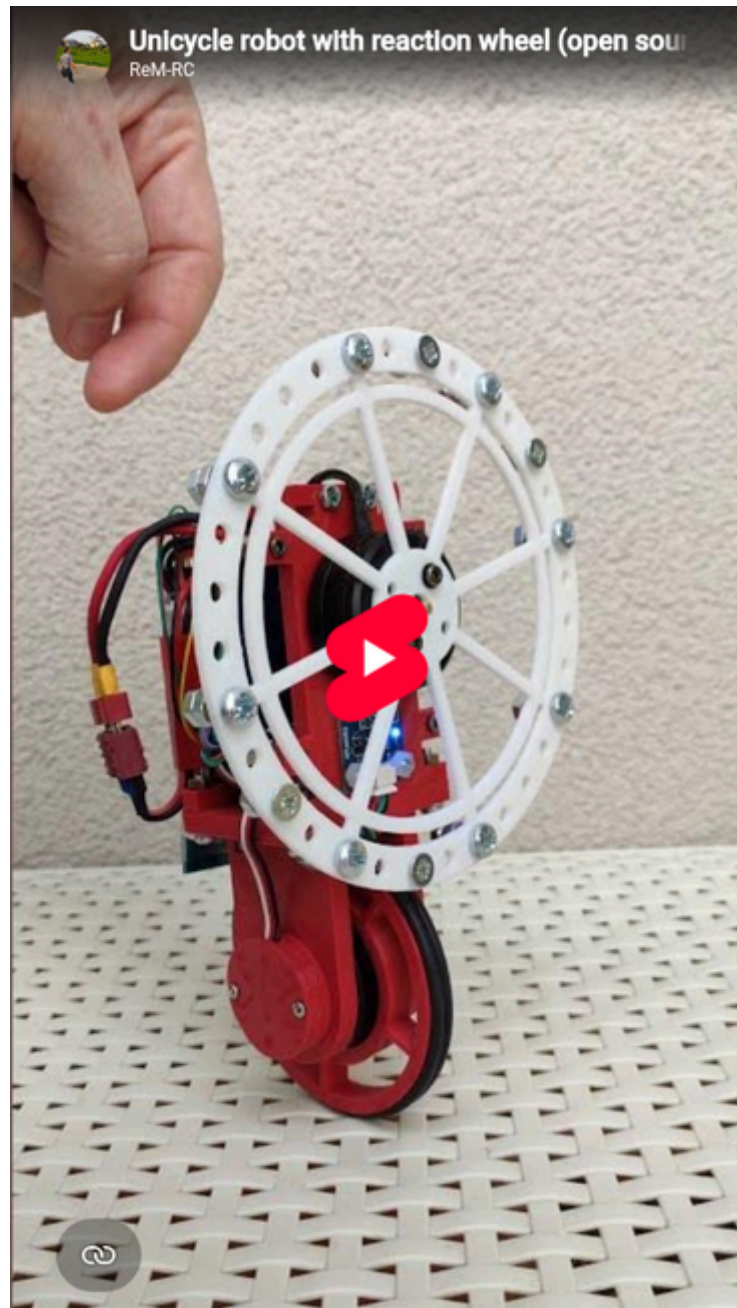
روبوتلارنىڭ سەزگۈ ئەزالىرى

تەڭپۇڭلۇك، يانتۇلۇق، تېزلىنىش	IMU (İnersiyel Ölçüm Birimi): Denge, eğim, ivme
لازېر نۇرى بىلەن ئارىلىق ئۆلچەش	LiDAR: Lazerle 3D mesafe ölçümü
ستېرىيو كامېرالار: چوڭقۇرلۇق ئۆلچەش (ئادەم كۆزىگە ئوخشاش	Stereo Kameralar: Derinlik algısı
بېسىم، تېگىشىش	Dokunma Sensörleri: Kuvvet/temas geri bildirimini
ئېنېرغا قىزىل نۇر: ئارىلىق ۋە ئىسسىقلىق ئۆلچەش	Kızılötesi / Termal: Engel ve ısı algısı

• سېزىش IMU

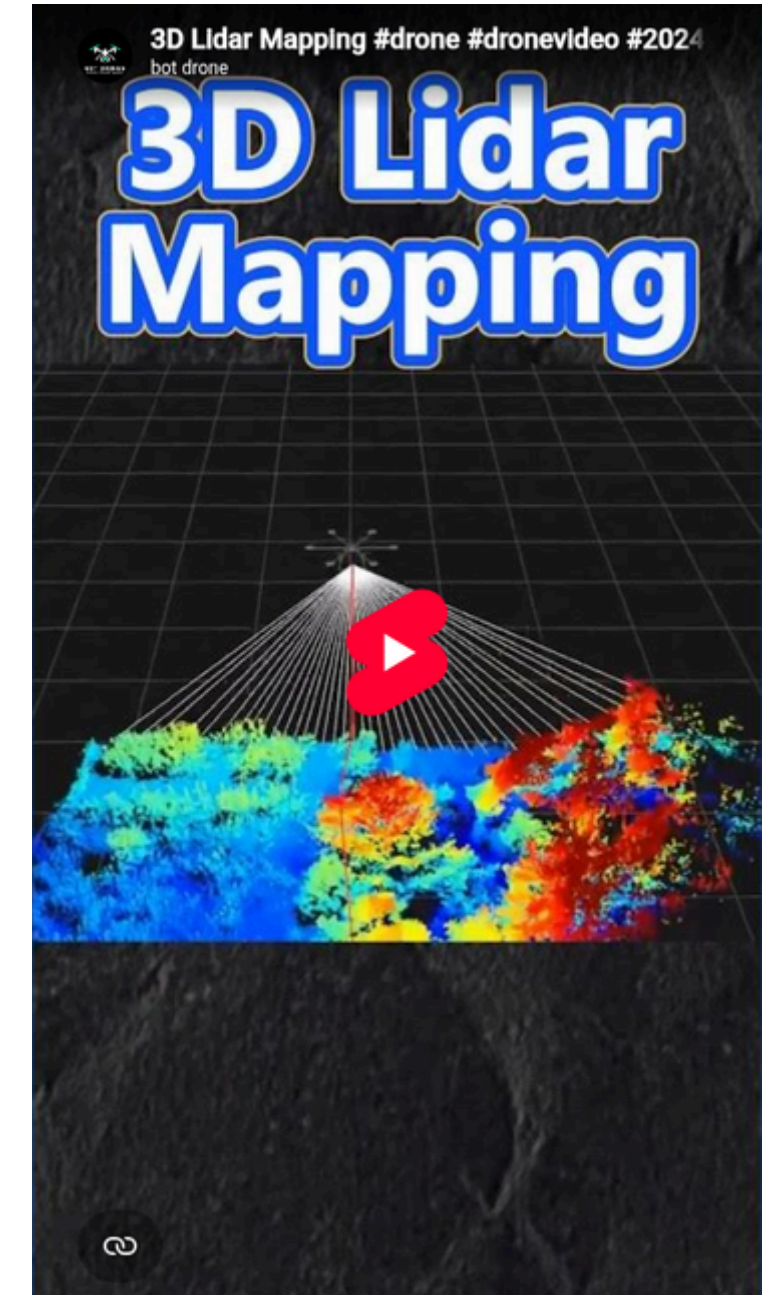


• سېزىش IMU

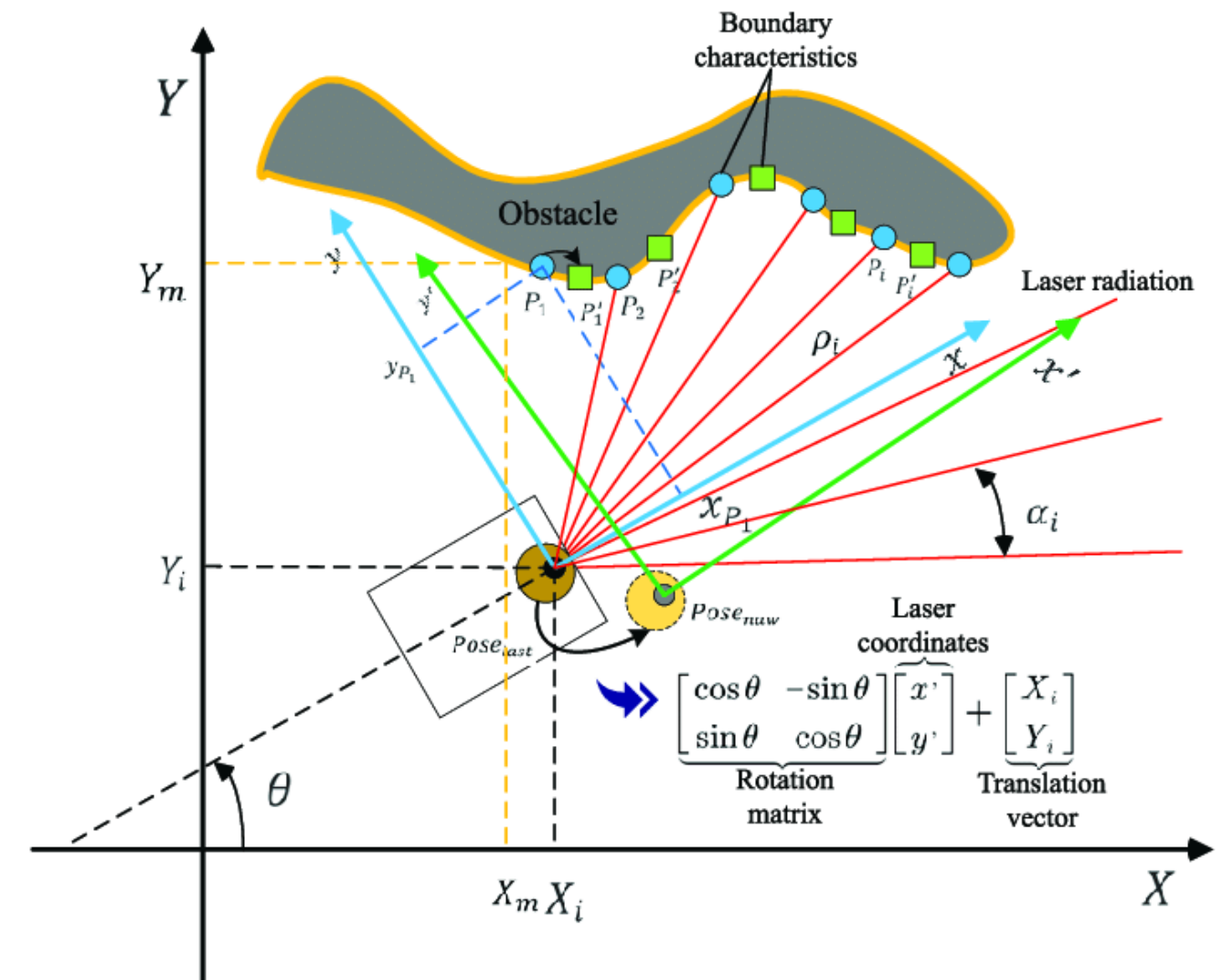
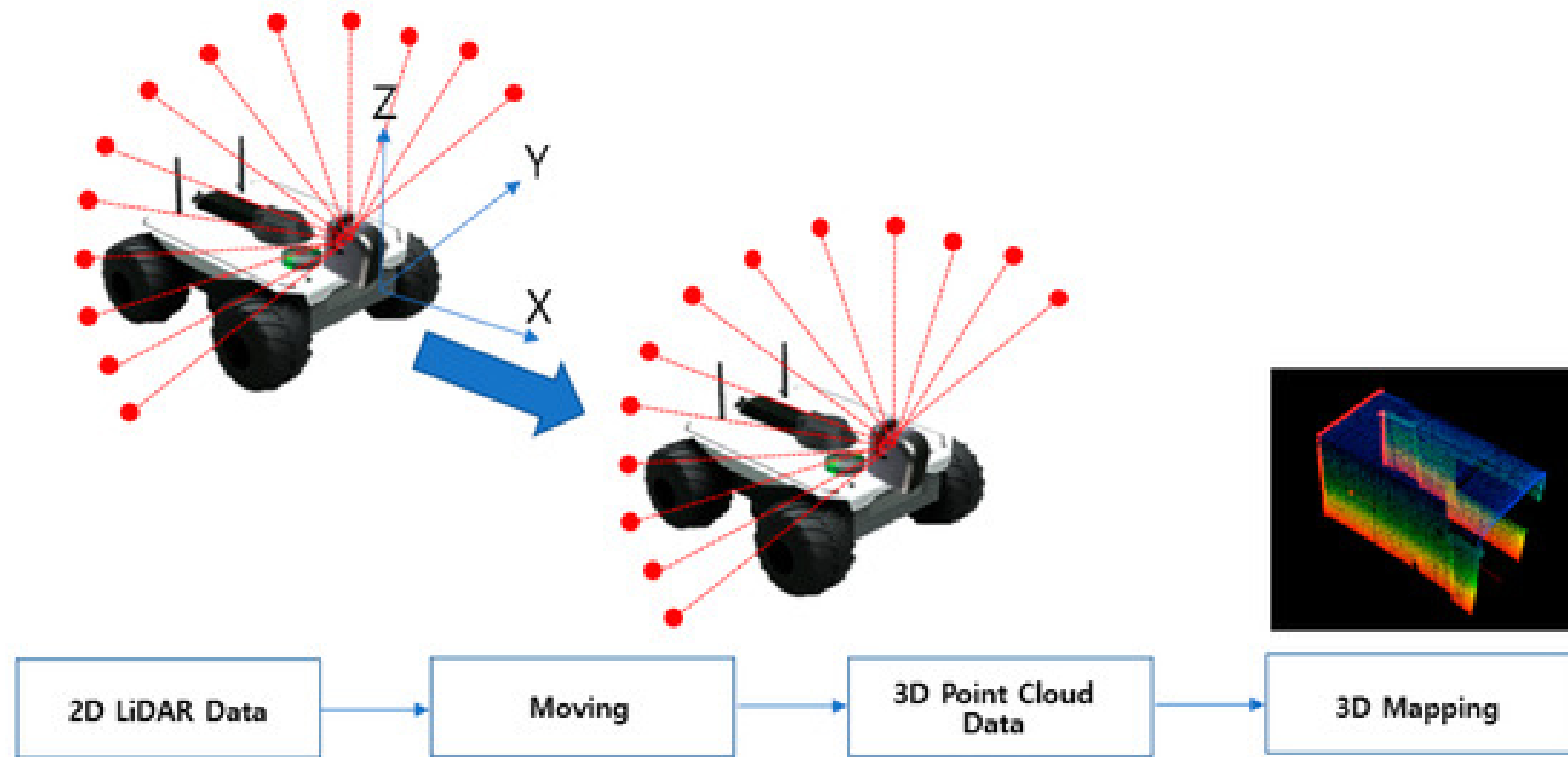


