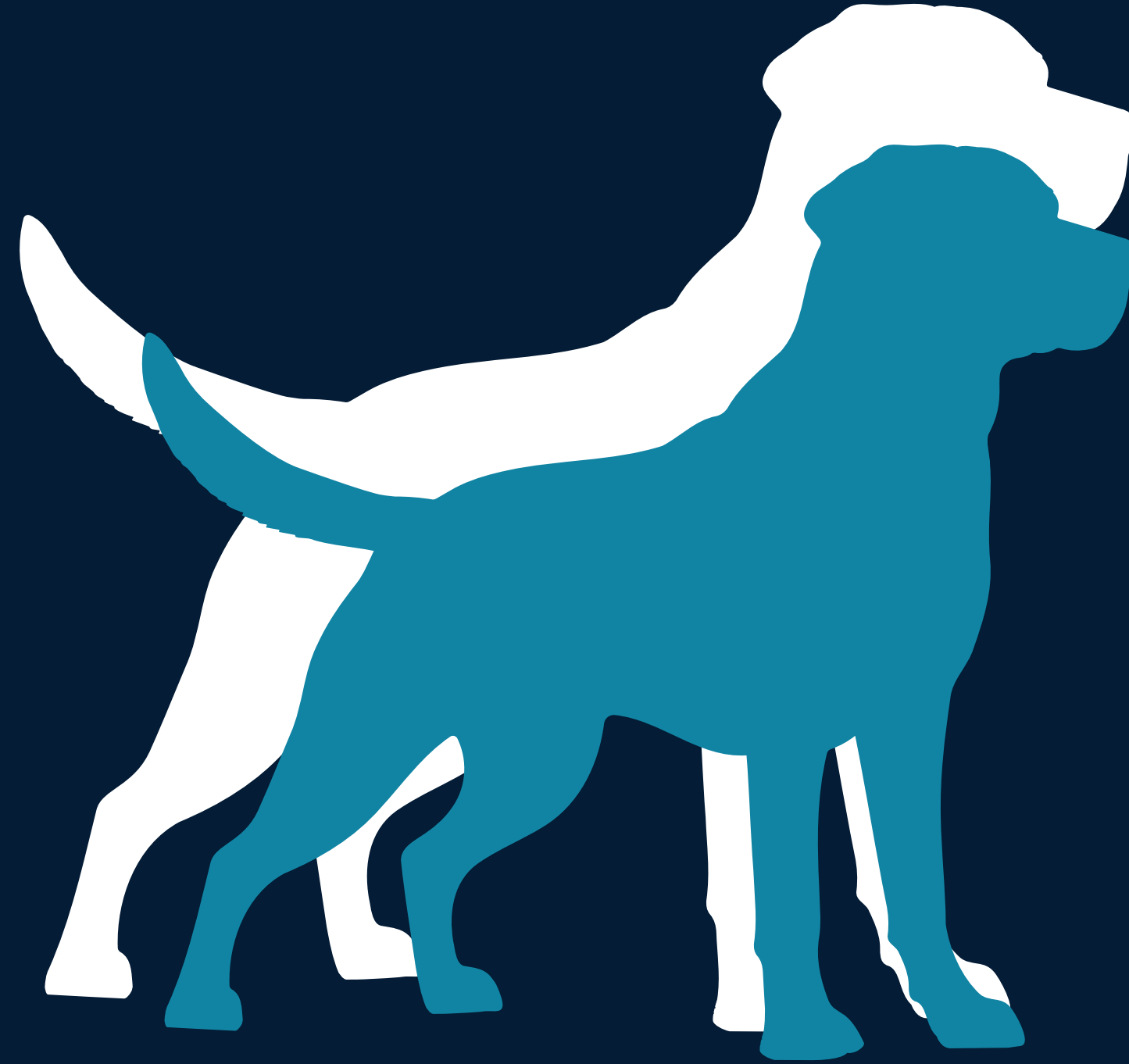


Sistema Embarcado Comercial

Vinícius Menezes Monte
Paulo Diego de Menezes





Unitree Go2

Cachorro Robô



Unitree Go2

Cachorro Robô

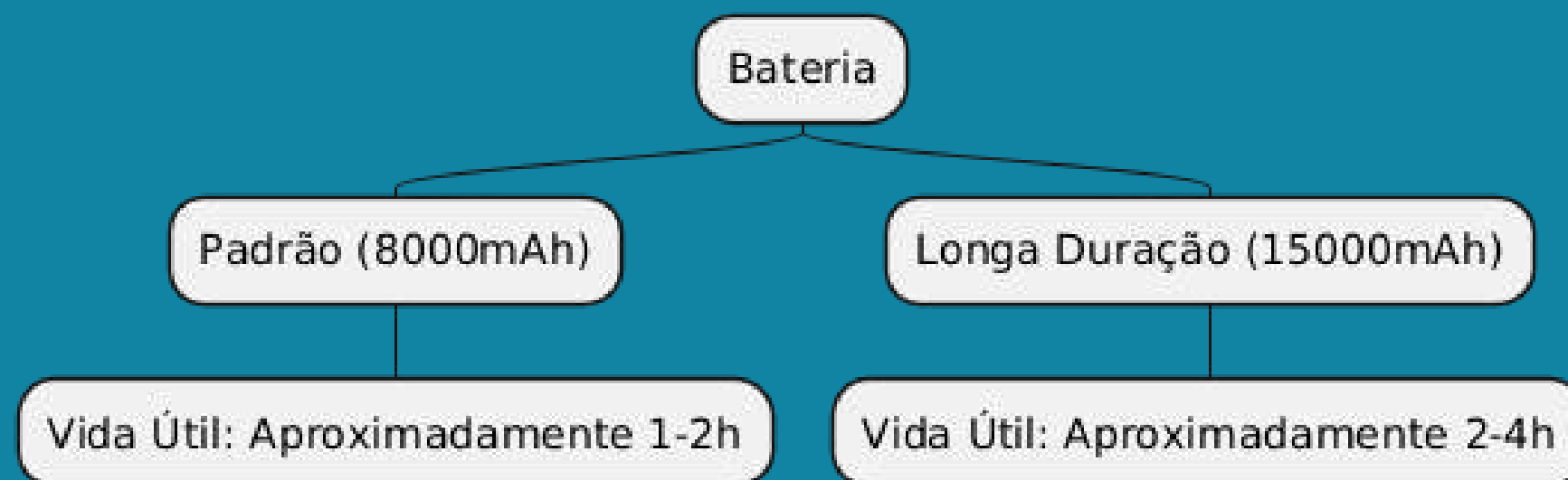
O Go2 na mídia



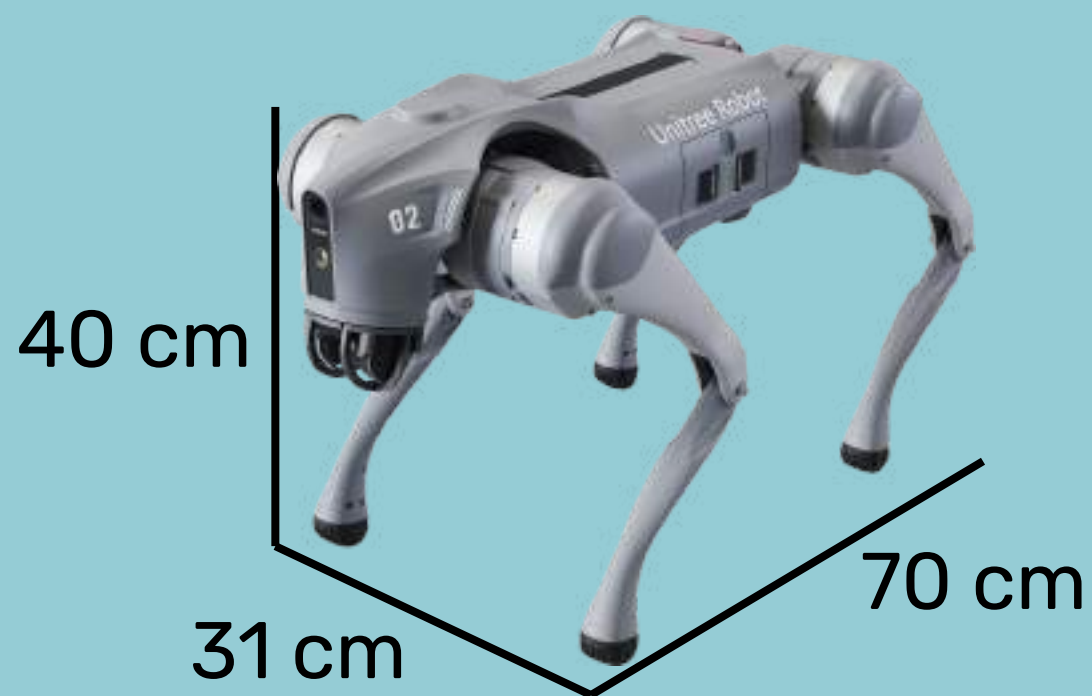
Categoria

Robô Quadrúpede / SEMB de
Consumo e Controle /
Plataforma de Robótica de
Mobilidade Autônoma

