



PPGEPT

Programa de Pós-Graduação em
EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA



UFSC

Desenvolvimento de um sistema automatizado para dosimetria em teleterapia

<https://sites.google.com/view/projetofantorama>



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Programa de Pós-Graduação em
EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA



UFSC

Orientadora: Leila Maria Araújo Santos

Co-orientador: Rogerio Correa Turchetti

<https://sites.google.com/view/projetofantorama>

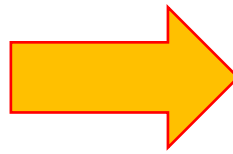
Motivação





Motivação

Manivela



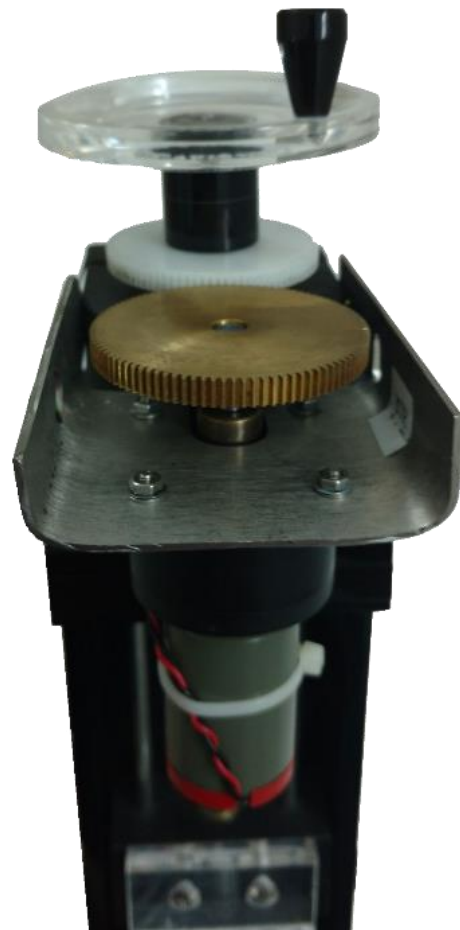
CQ:

- 2 energias de fótons
- 5 de elétrons
- Simetria
- Planura
- Inplane/crossplane





Primórdios (2017)

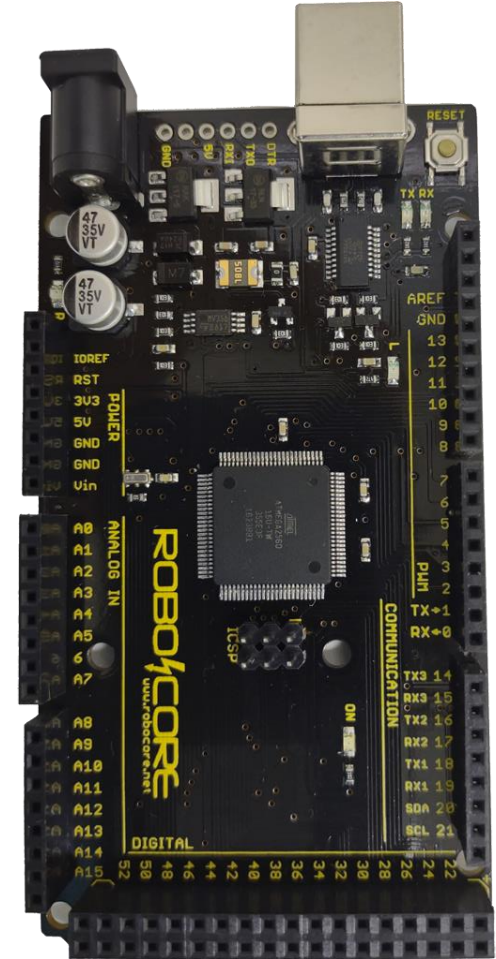
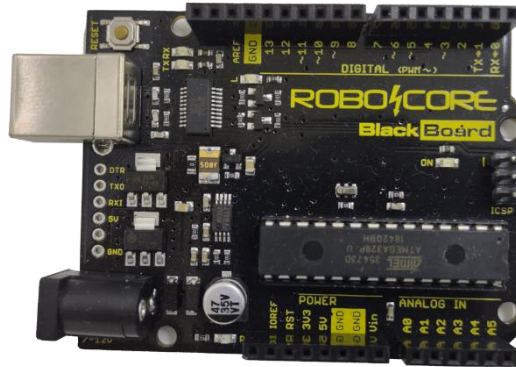
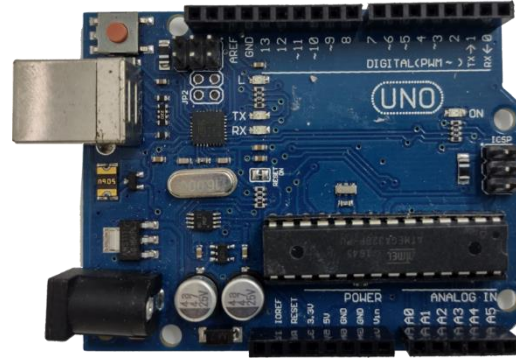