• سېزىش

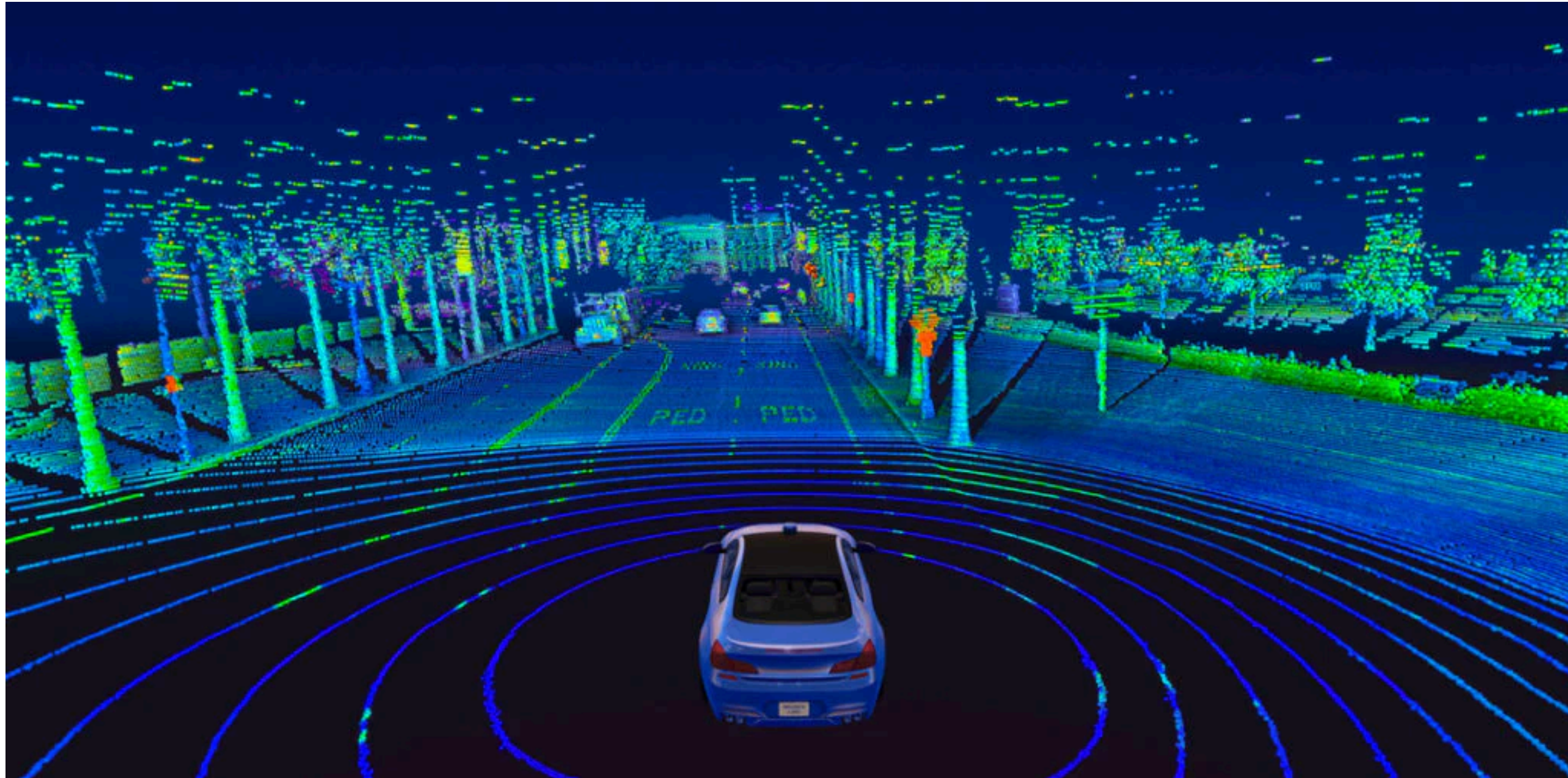
Lidar



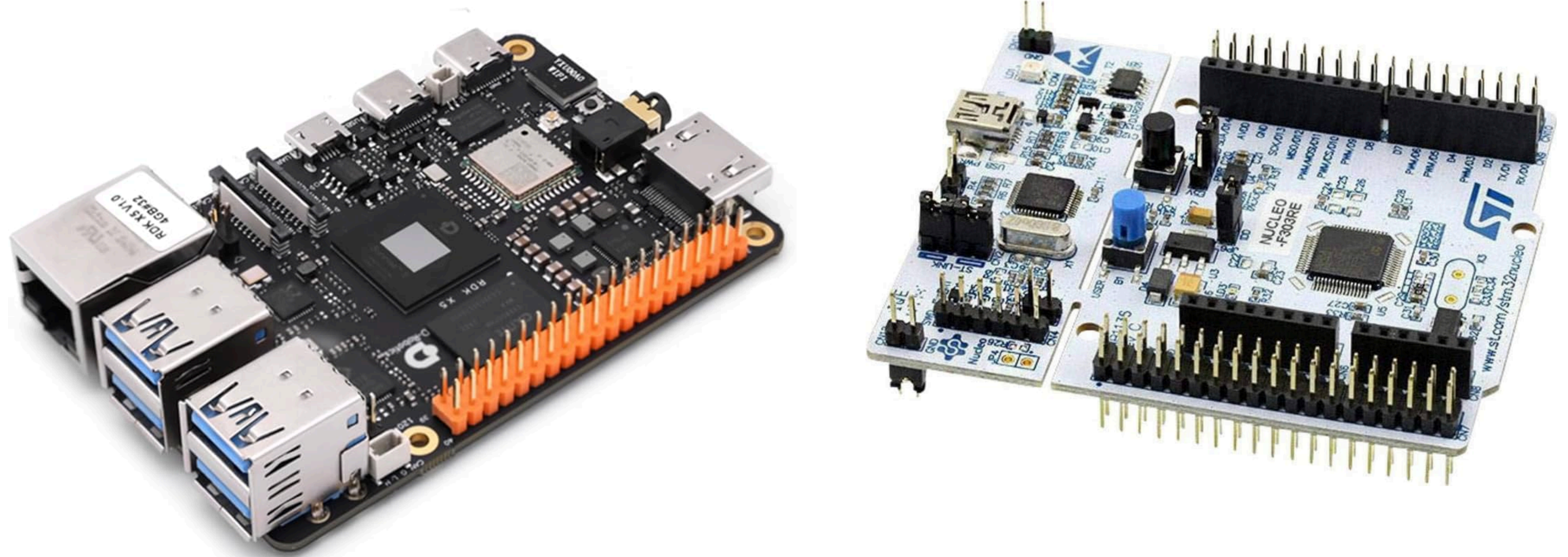
• سېزىش Lidar



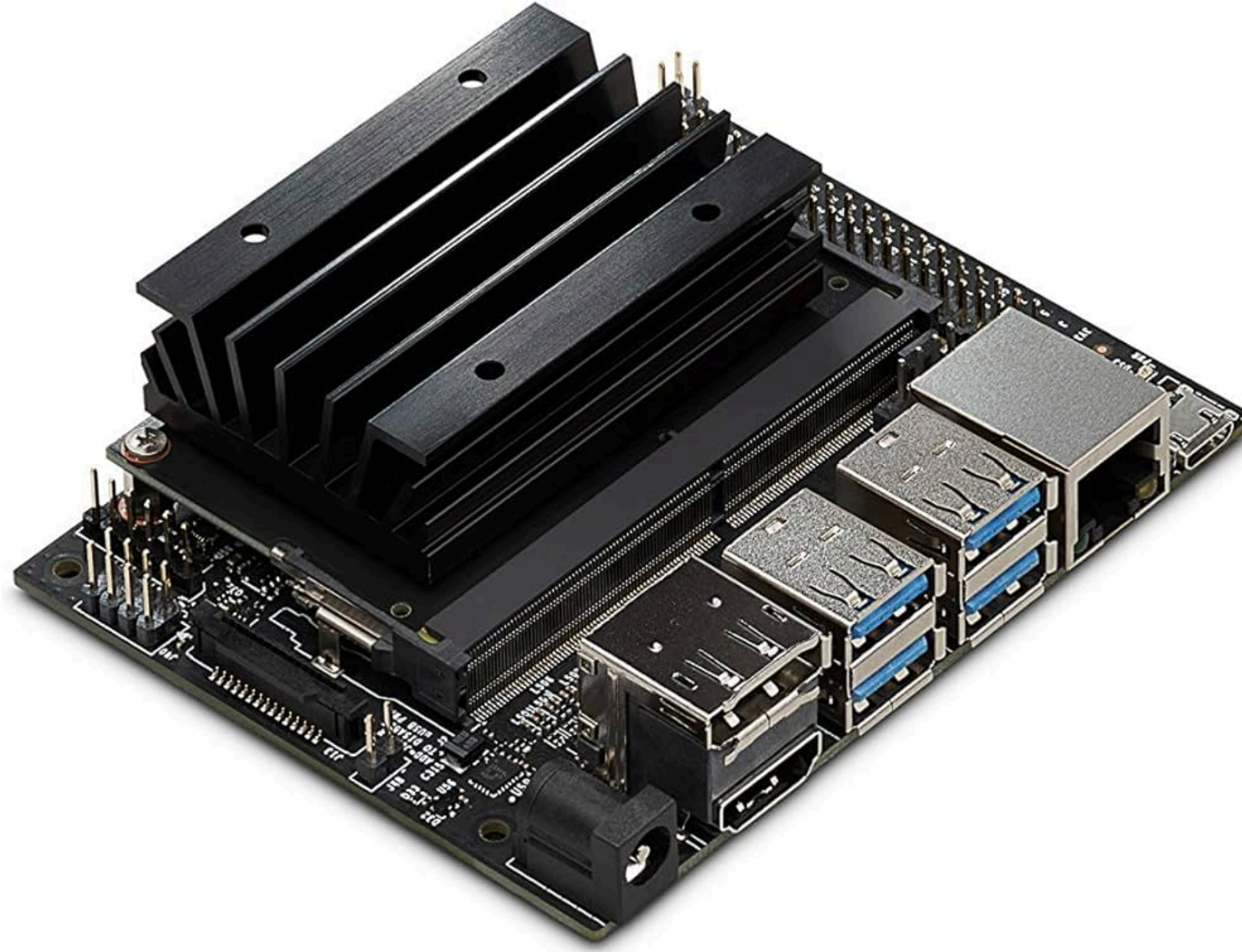
• سېزىش Lidar



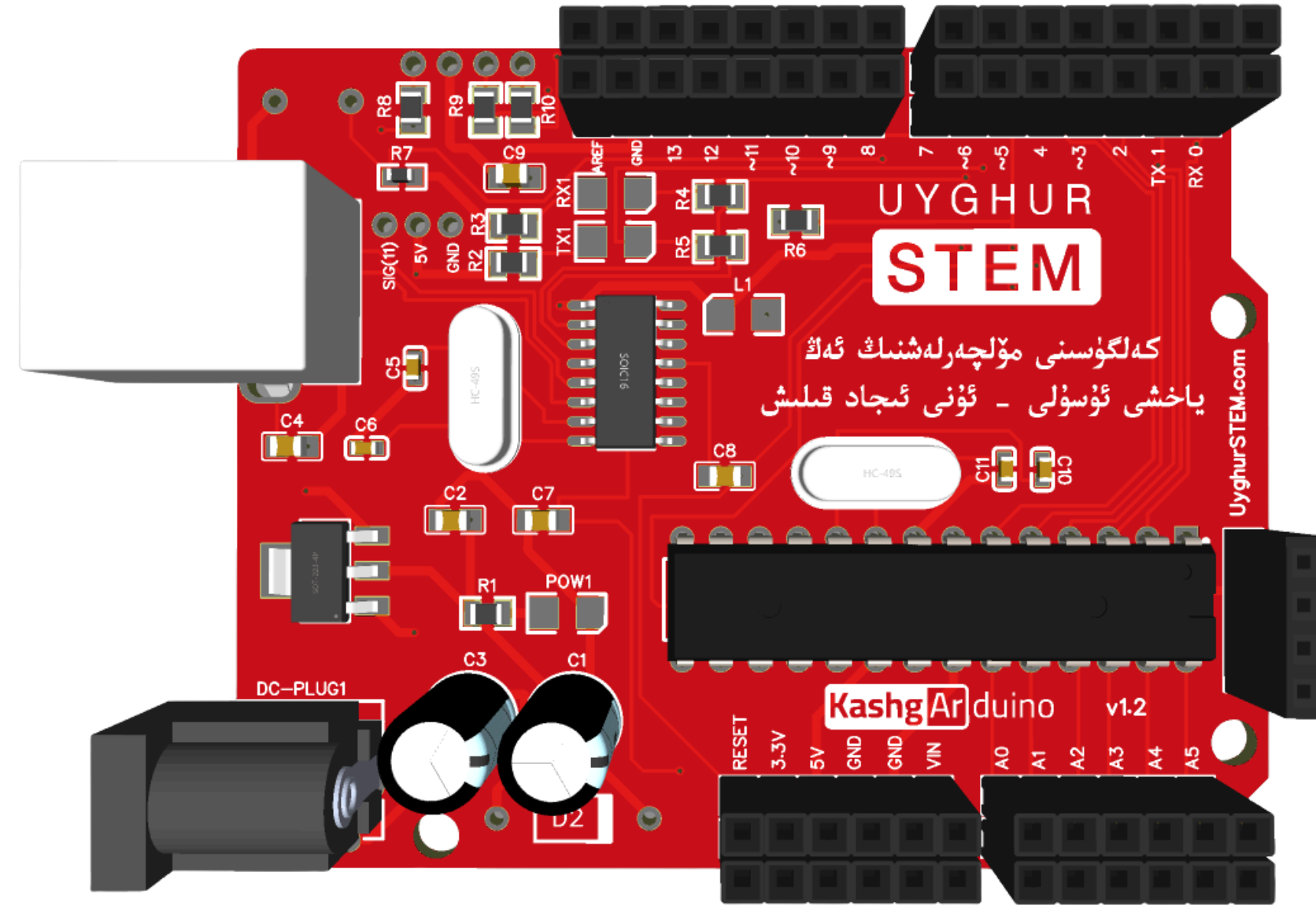