Bateria



Dimensões



Peso

Uma criança de
3 a 4 anos

Ou



Conectividade

WiFi 6/Bluetooth/4G

Velocidade Max



Approx. 5m/s

Plataforma



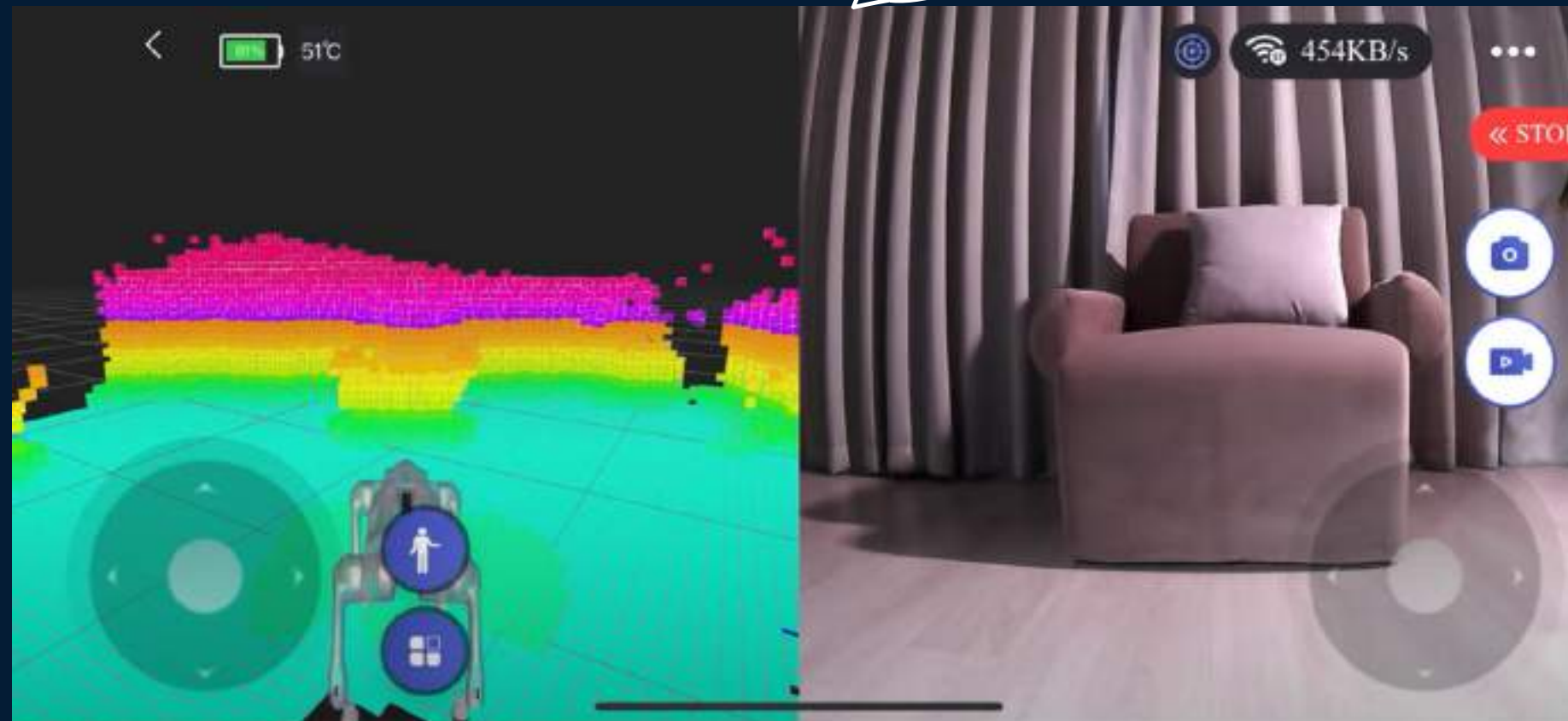
ubuntu[®]
20.04

Carrega até



Controls

- Via Controle Remoto
- Via Controle Beacon
- Via SmartPhone

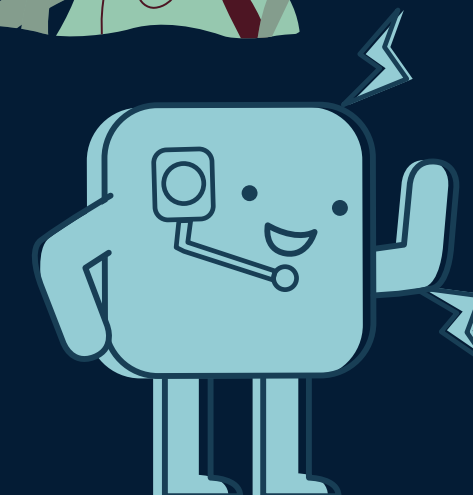


Preços



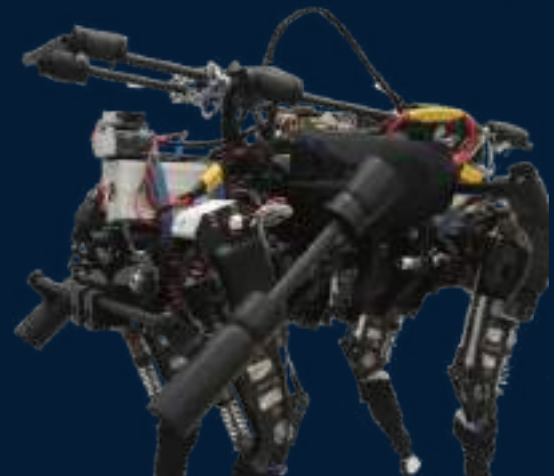
O que ele faz?

- Locomoção: Caminha, Salta, Corre, Escala, Dança, Faz Bananeira, Evita obstáculos
- Segue o usuário através do Beacon em trajetos complexos com obstáculos em ambientes mapeados
- Realiza o mapeamento de ambientes -Utilizando LiDAR
- Cumpre comandos - Senta, Levanta
- Comunicação em linguagem natural
- Capacidade de tirar fotos, gravar e transmitir vídeo
- Segue uma coleira que lhe é colocada
- Conecta-se à internet
- Possui programação customizável
- Serve de receptáculo para o ChatGPT
- Retorna à base de carregamento (Se incluso)



Timeline

Tempo de desenvolvimento e evolução do produto.



2016

XDog

Primeira versão do robô quadrupede, desenvolvido durante o doutorado do CEO da Unitree, Wang Xingxing.



2017

LaikaGo

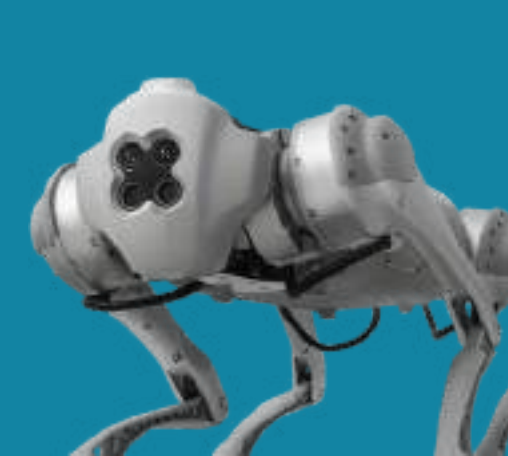
Segunda versão, com melhoras de tamanho, formato, motor, performance energética.



2019

AlienGo

Primeiro lançamento comercial de robô quadrupede da empresa. Melhora no design e em consumo de energia.



2021

Go1

Primeiro Robô quadrupede **da história** acessível ao **público geral**. Melhor performance e novas funcionalidades.



2023

Go2

Modelo atual com preço mais acessível. Novas funcionalidades como **IA** e **LiDAR**.