Primórdios (2017)



Arduino

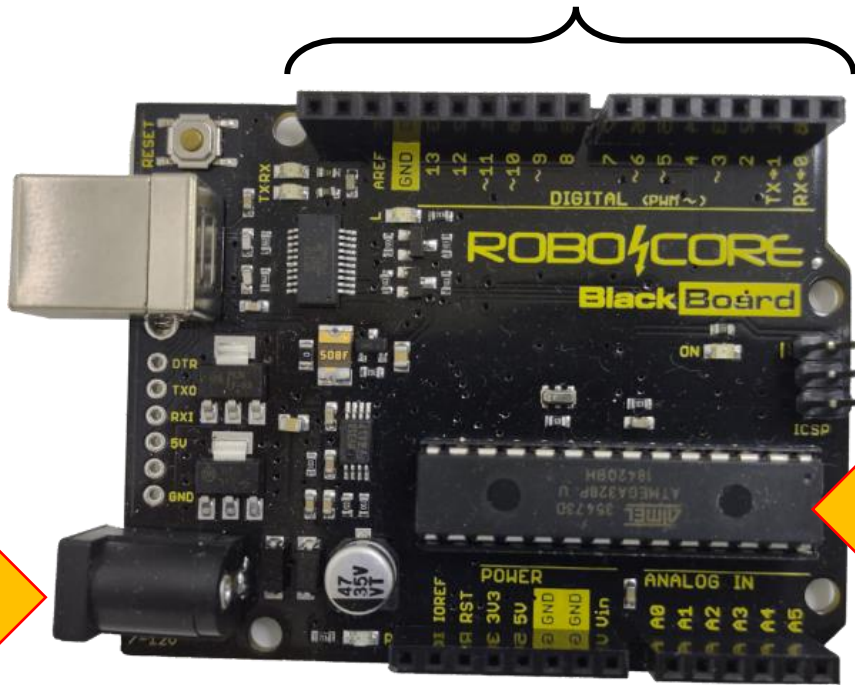
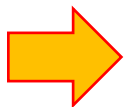




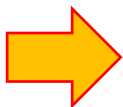
Arduino

E/S digitais

USB



Entrada de
alimentação
(7-12V)



Microcontrolador



Conectores de
alimentação

E/S analógicas



Arduino IDE (Programação)