• ئويلاش ، قارار قىلىش



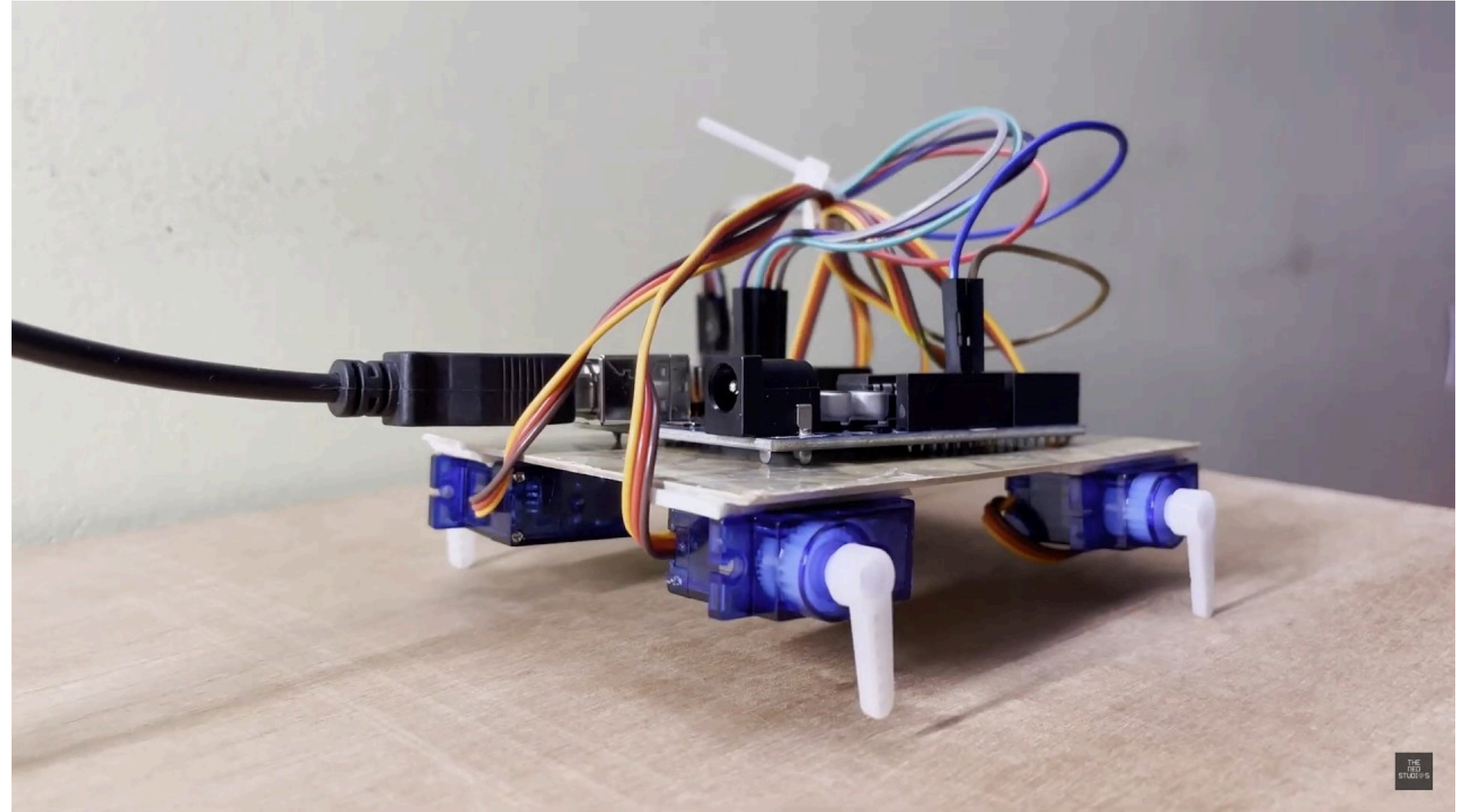
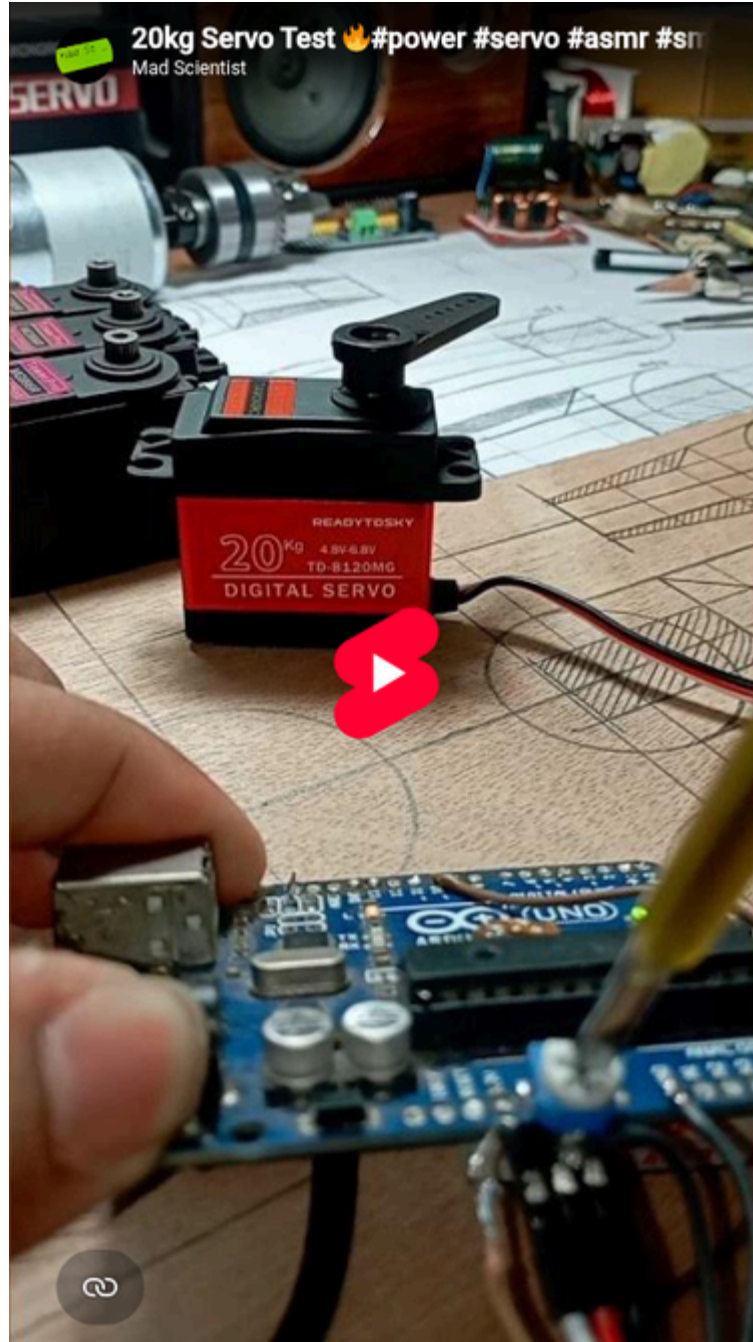
• ئويلاش ، قارار قىلىش



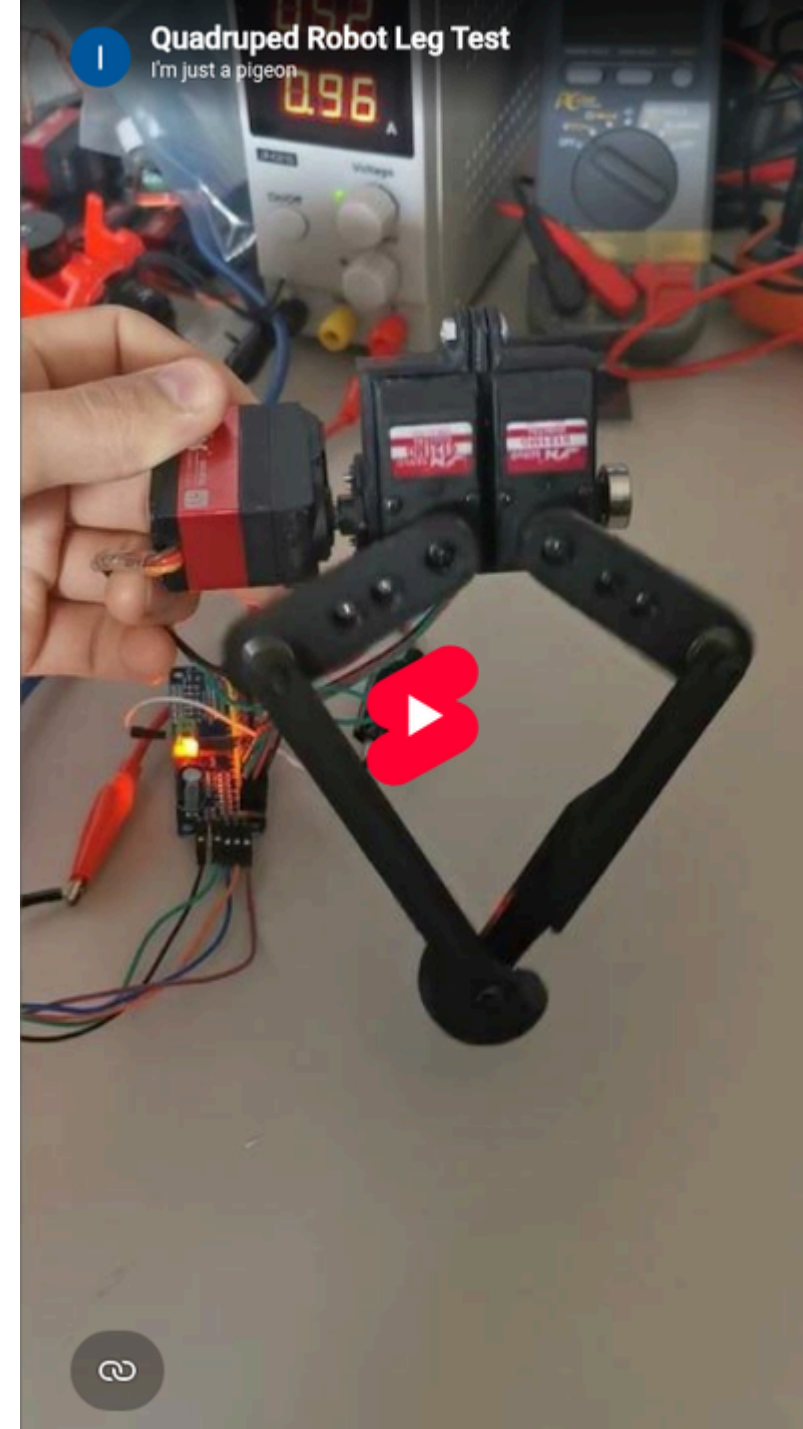
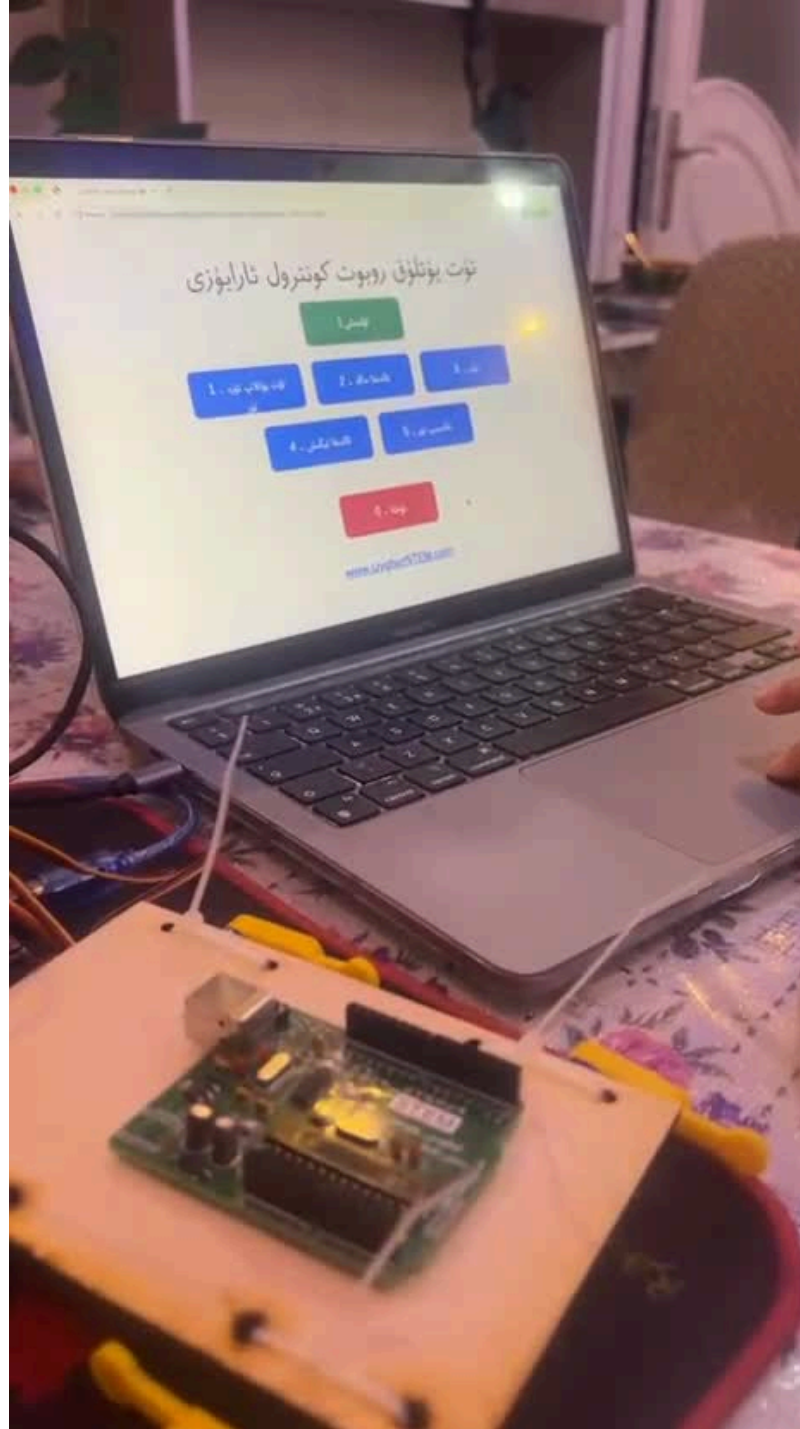
• ئويلاش ، قارار قىلىش