Lançados para o público geral



Modos de Uso

Modo Companhia



Modo IA

- Adaptação
 - Usa Aprendizado de máquina através da simulação massiva do corpo do robô em ambiente virtual
 - Se adapta ao ambiente
 - Se Levanta



IA na Mobilidade

Através da **simulação** massiva da movimentação de instâncias do robô em ambiente **virtual** é criado um modelo que é incorporado na máquina e ***precisa de um maior poder computacional embarcado para o processo de inferência dos algoritmos de aprendizado por reforço.***



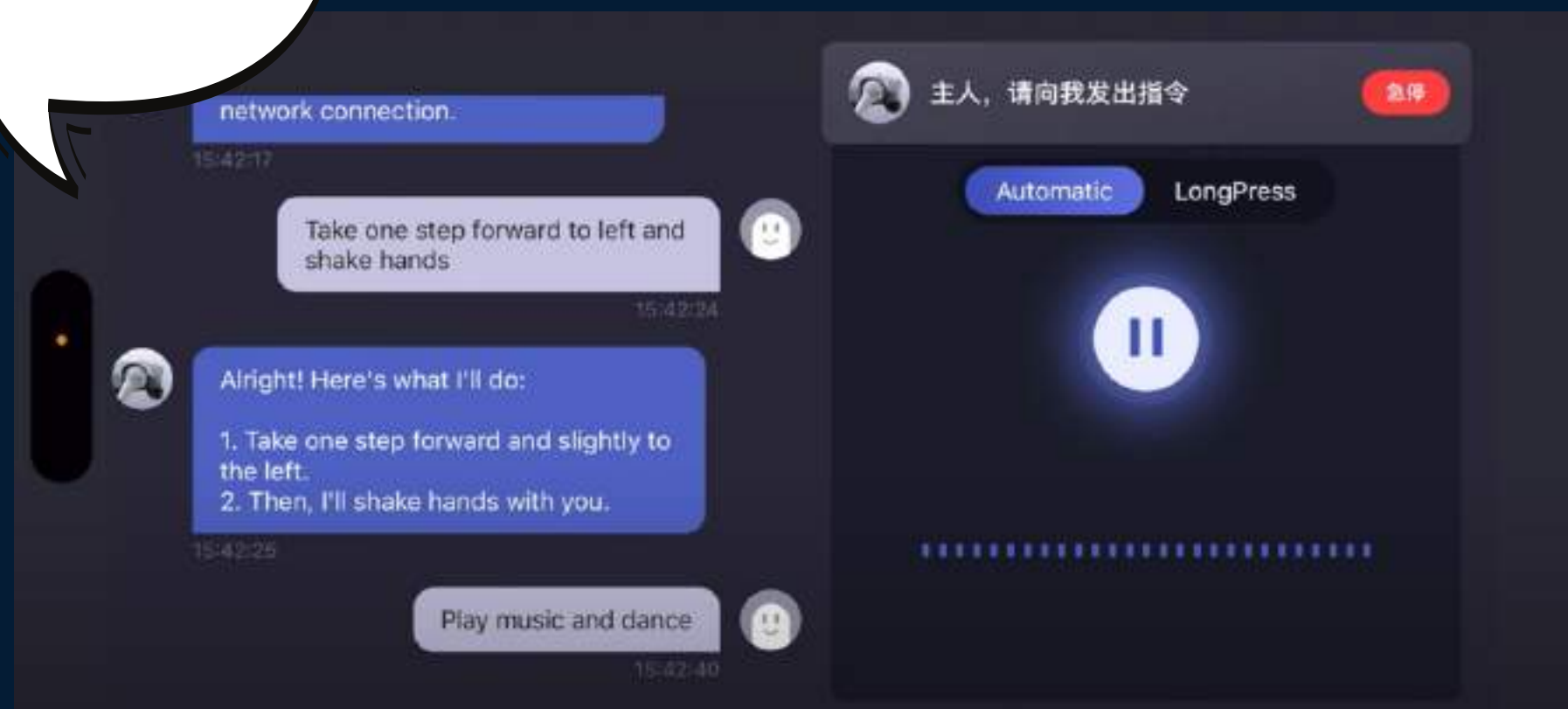
A Revolução das máquinas vem aí?



BenBen

- Usa GPT
 - LLM
 - Processamento de Linguagem natural

Usa Cloud

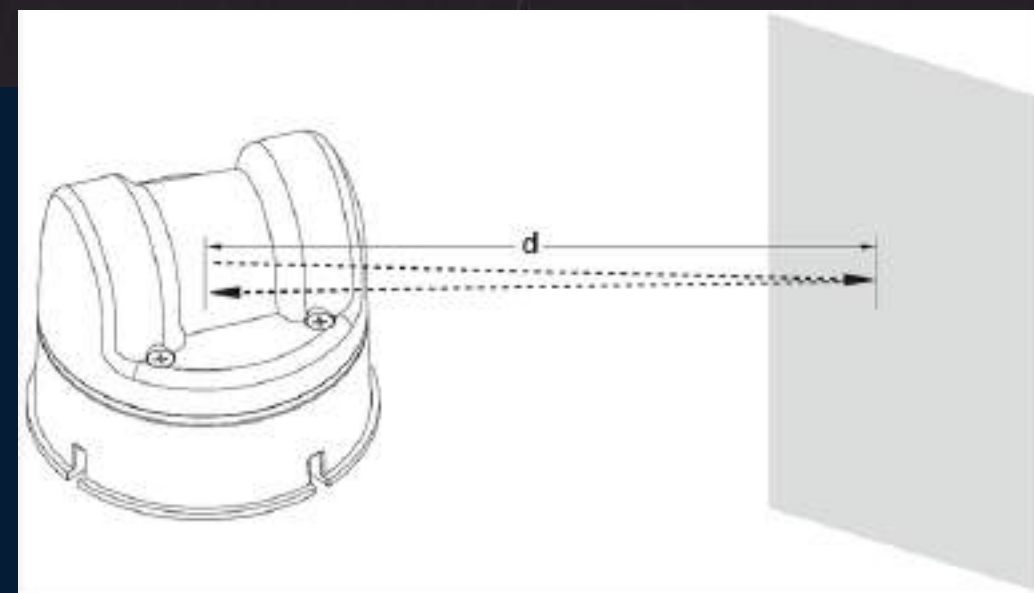
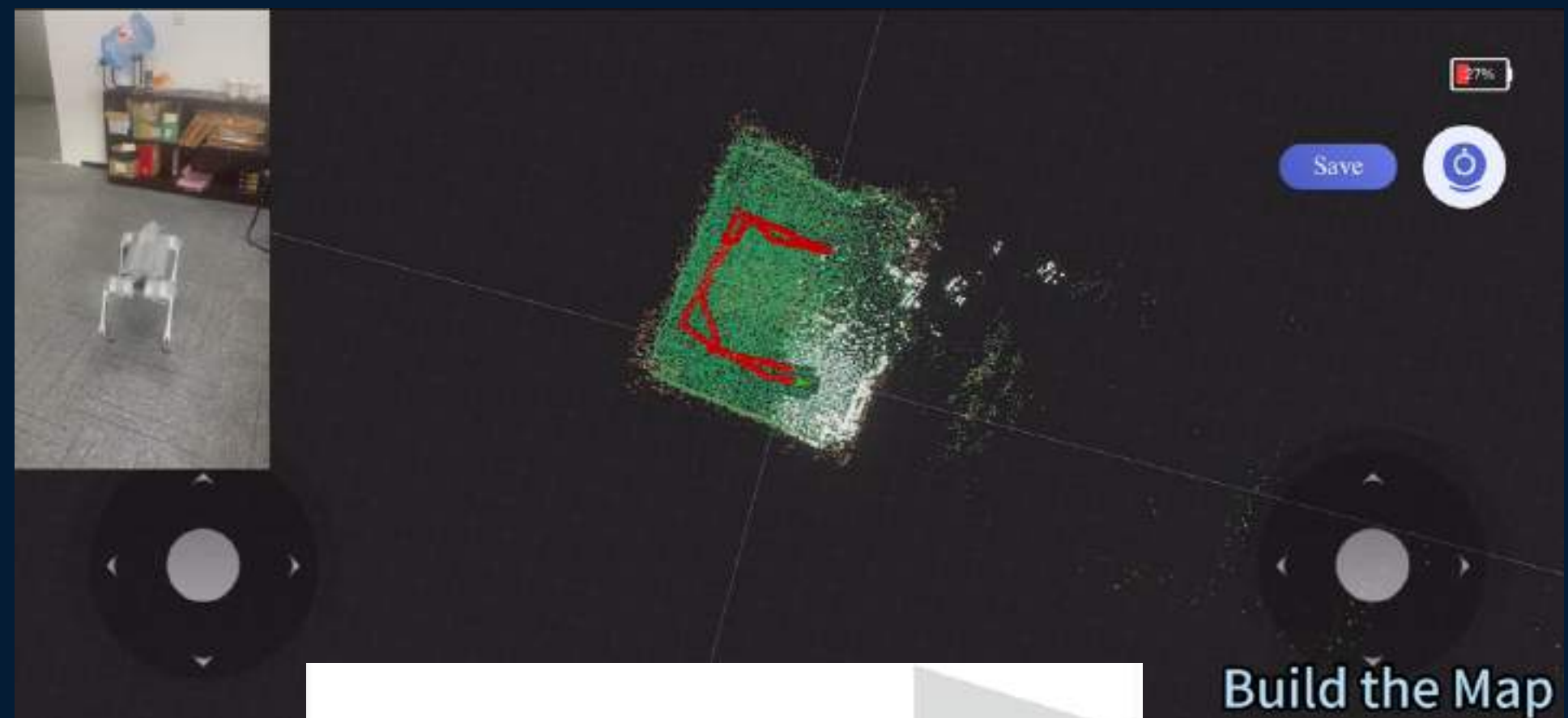