Barra de títulos

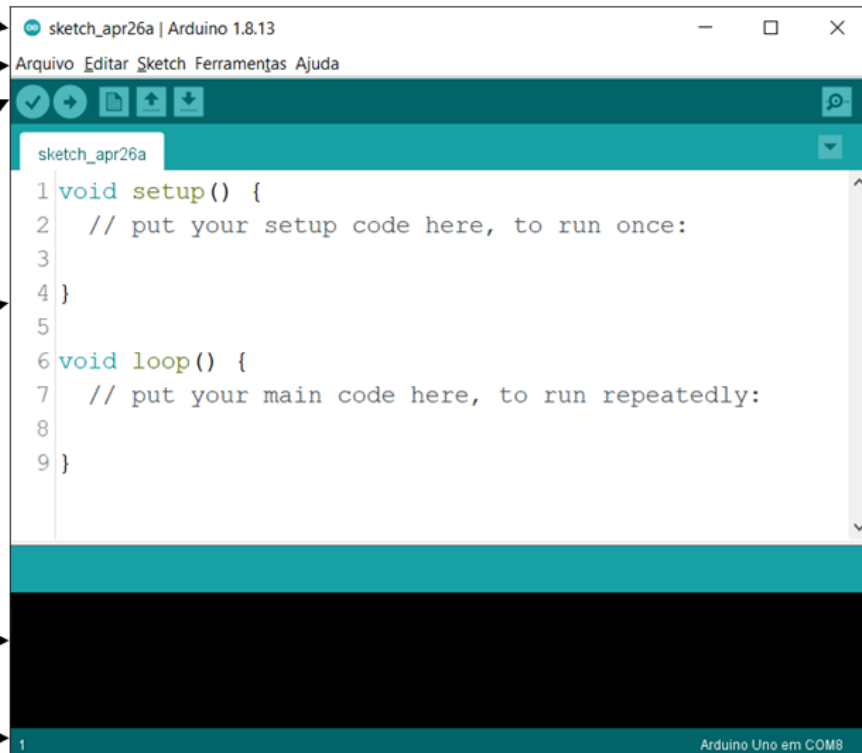
Menus

Barra de ferramentas

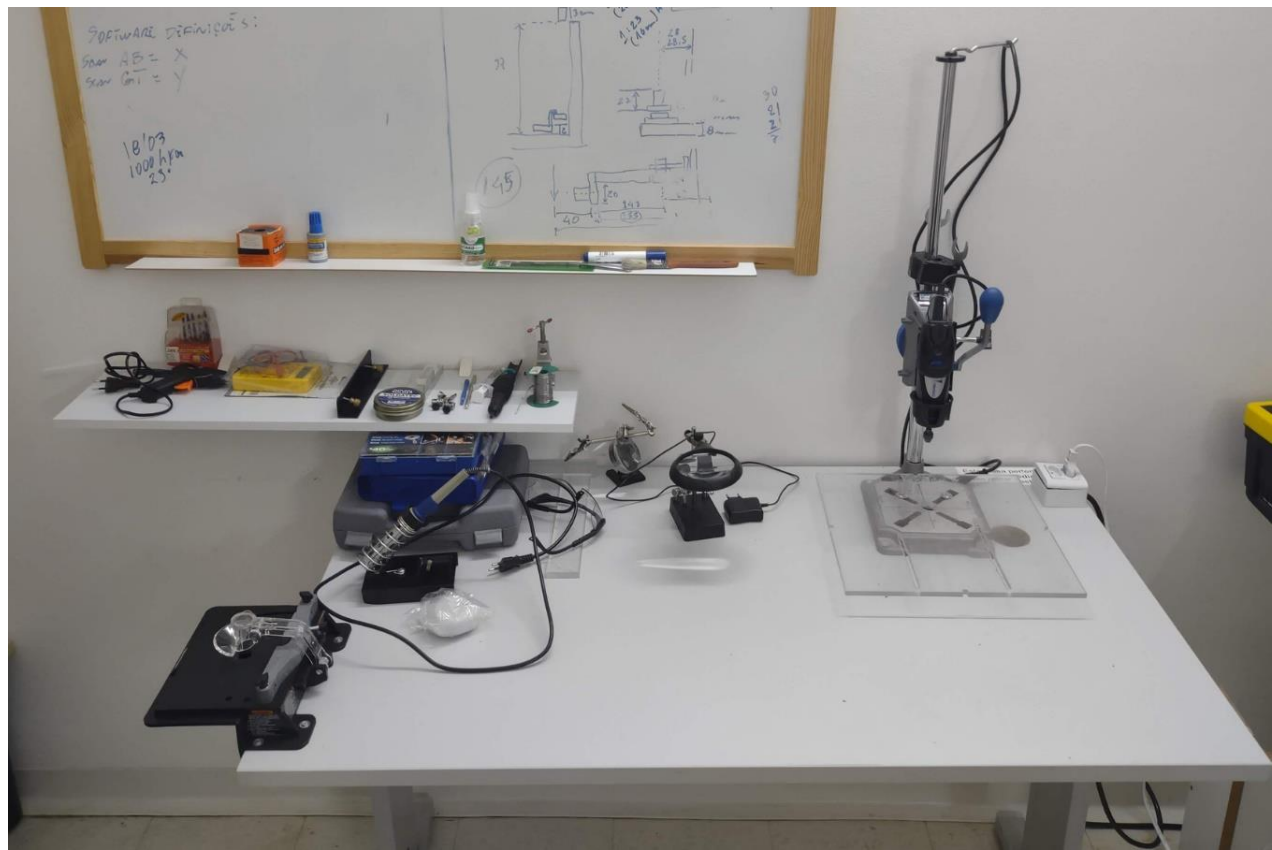
Área de edição

Área de mensagens