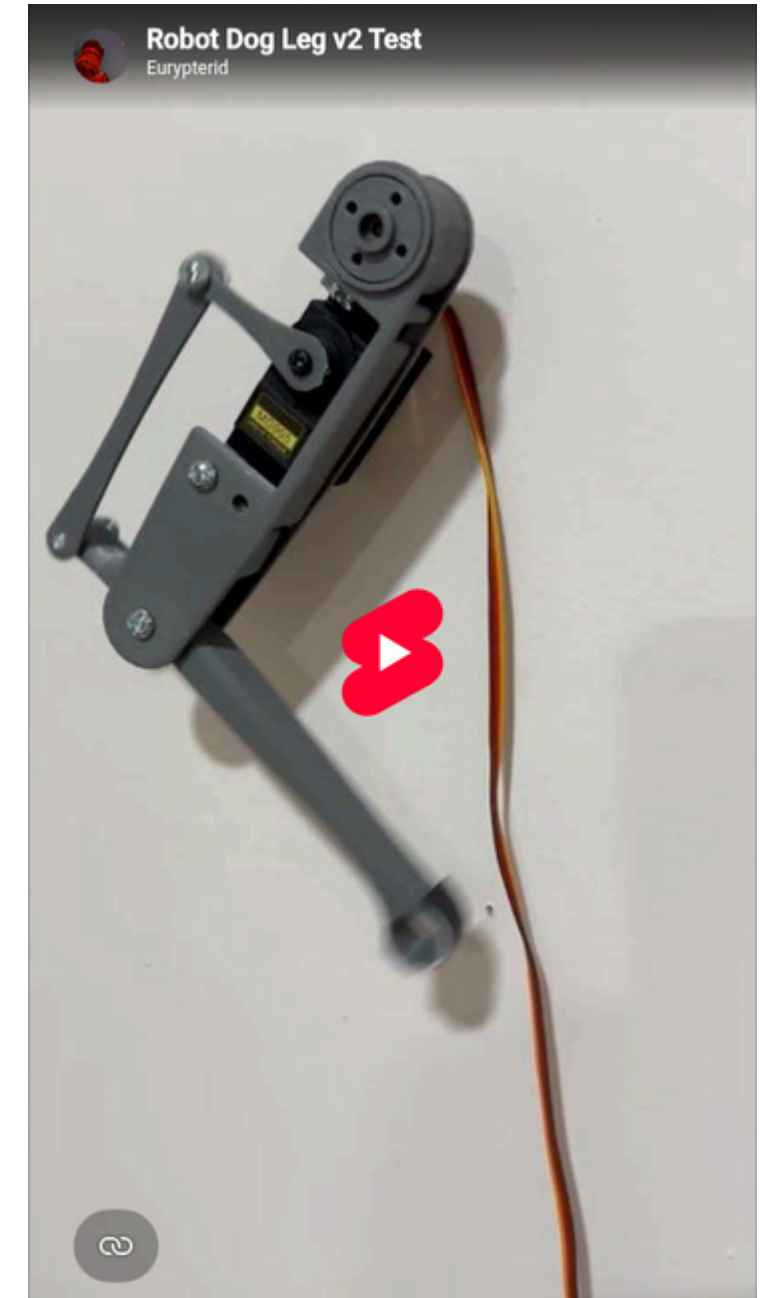
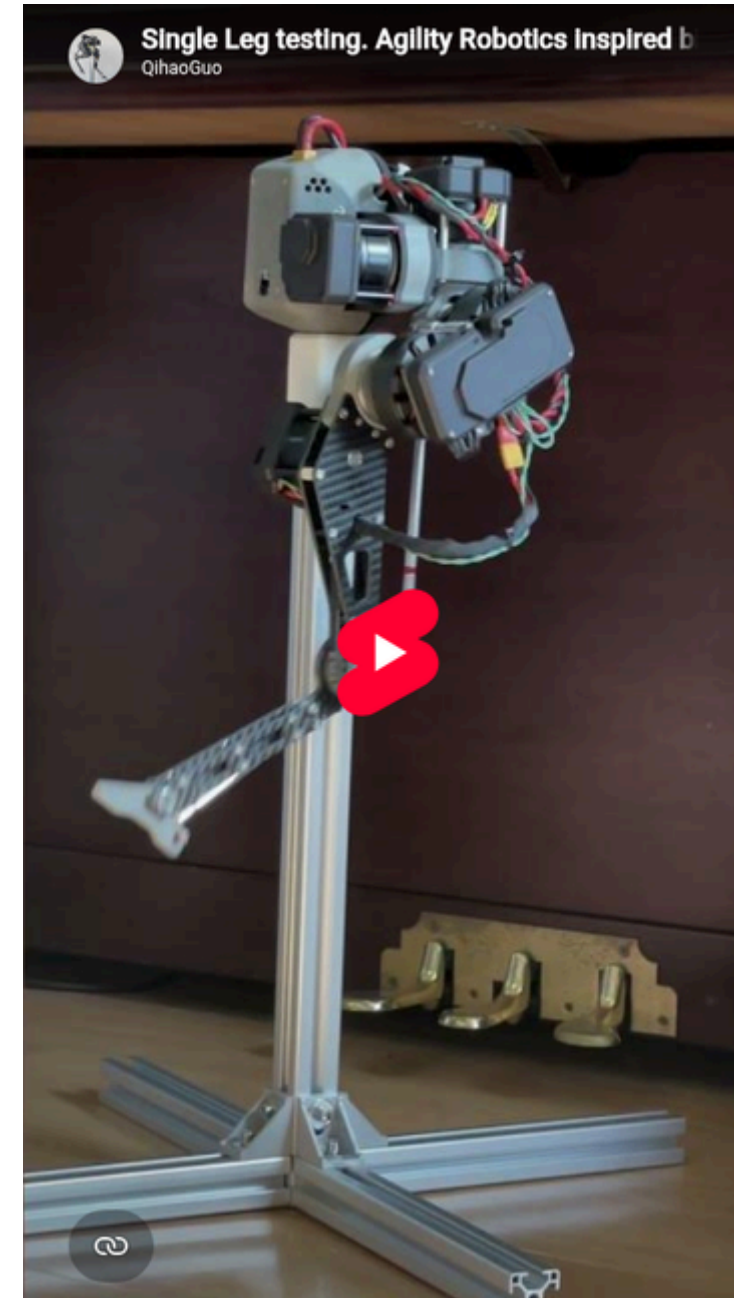
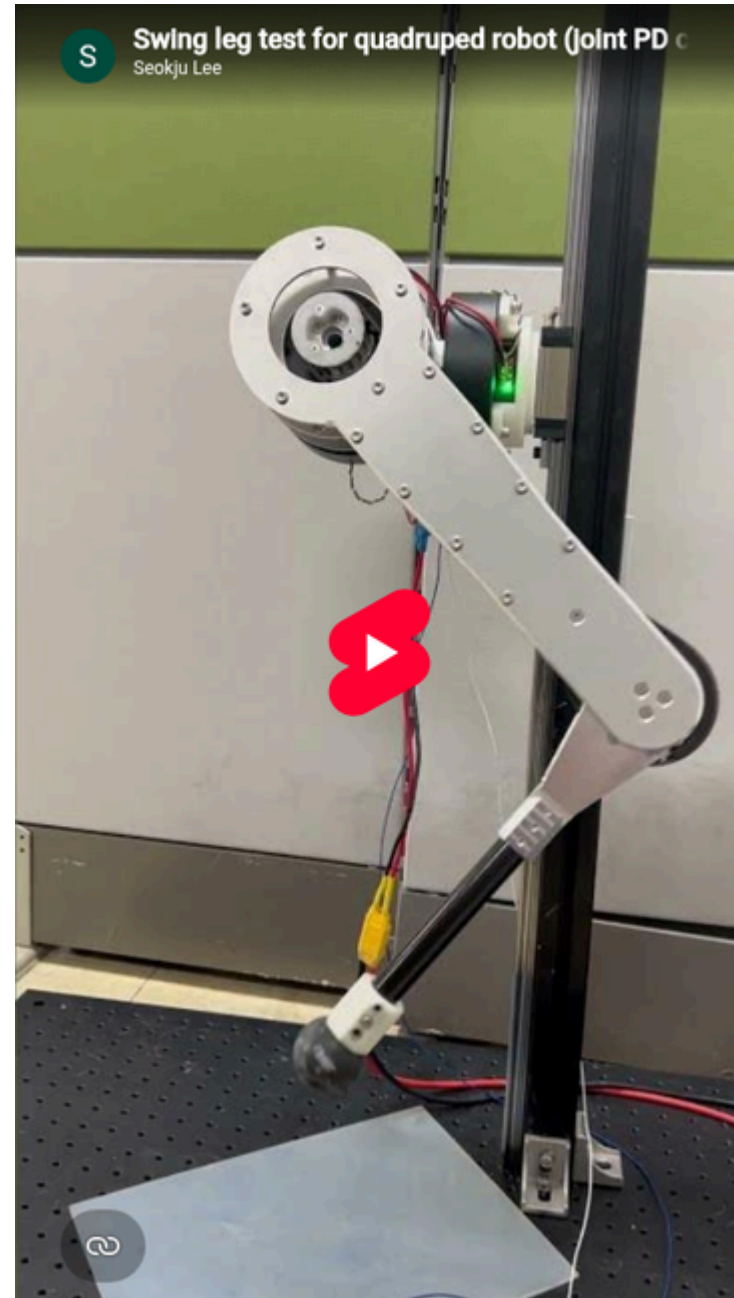
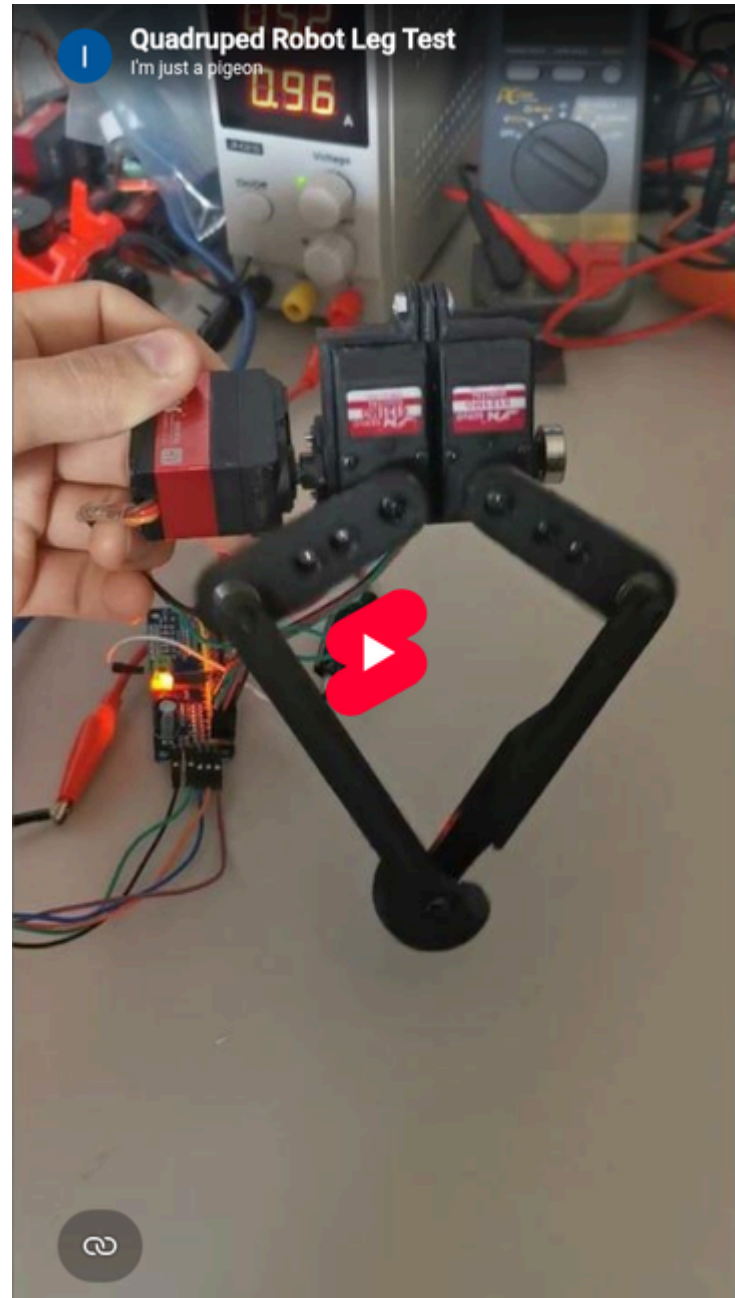
• ھەرىكەت