Localmente

Type	Phrase	Voice response	Corresponding action
Wake up	Hey Benben	I'm here.	
Command word	Turn up the sound	Yes sir.	Adjust volume.
Command word	Turn down the sound	OK sir.	Adjust volume.
Command word	Show me a dance	OK, let's dance!	Dance.
Command word	Wiggle Butt	As you wish.	Perform a wiggle.
Command word	Bow with hands	Wish you good luck!	Stand up and bow.
Command word	Lock	Yes, sir. It's done.	Stop the movement and get locked.
Command word	Unlock	OK, now I can move.	Get Unlocked.
Command word	Move forward	No problem.	Unlock and start motion mode to advance for 2s.
Command word	Climbing mode	I'm climbing now.	Start stair climbing mode.
Command word	Running mode	I'm the Flash.	Start run mode.
Command word	Turn on obstacle avoidance	Yes sir.	Start obstacle avoidance.
Command word	Turn off obstacle avoidance	No problem	Stop obstacle avoidance
Command word	Roll over	I'm rolling	Stop rolling.
Command word	Stretch yourself	What a sunny day!	Stretch
Command word	Shake hand	OK sir	Stop moving and lift the front legs to shake hands
Command word	Lie down	I'm tired/I'm sleepy	Stop moving, first switch to standing low, then enter damping mode
Command word	Stand up	Let's go!	Stand up and lock on

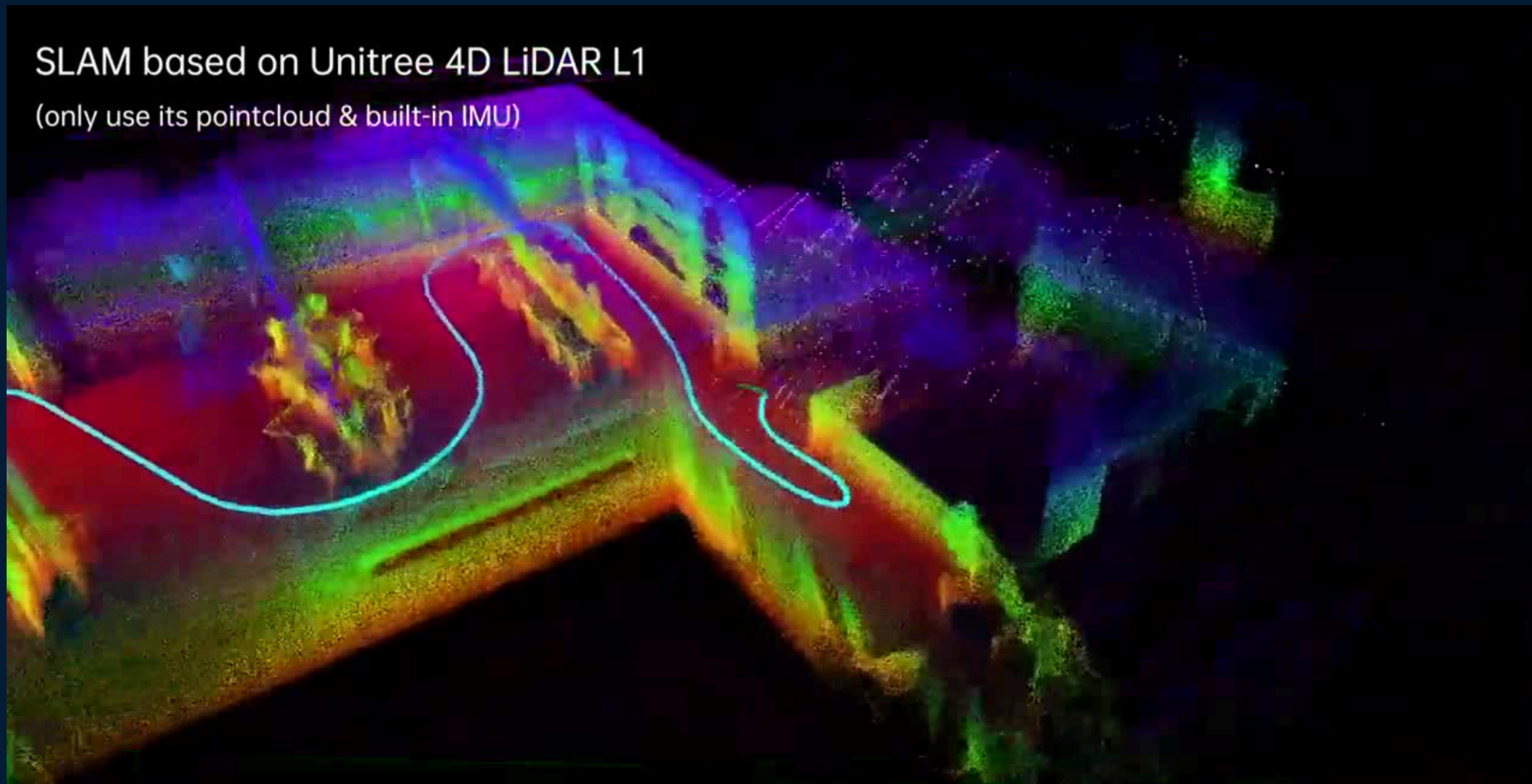
Mapeamento E Seguir Caminho

- Mapeia um espaço
 - LiDAR
- Segue um caminho
 - Usuário traça caminho pelo App
 - O Robô segue o caminho traçado



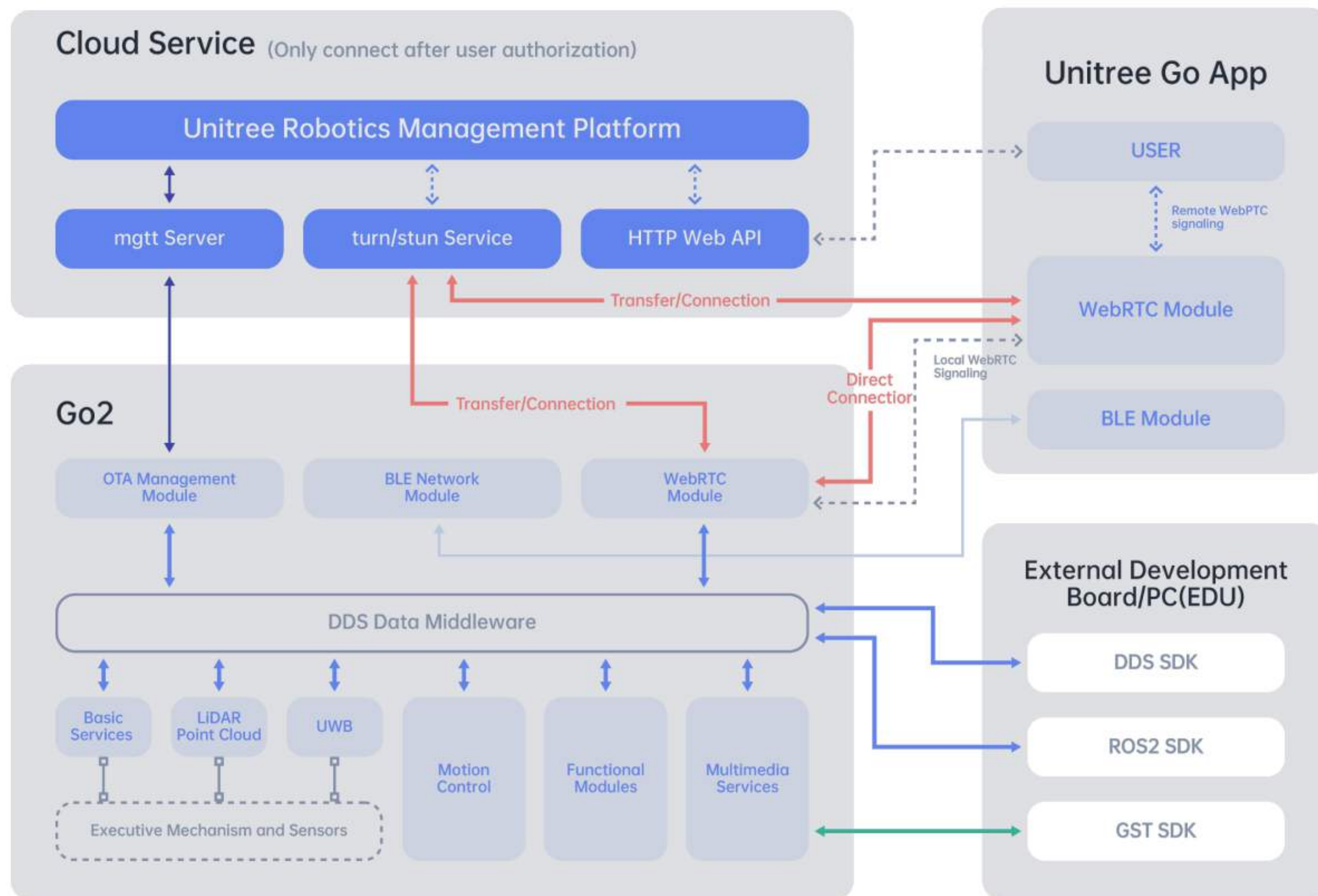
LiDAR 4D

SLAM based on Unitree 4D LiDAR L1
(only use its pointcloud & built-in IMU)