Barra de mensagens

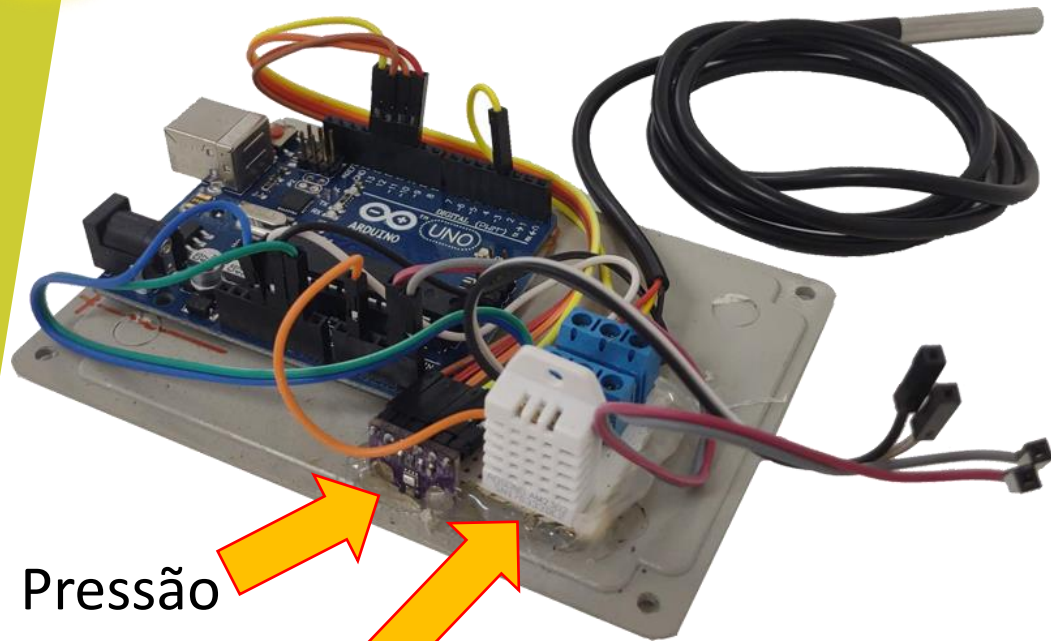


Primeiro projeto





Primeiro projeto



Pressão

temperatura

Umidade



A prova