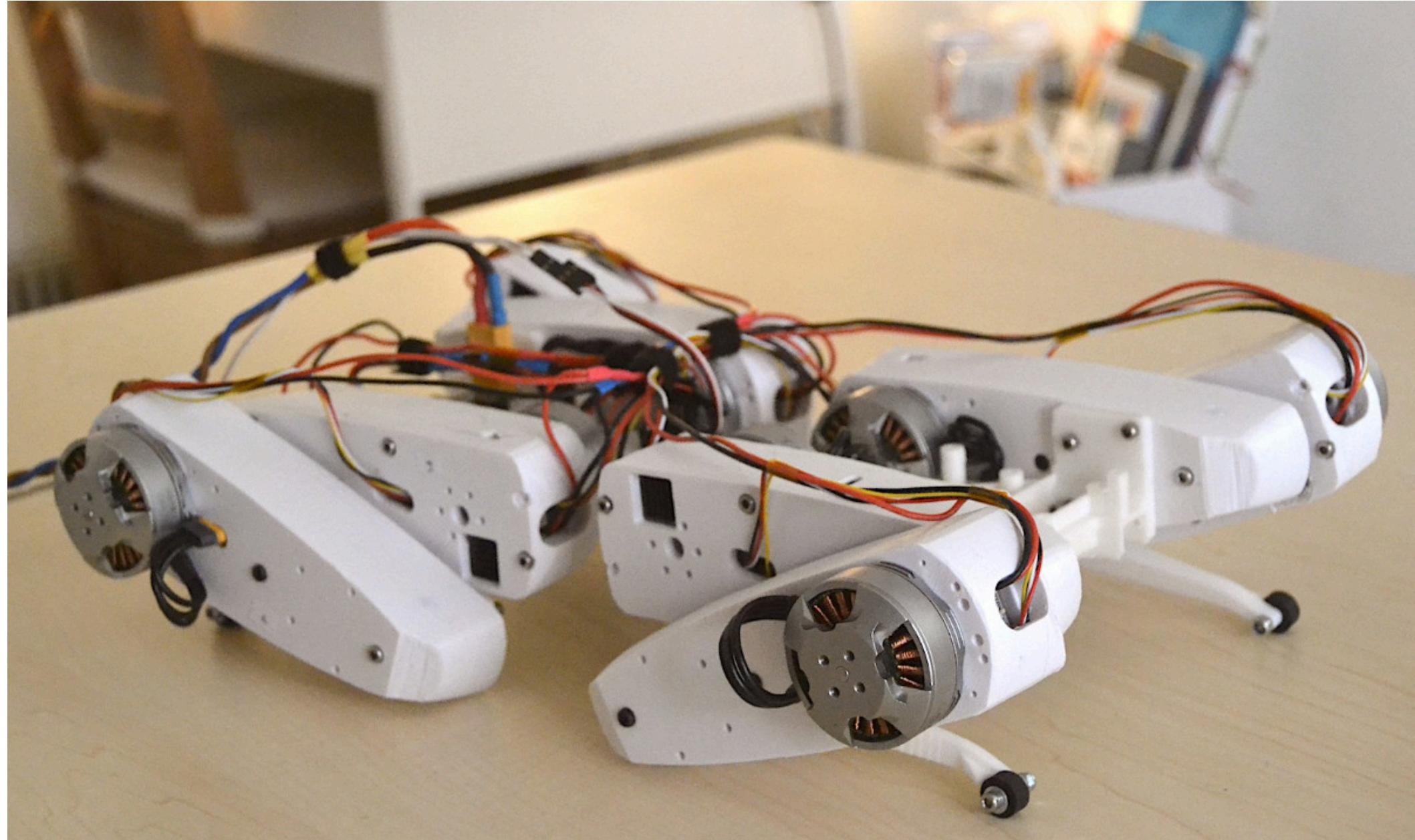
• ھەرىكەت



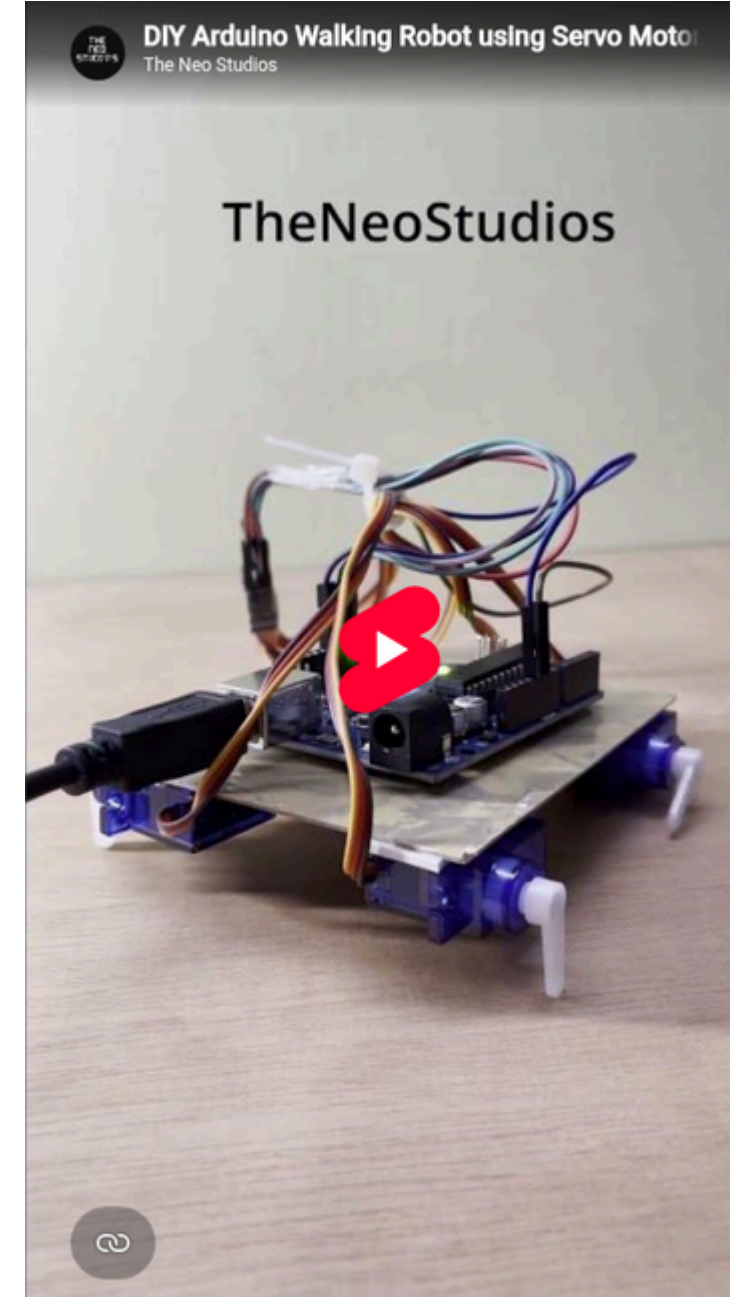
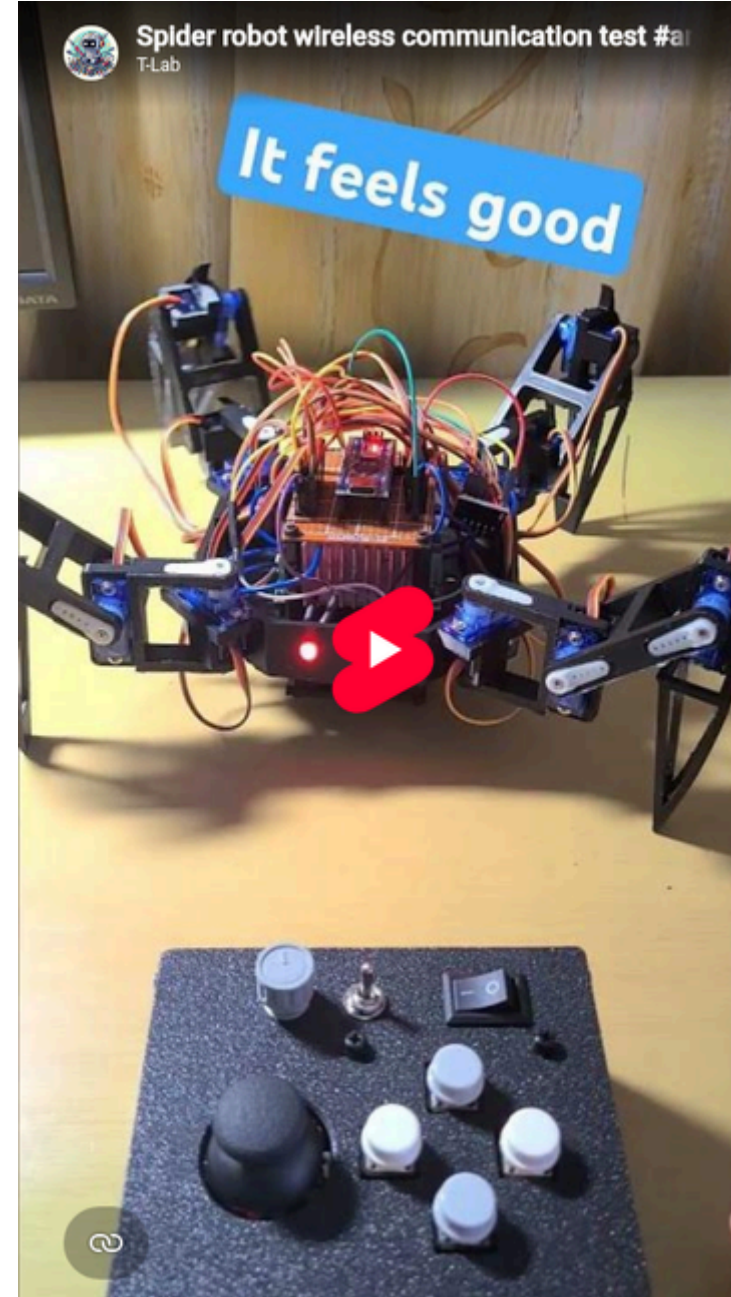
• ھەرىكەت