Software

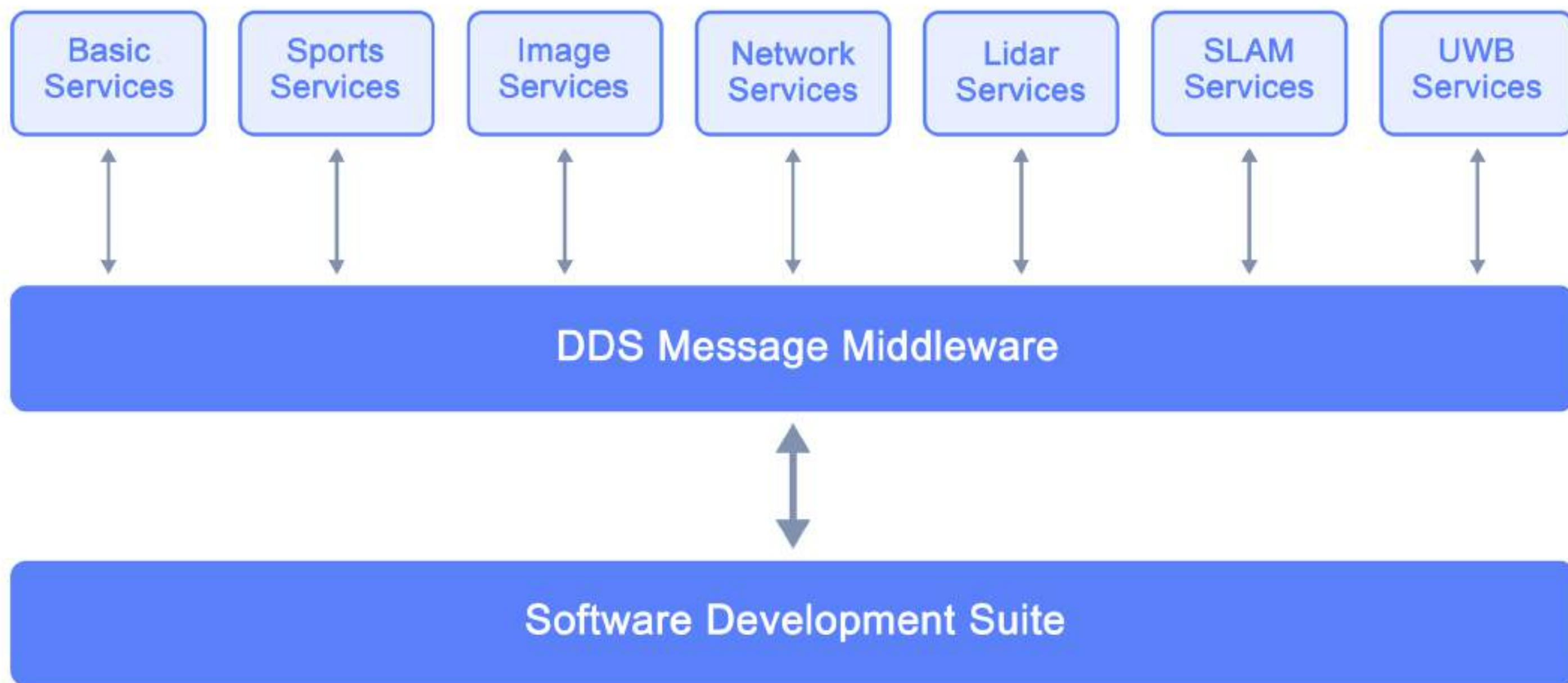


Data Stream

- ↔ DDS data
- ↔ WebRTC Data Communication
- ↔ GST Streaming
- ↔ Other Data Communication
- ↔ MQTT Publishing Subscription
- ↔ HTTP Data
- ↔ Bluetooth BLE Data
- □ Serial Communication

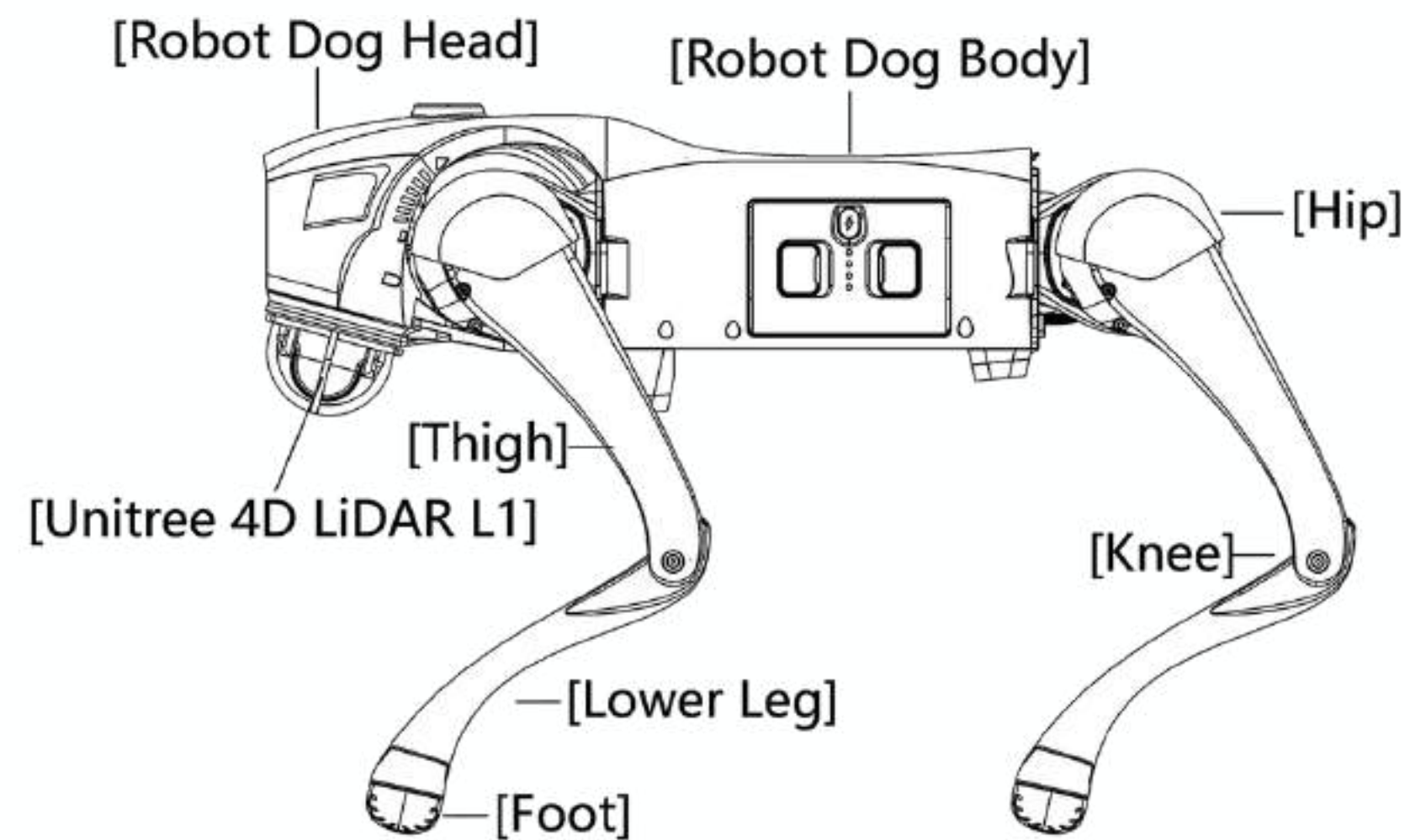
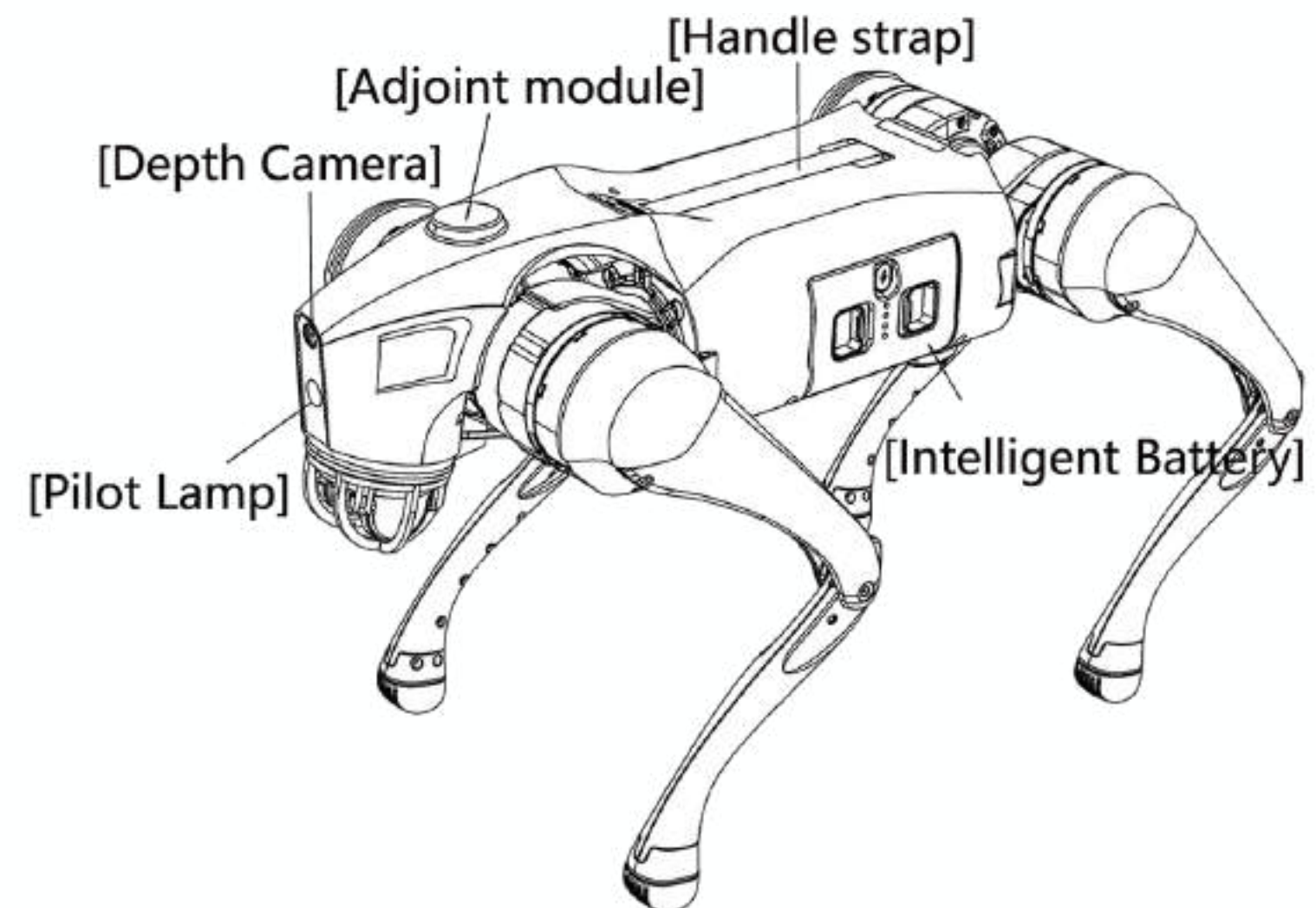
Note 1:
The functional modules include obstacle avoidance path planning, speech recognition, etc.