d'água



Display

T: 23.7C T2: 24.9C
P: 999.1hPa 65%



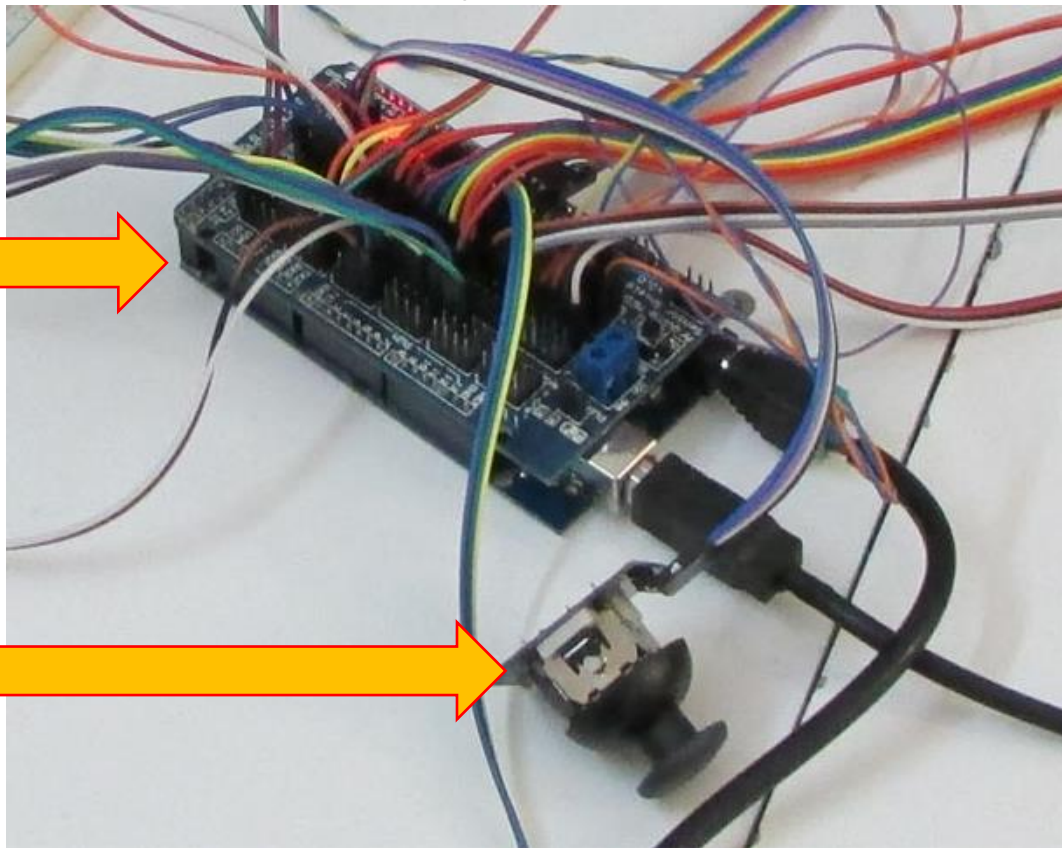


Conhecendo os componentes

Arduino

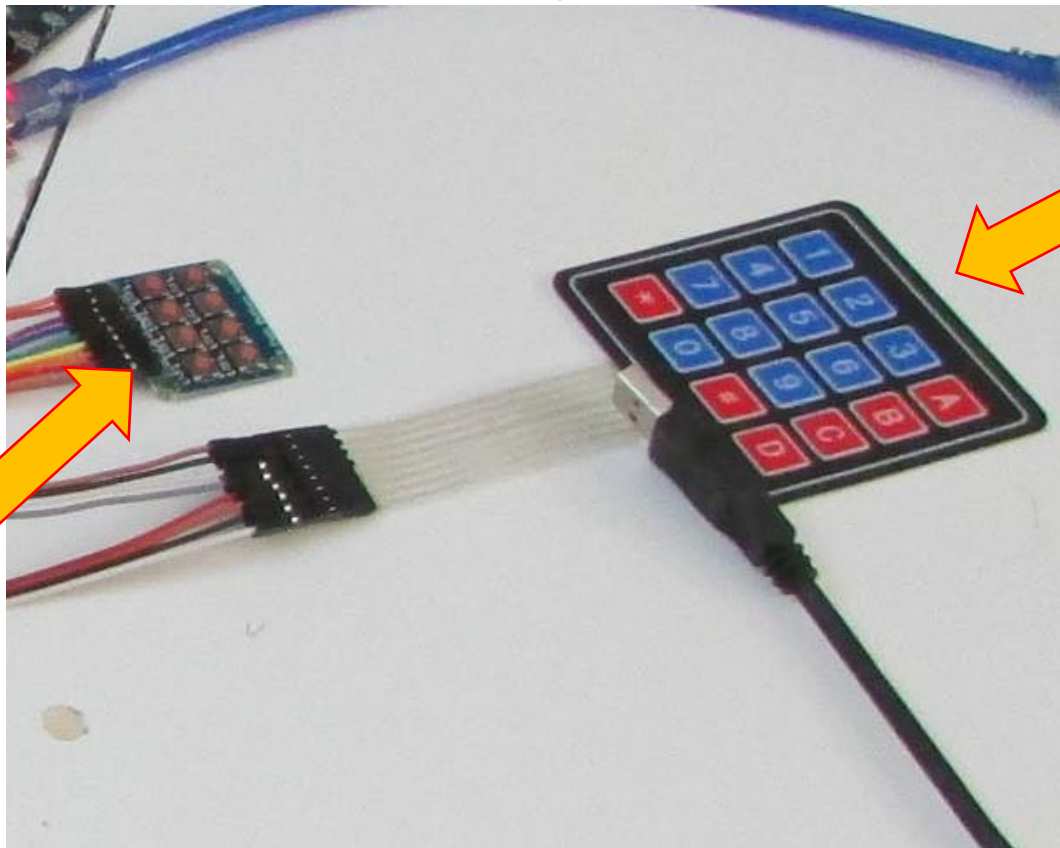