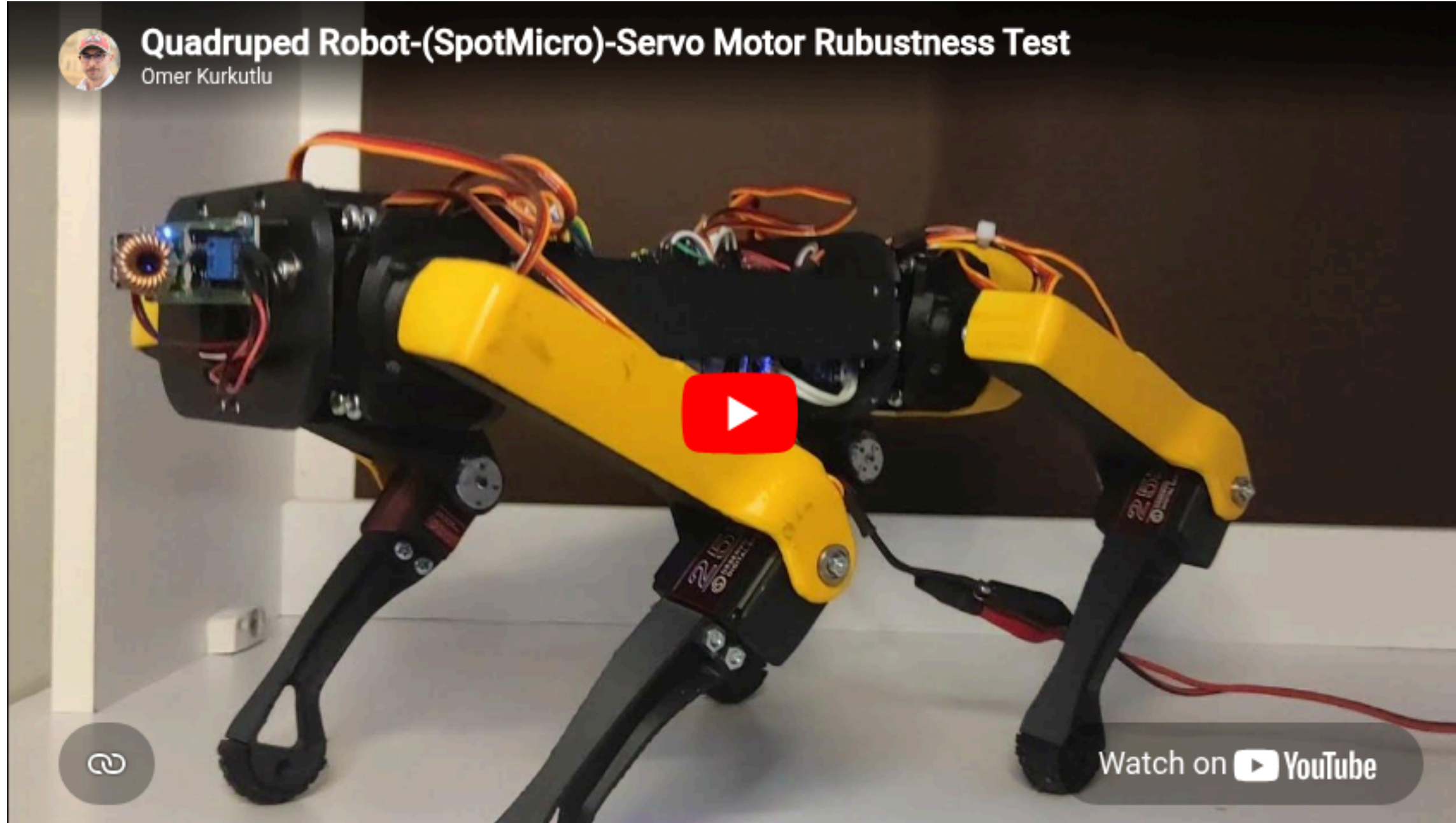
• ھەرىكەت



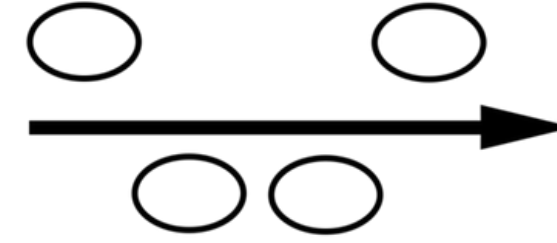
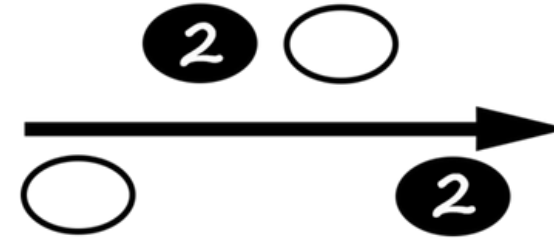
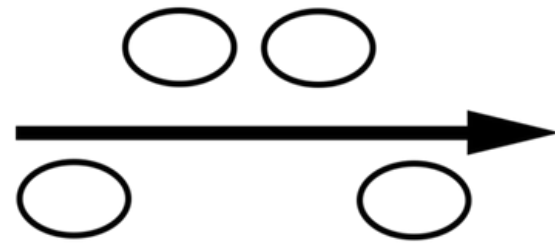
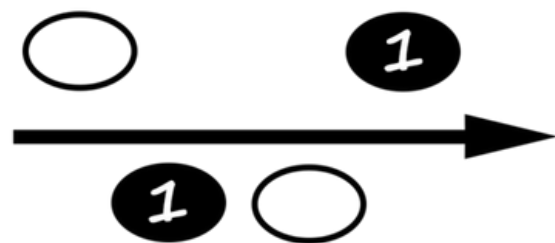
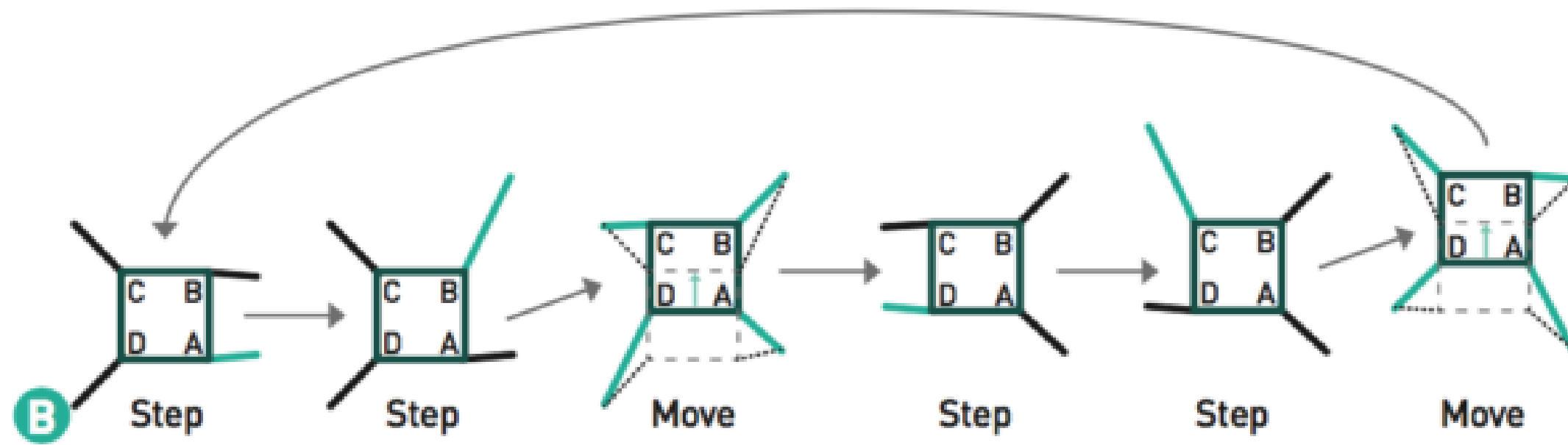
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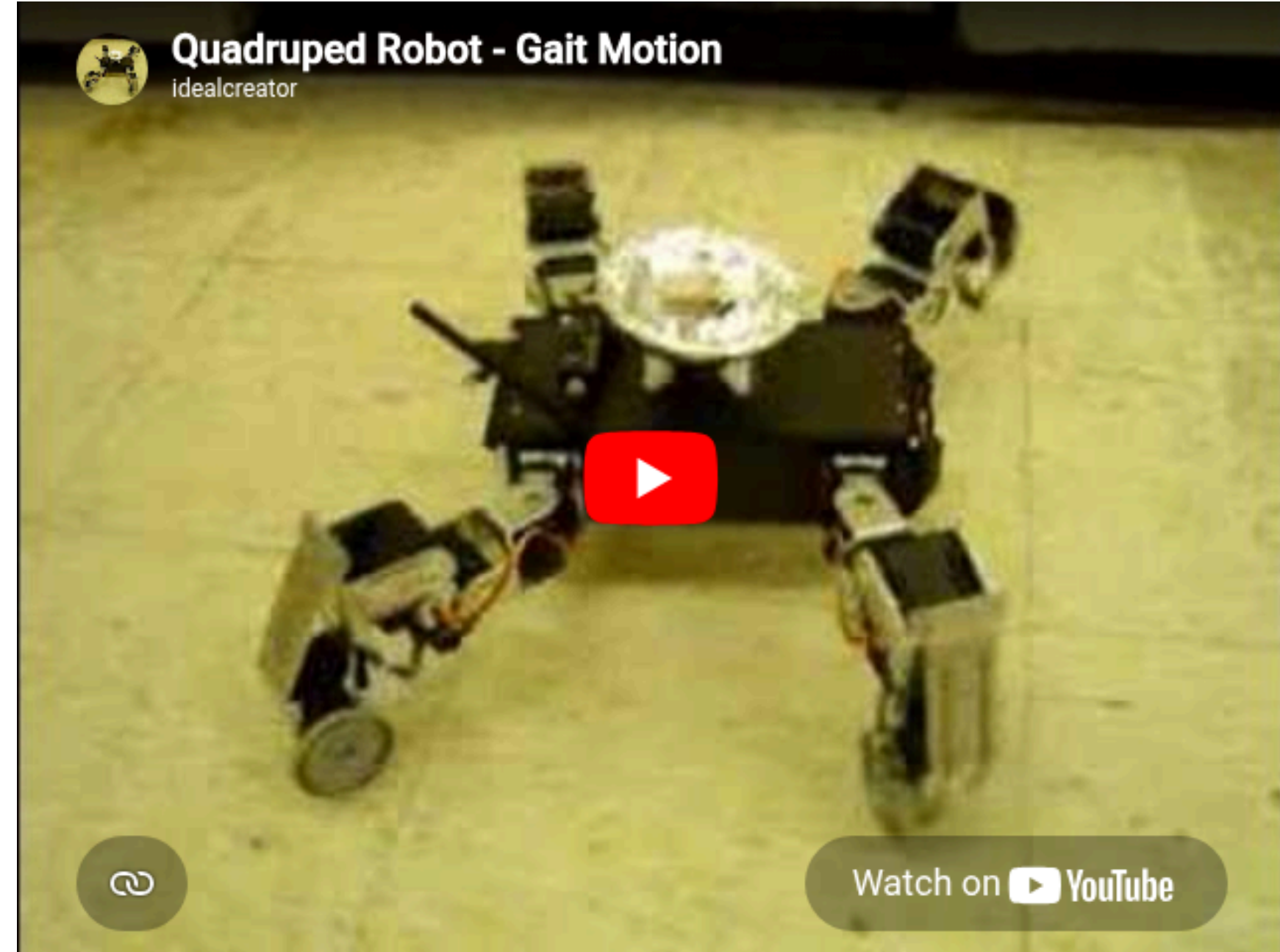
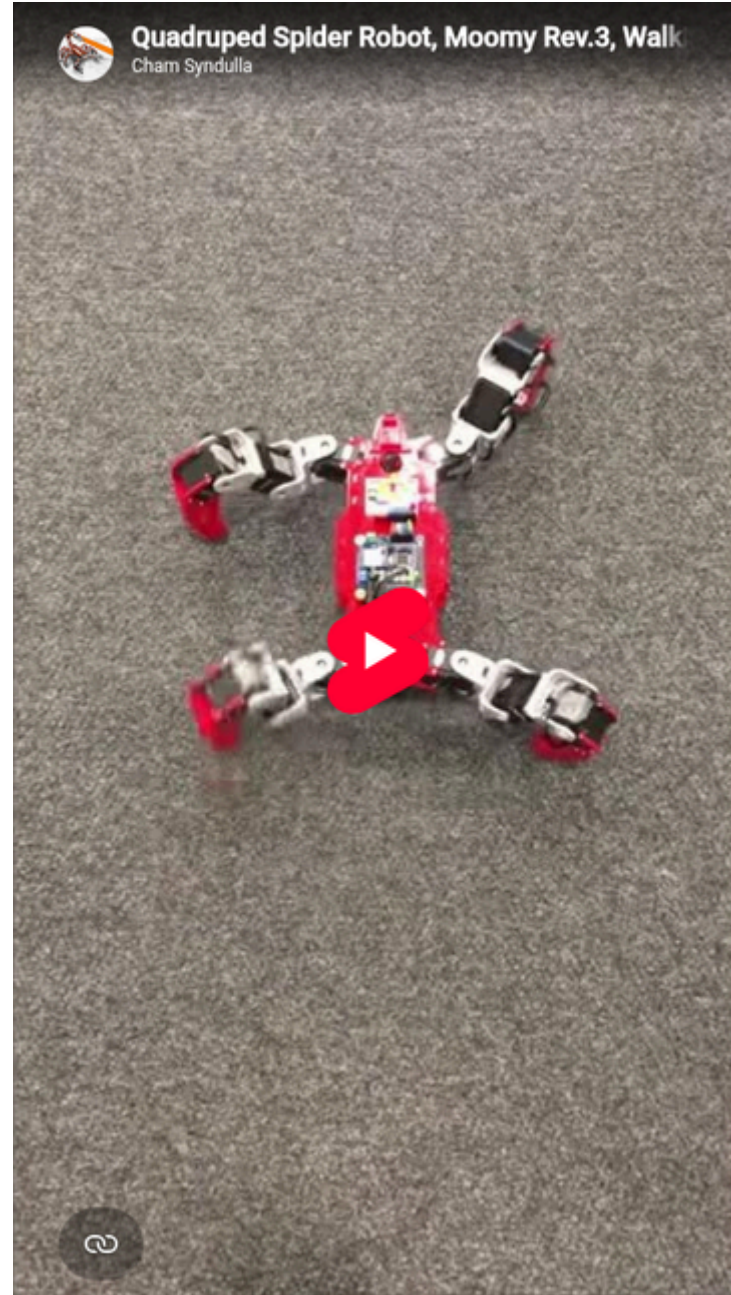
• ھەرىكەت



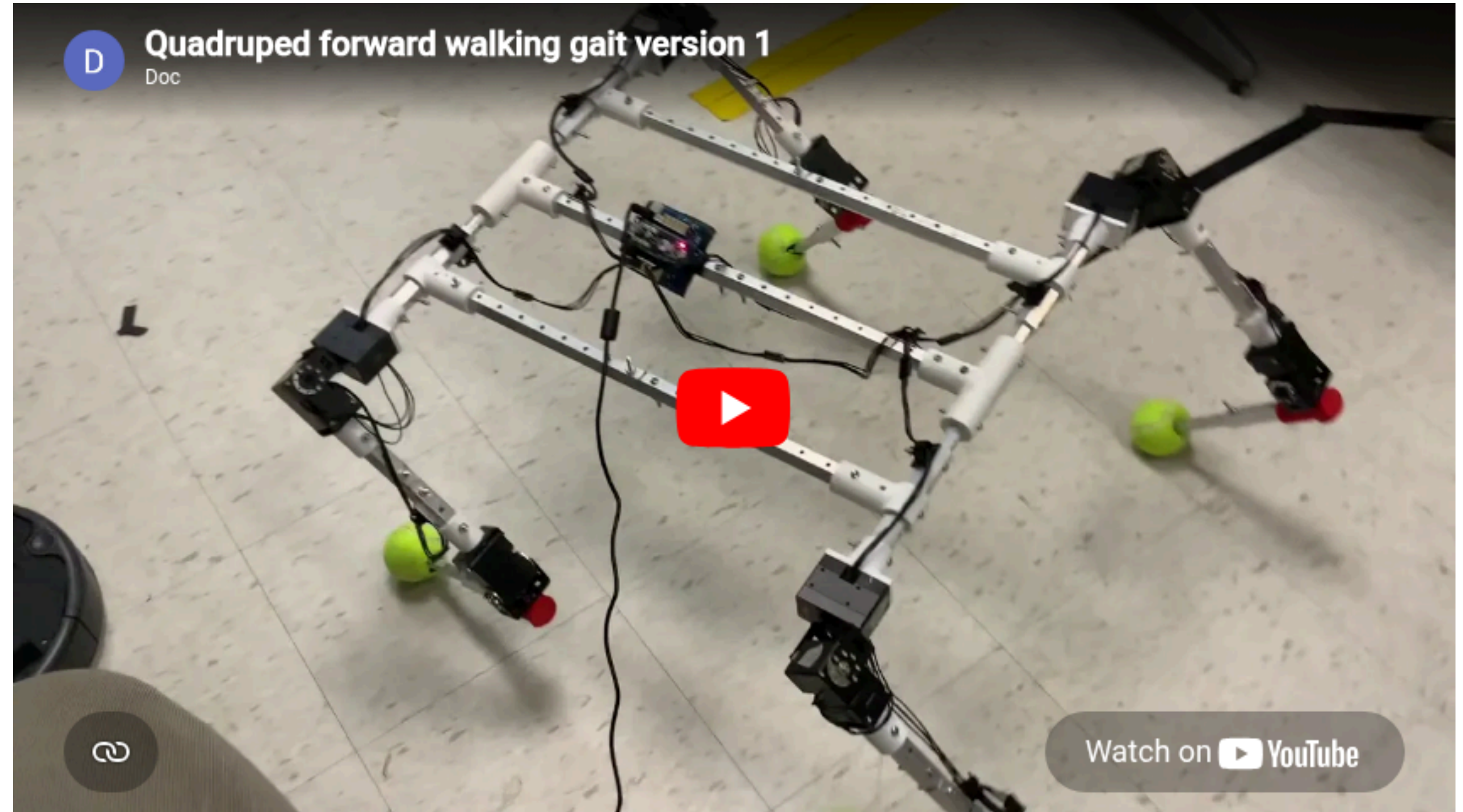
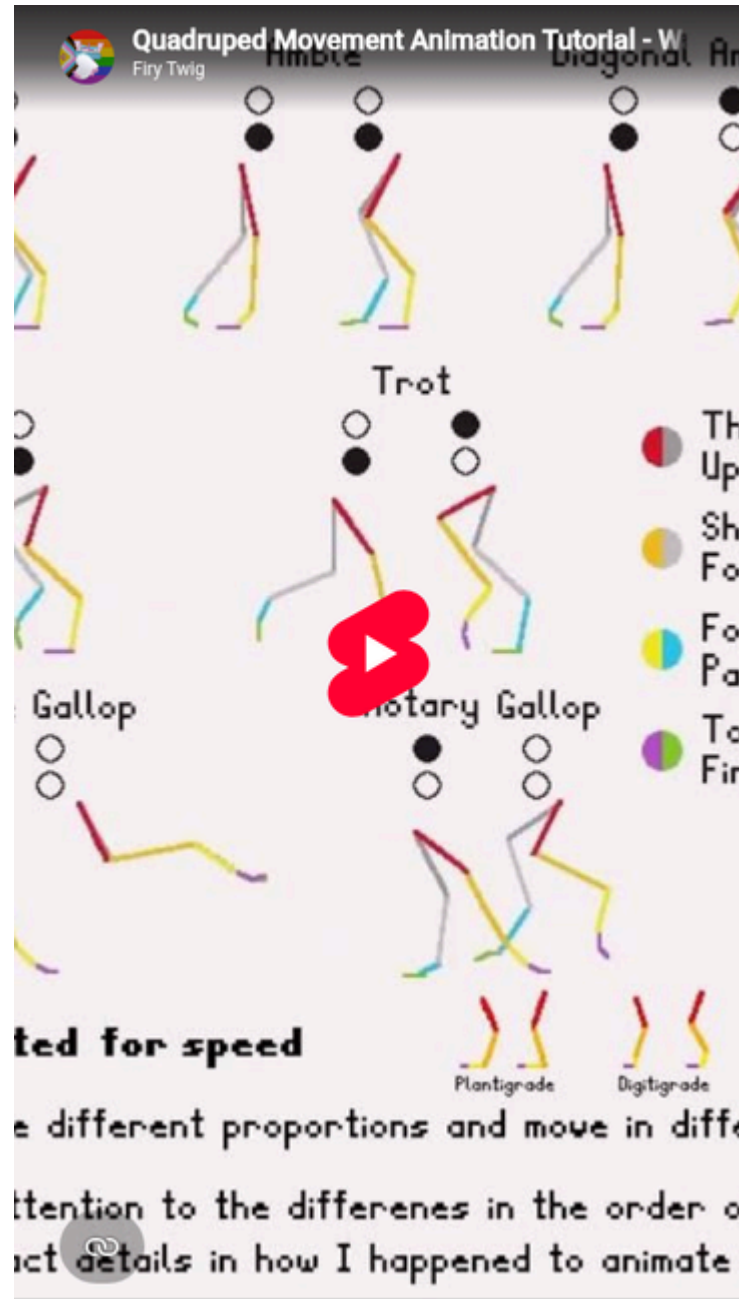
• قانداق ھەرىكەتلەندۈرىمىز؟