Note 2:
DDS is compatible with ROS2 and can be directly accessed.





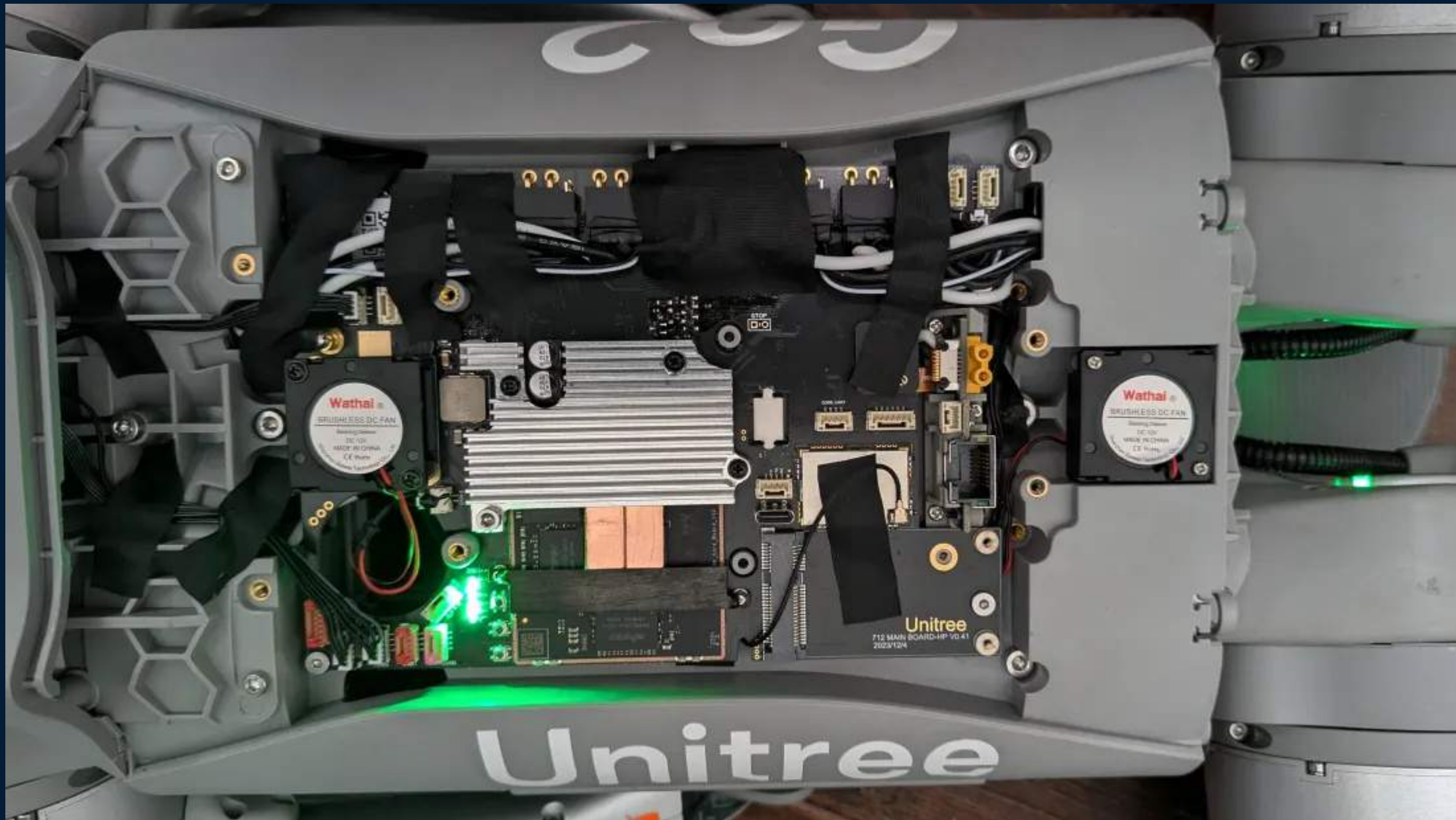
“Anatomia” Do Robô





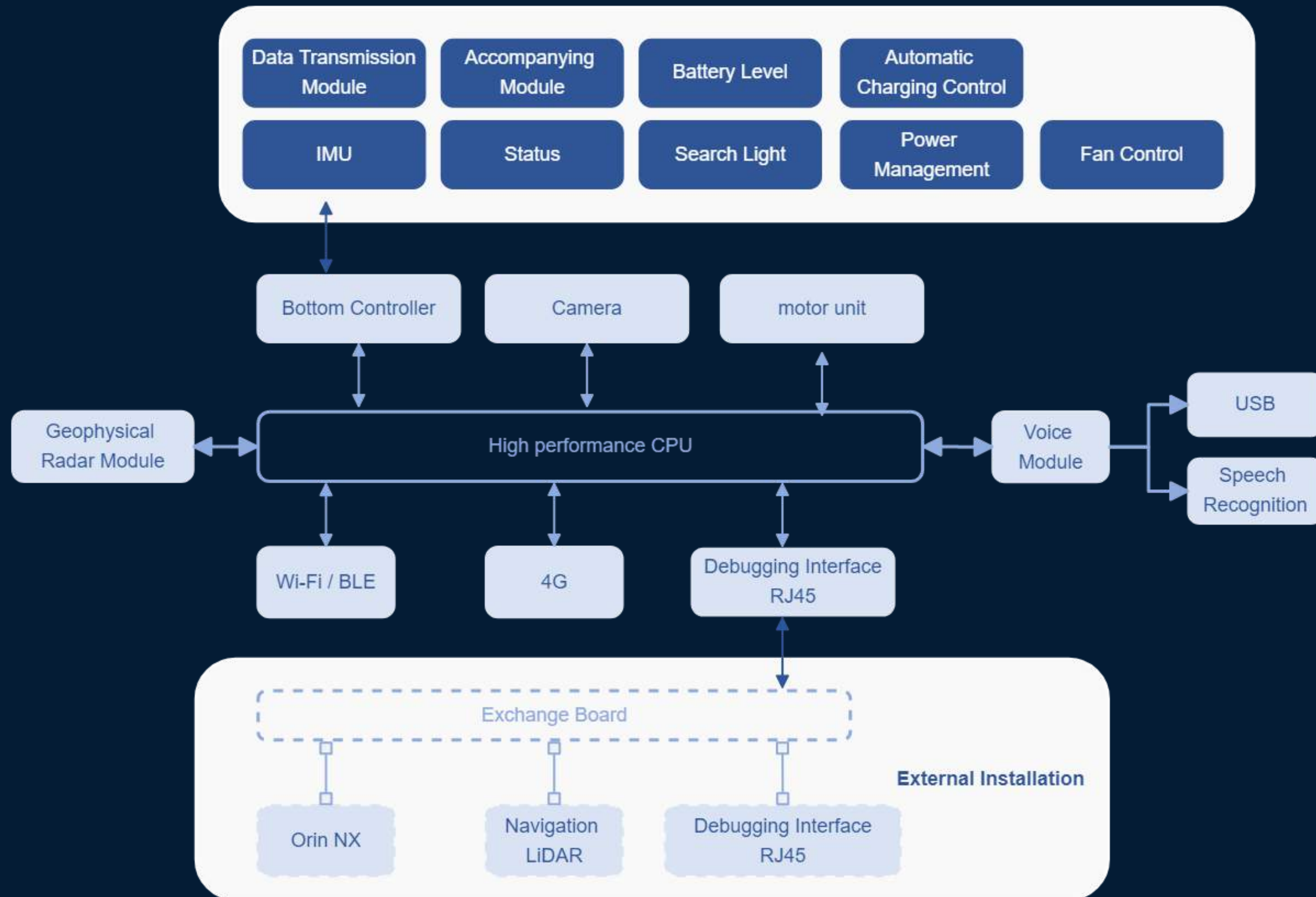