• قانداق ھەرىكەتلەندۈرىمىز؟

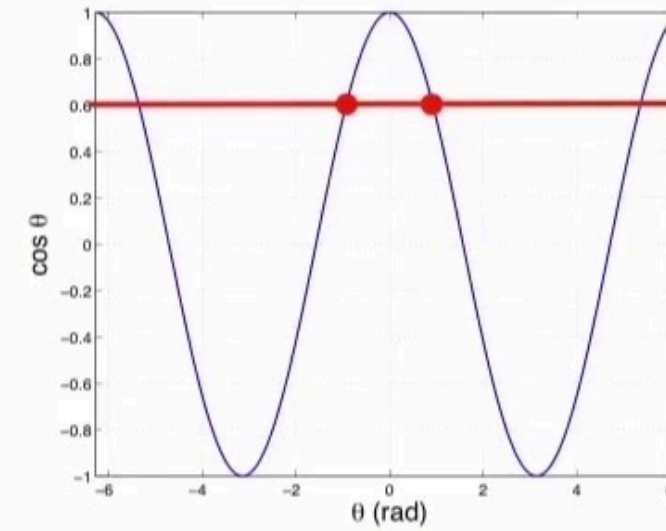
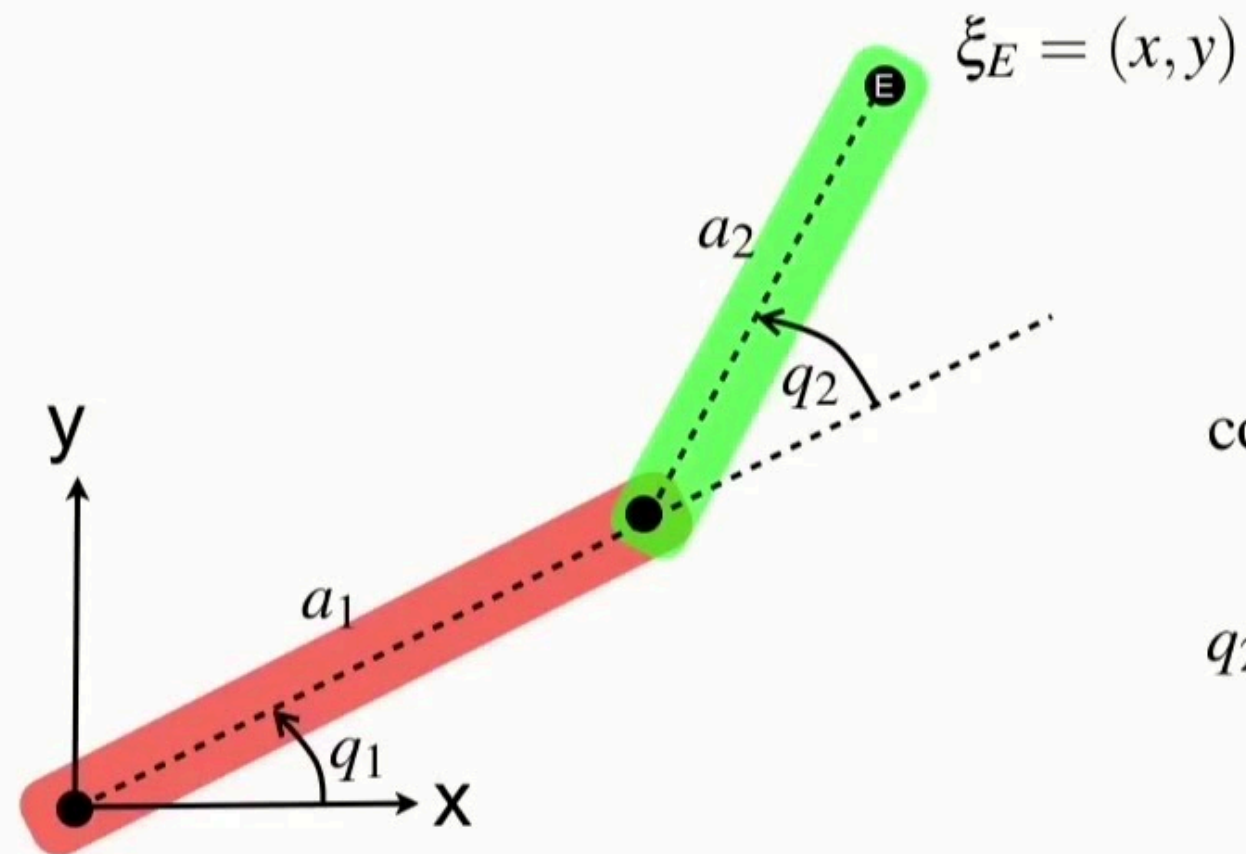


• قانداق ھەرىكەتلەندۈرىمىز؟



• قانداق ھەرىكەتلەندۈرىمىز؟

Tool tip pose



$$\cos q_2 = \frac{x^2 + y^2 - a_1^2 - a_2^2}{2a_1a_2}$$

$$q_2 = \cos^{-1} \frac{x^2 + y^2 - a_1^2 - a_2^2}{2a_1a_2}$$

$$q_1 = \tan^{-1} \frac{y}{x} - \tan^{-1} \frac{a_2 \sin q_2}{a_1 + a_2 \cos q_2}$$

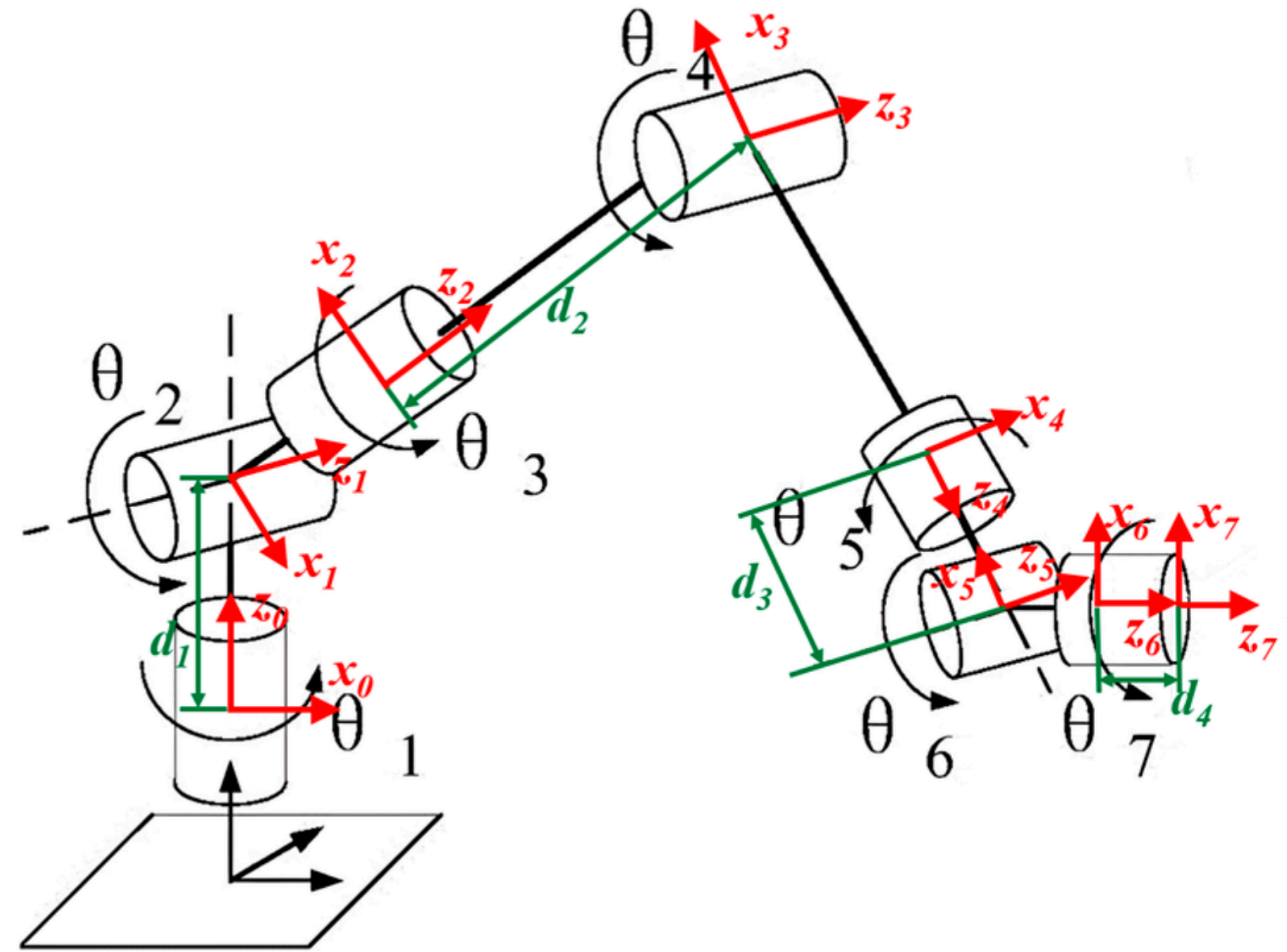
• قانداق ھەرىكەتلەندۈرىمىز؟

Articulated 3R robot in MATLAB using Simscape

mathematical Calculations CAD Model of 3R Robot

i	a_{i-1}	α_{i-1}	d_i	θ_i
1	0	0	0	θ_1
2	L_1	-90	0	θ_2
3	L_2	0	0	θ_3
4	L_3	0	0	0

Block Model



• قانداق ھەرىكەتلەندۈرىمىز؟

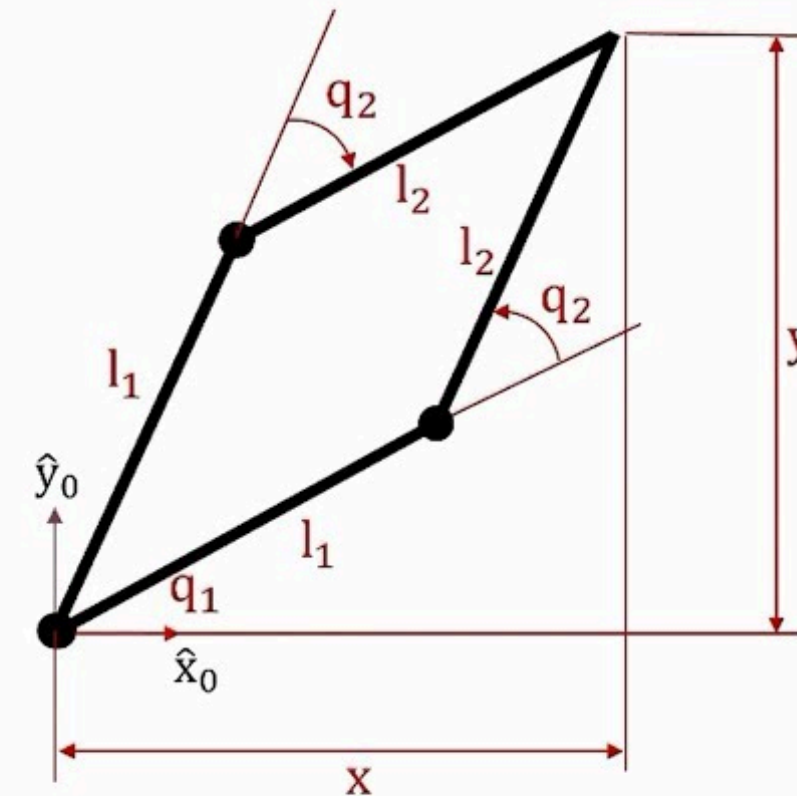
Inverse Kinematics of a 2-Link Planar Robot

There are 2 distinct joint configurations $\mathbf{q} \in \mathbb{R}^2$ for a given end-effector pose $\mathbf{x} \in \mathbb{R}^2$.

$$\mathbf{q} = \begin{bmatrix} \tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{l_2 \sin(q_2)}{l_1 + l_2 \cos(q_2)}\right) \\ \pi - \cos^{-1}\left(\frac{l_1^2 + l_2^2 - x^2 - y^2}{2l_1 l_2}\right) \end{bmatrix}$$

Or

$$\mathbf{q} = \begin{bmatrix} \tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{l_2 \sin(q_2)}{l_1 + l_2 \cos(q_2)}\right) \\ \cos^{-1}\left(\frac{x^2 + y^2 - l_1^2 - l_2^2}{2l_1 l_2}\right) \end{bmatrix}$$