Por Dentro Do Robô

TearDown

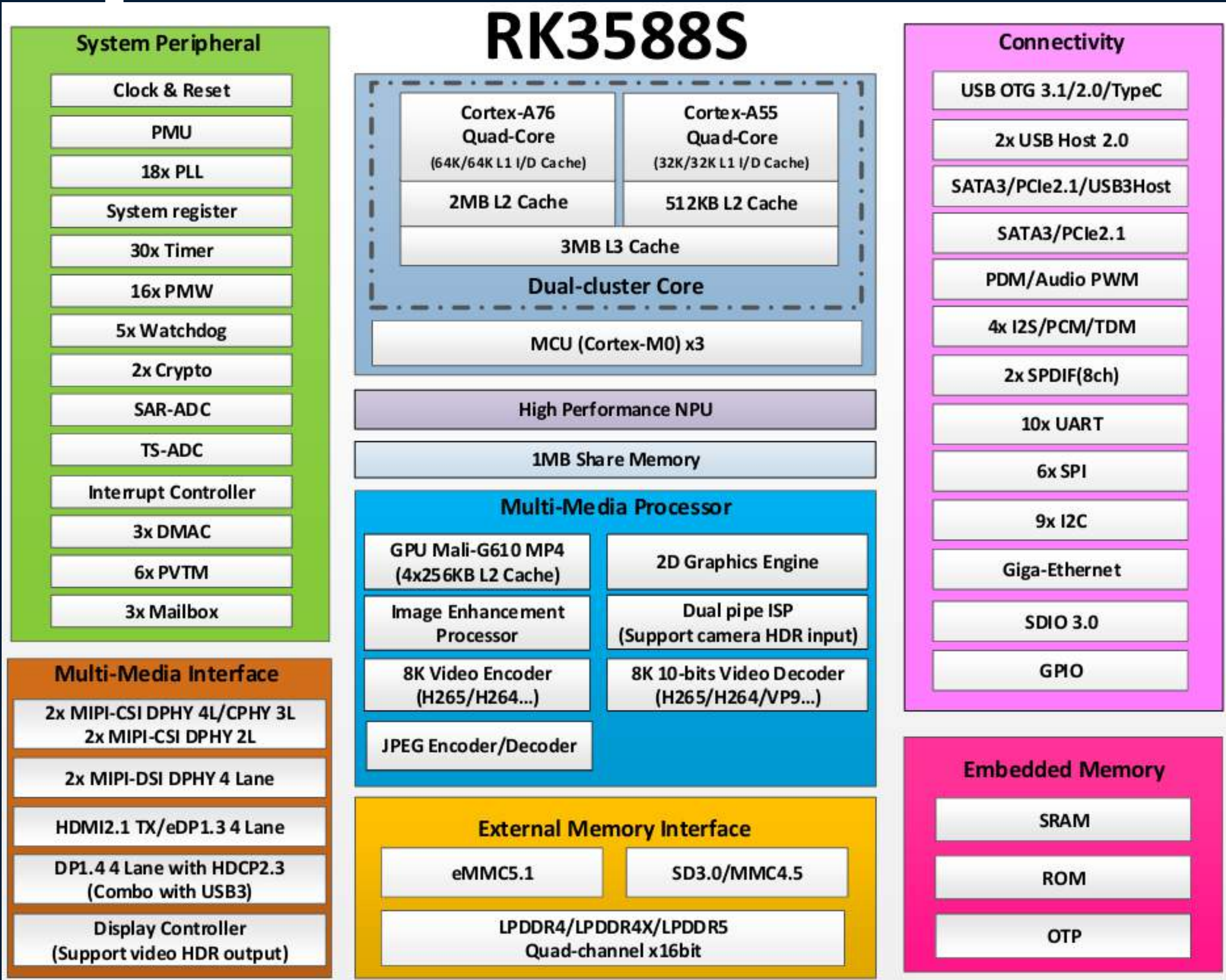




Hardware

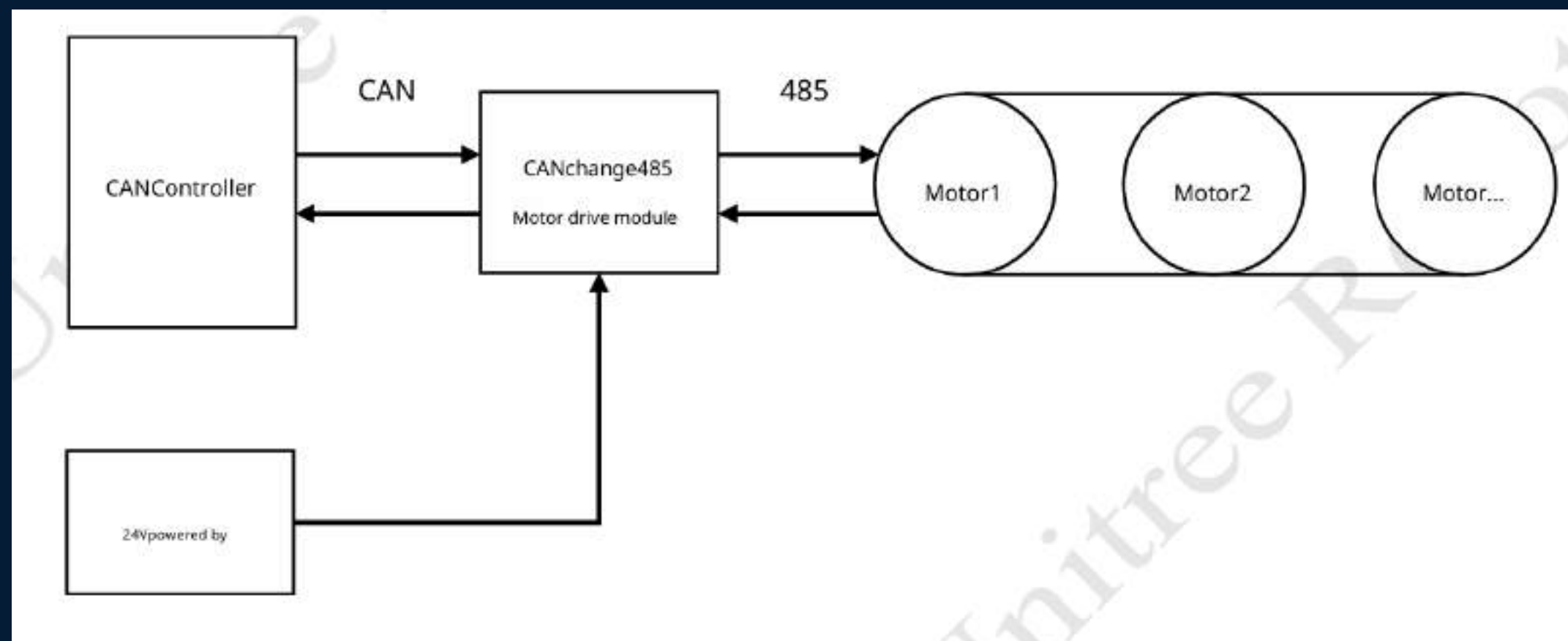
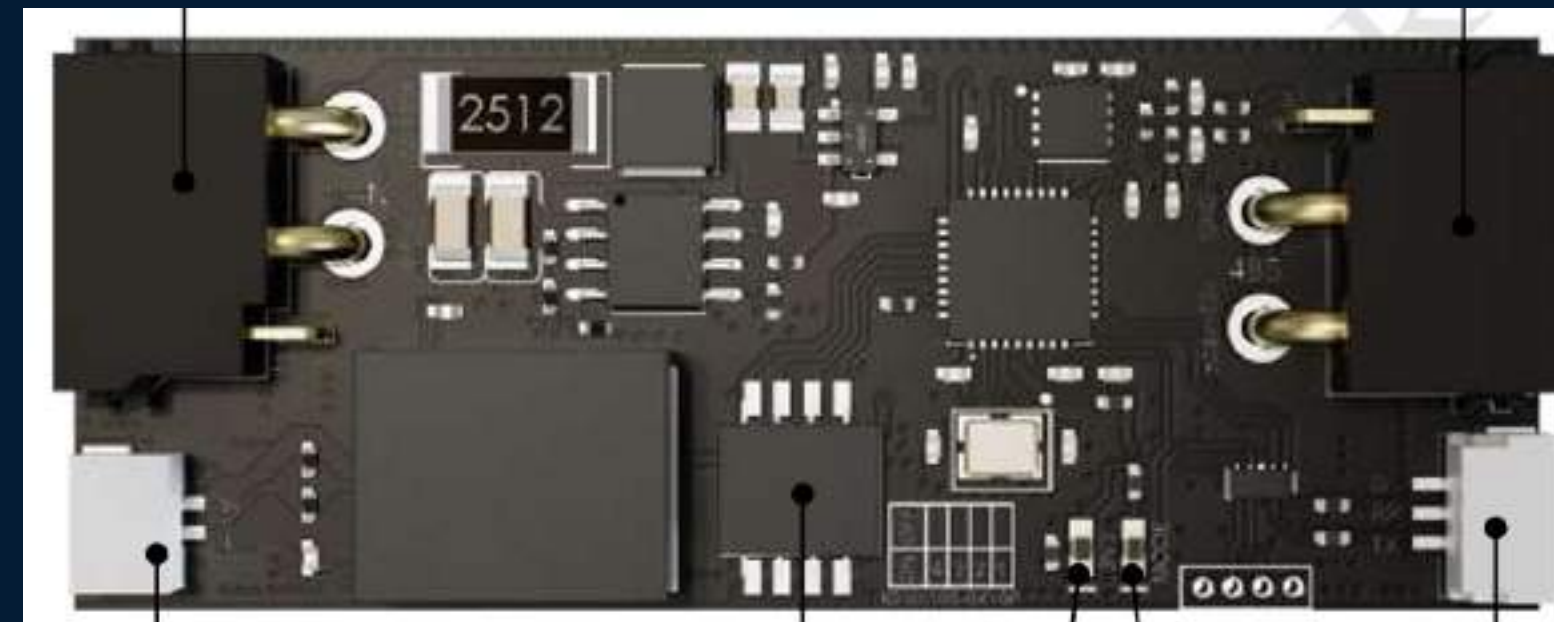


Rockchip RK3588S



Motor de Articulação

- Atuadores
 - 4 motores GO-M8010-6
- Feedback / Comandos
 - Ângulo
 - Velocidade Angular
 - Aceleração Angular
 - Temperatura

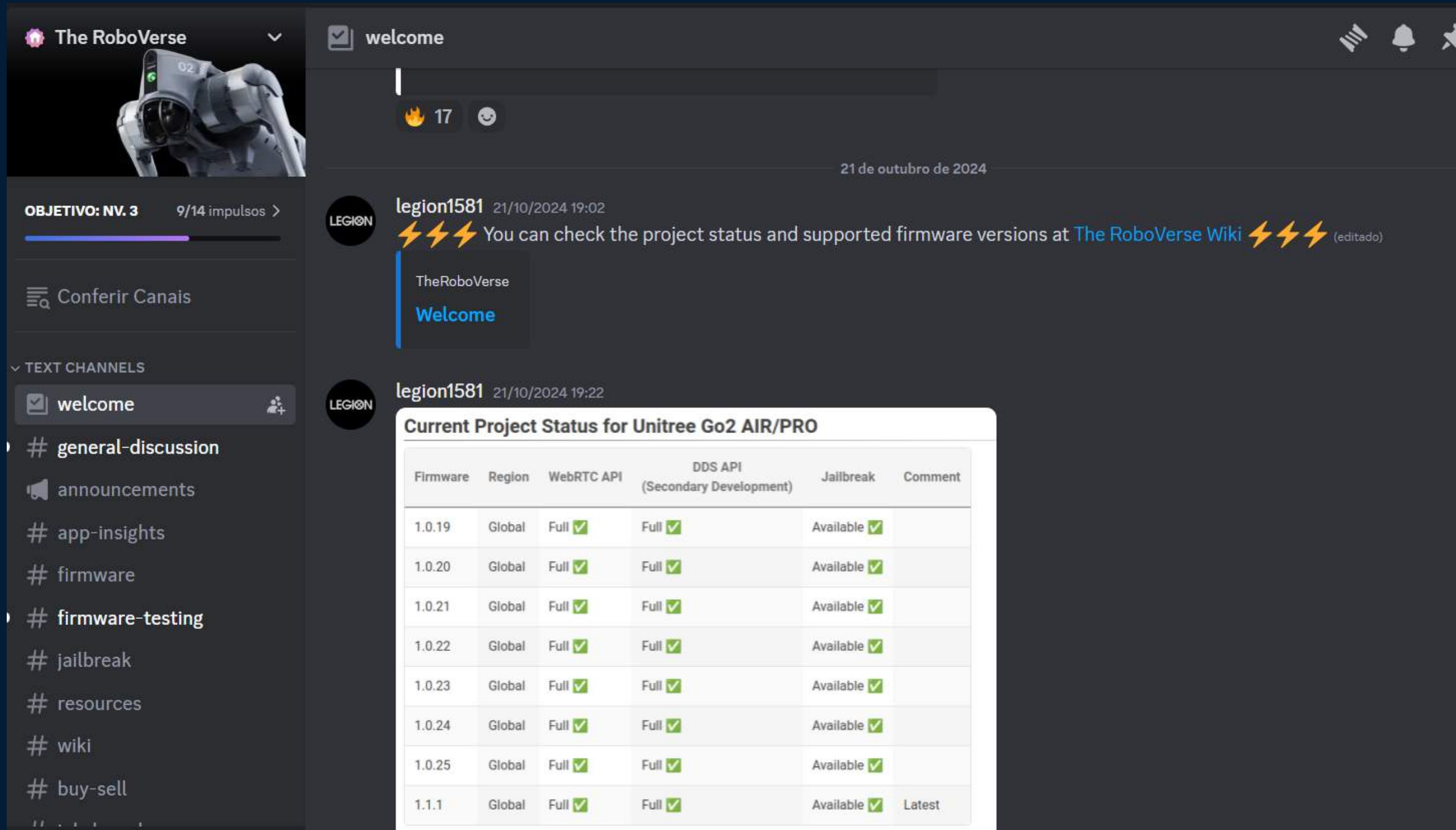


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 - <https://www.youtube.com/watch?v=rc8KgGkYxBE>
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 - https://www.reddit.com/r/unitree/comments/18su3vg/i_took_apart_the_unitree_go2_and_put_it_back/
 - <https://support.unitree.com/home/en/developer>
- MANUALS
 - <https://www.docs.quadruped.de/projects/go2/html/controller.html>
 - <https://static.generation-robots.com/media/Go2-User-Manual.pdf>
 - <https://youtu.be/iaBDDpuJgIY?si=ECs6anMtw3KvHsOd>
- SOFTWARE
 - https://support.unitree.com/home/en/developer/AI_motion_service
 - <https://github.com/Teddy-Liao/walk-these-ways-go2>

Agradecimento Especial

The RoboVerse -> <https://discord.gg/XqDyVBsW>



legion1581 21/10/2024 19:02
⚡⚡⚡ You can check the project status and supported firmware versions at [The RoboVerse Wiki](#) ⚡⚡⚡ (editado)

legion1581 21/10/2024 19:22

Firmware	Region	WebRTC API	DDS API (Secondary Development)	Jailbreak	Comment
1.0.19	Global	Full ✓	Full ✓	Available ✓	
1.0.20	Global	Full ✓	Full ✓	Available ✓	
1.0.21	Global	Full ✓	Full ✓	Available ✓	
1.0.22	Global	Full ✓	Full ✓	Available ✓	
1.0.23	Global	Full ✓	Full ✓	Available ✓	
1.0.24	Global	Full ✓	Full ✓	Available ✓	
1.0.25	Global	Full ✓	Full ✓	Available ✓	
1.1.1	Global	Full ✓	Full ✓	Available ✓	Latest



Perguntas?

Obrigado!