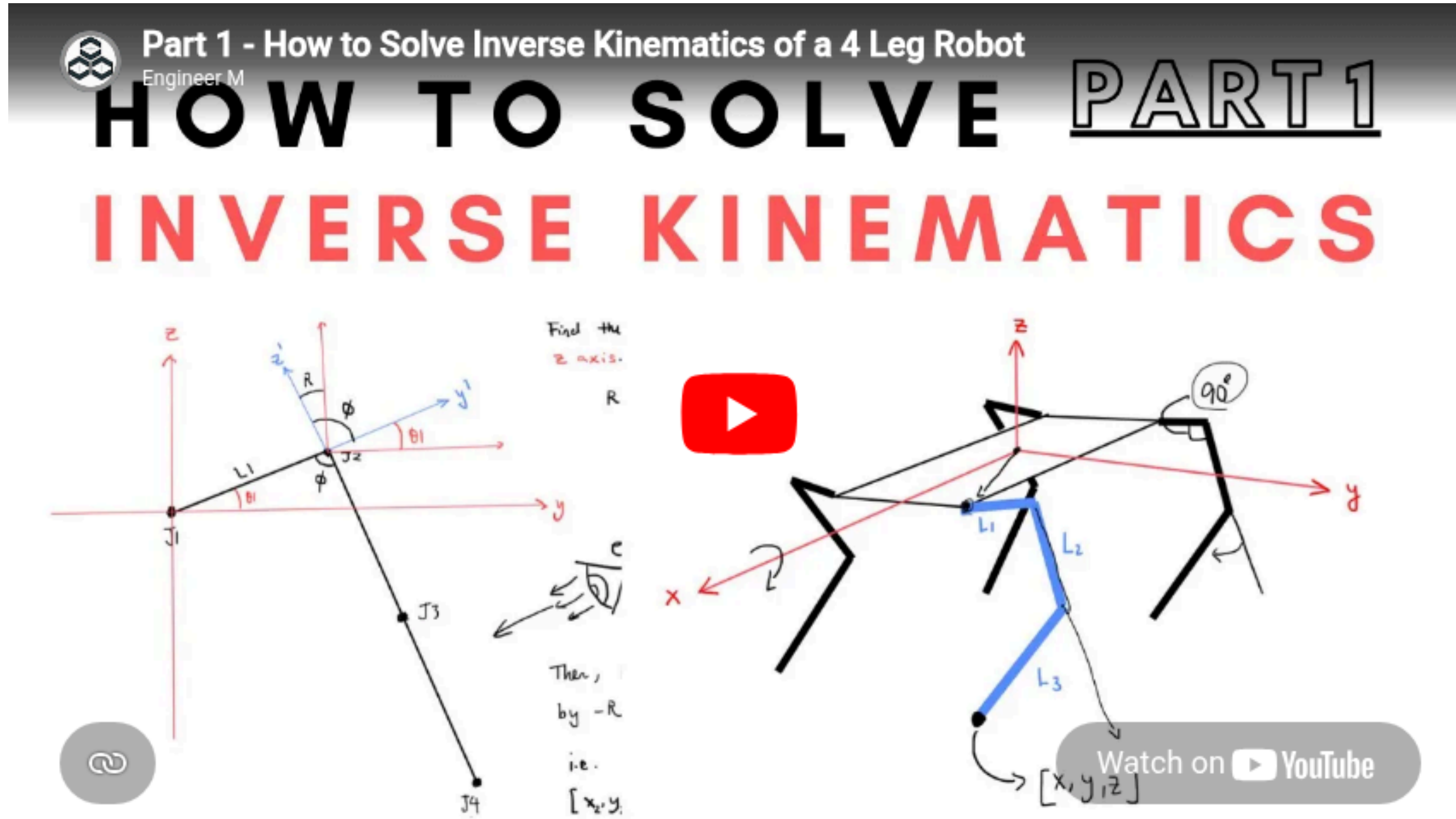


• قانداق ھەرىكەتلەندۈرىمىز؟

Part 1 - How to Solve Inverse Kinematics of a 4 Leg Robot
Engineer M

HOW TO SOLVE PART 1

INVERSE KINEMATICS

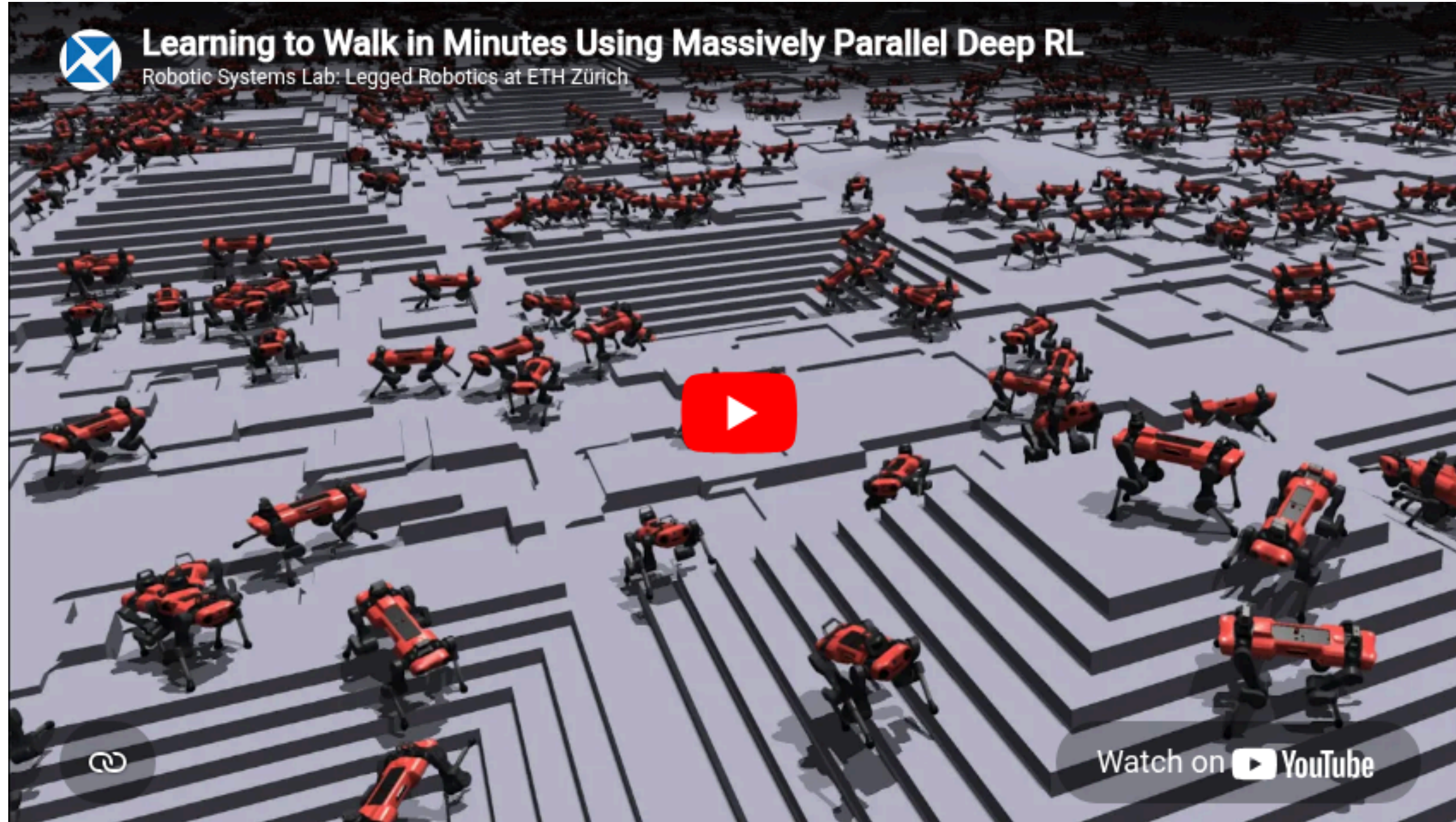


Find the z axis. R

Then, by -R i.e. [x, y]

Watch on YouTube

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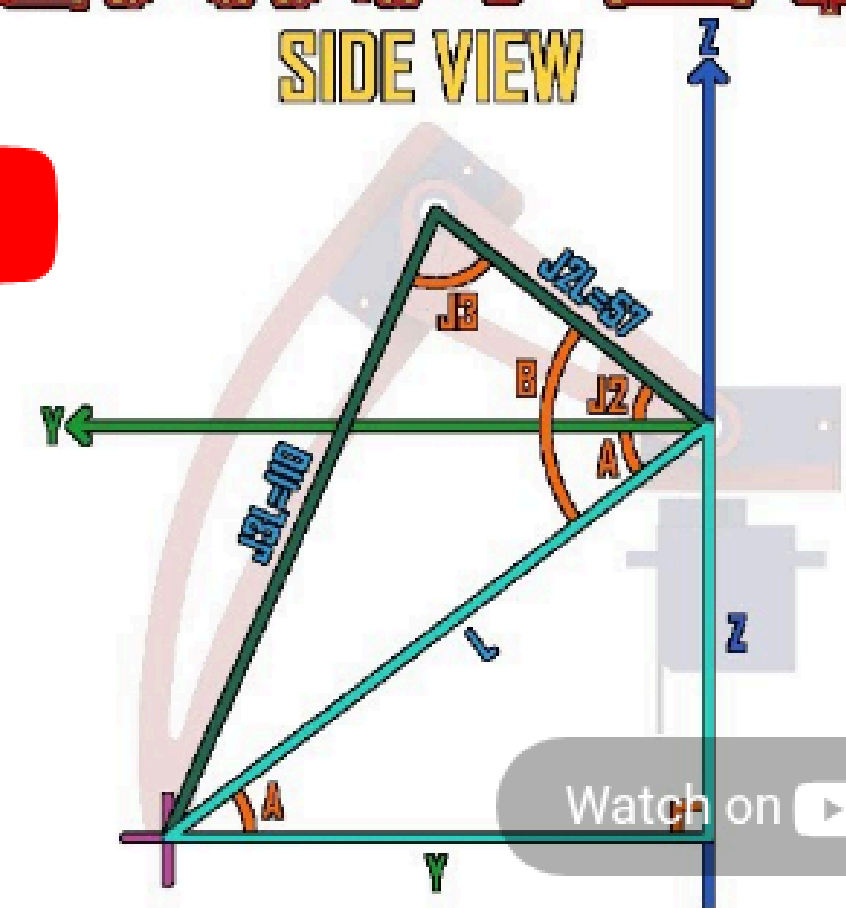






JA MC Robot Inverse Kinematics With A Hexapod Leg
JustAnotherMakerChannel

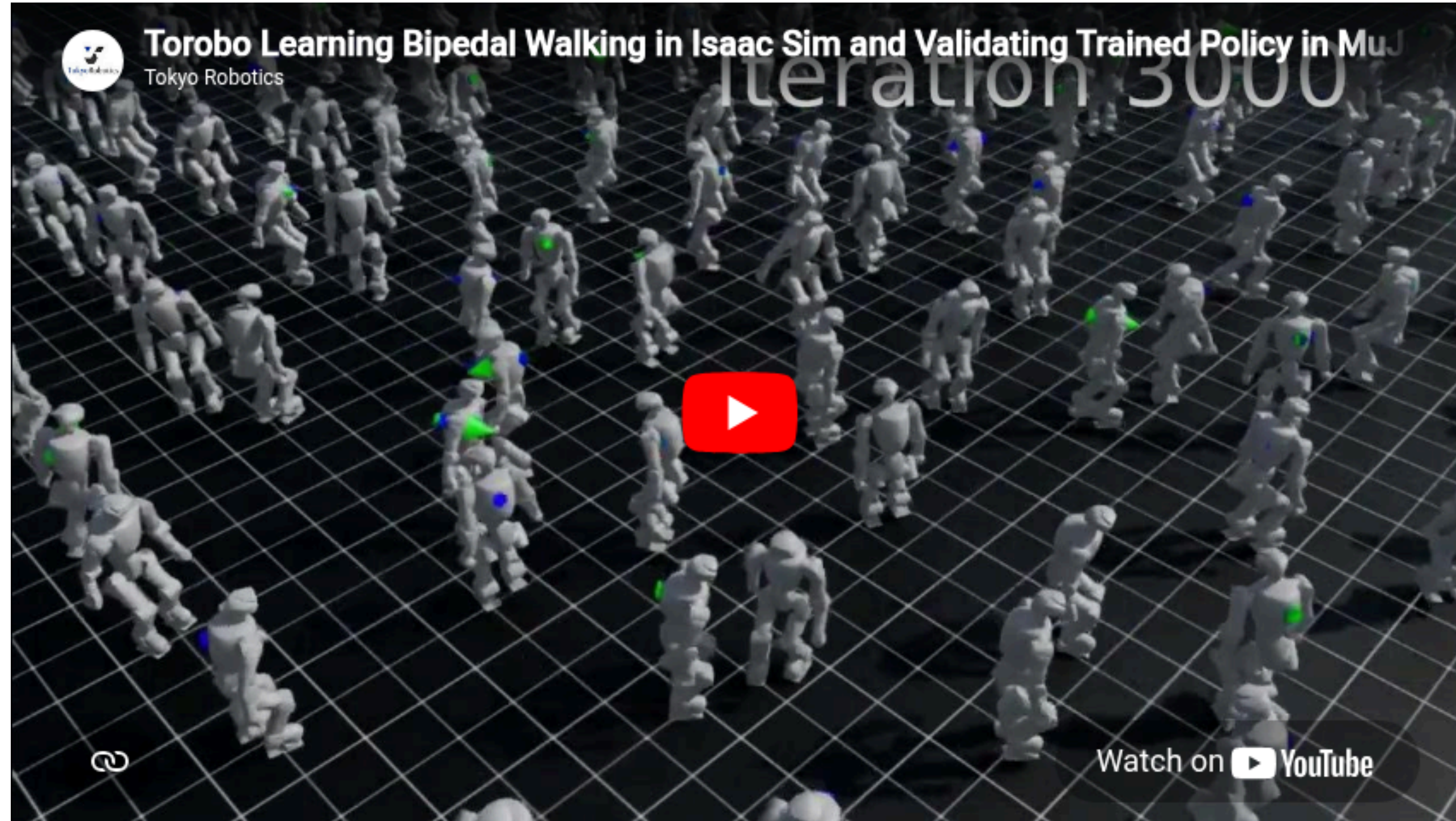
ROBOT INVERSE KINEMATICS

SIDE VIEW



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>S Chinese Quadruped Robot Takes Its First Steps
IEEE Spectrum



FROG-I: overstriding

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 **Mastering Dexterity, Defining Precision | Official release of WUJI HAND!**
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Wuji Hand





 [Watch on !\[\]\(8d2167f8f400a2defb3d6a7d6772232d_img.jpg\) YouTube](#)