Joystick





Conhecendo os componentes



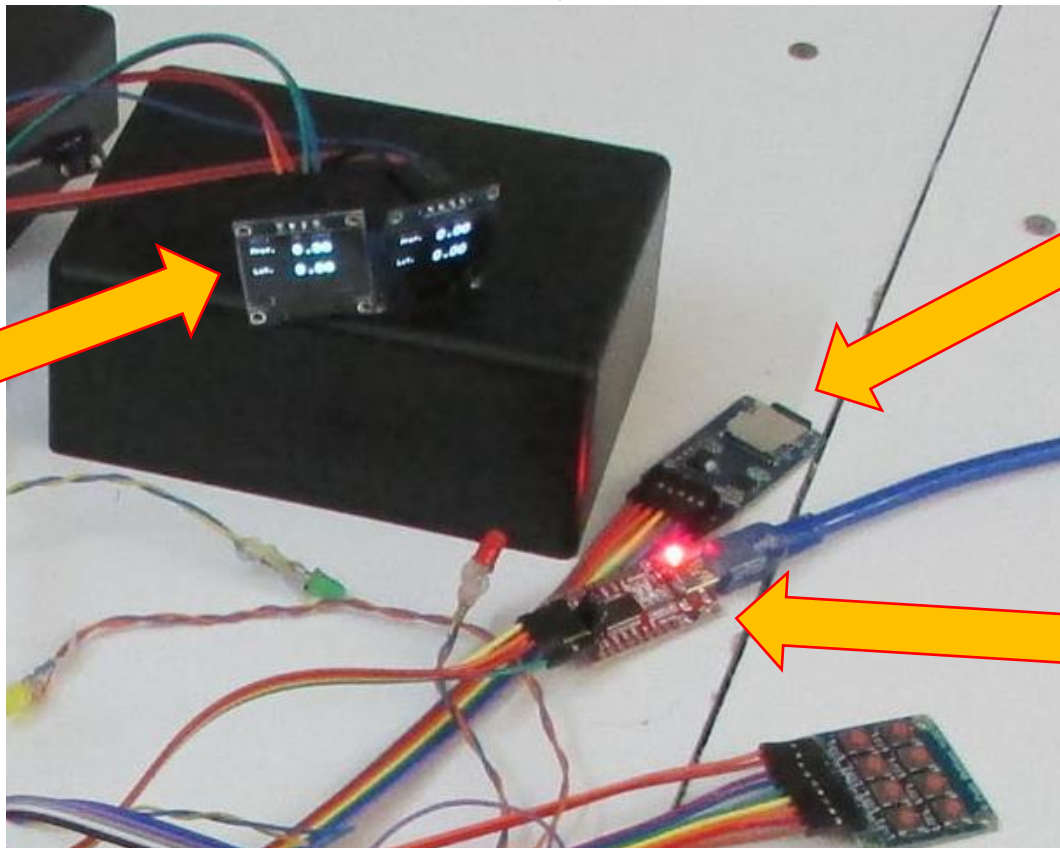
Push
buttons

Keypad



Conhecendo os componentes

OLED

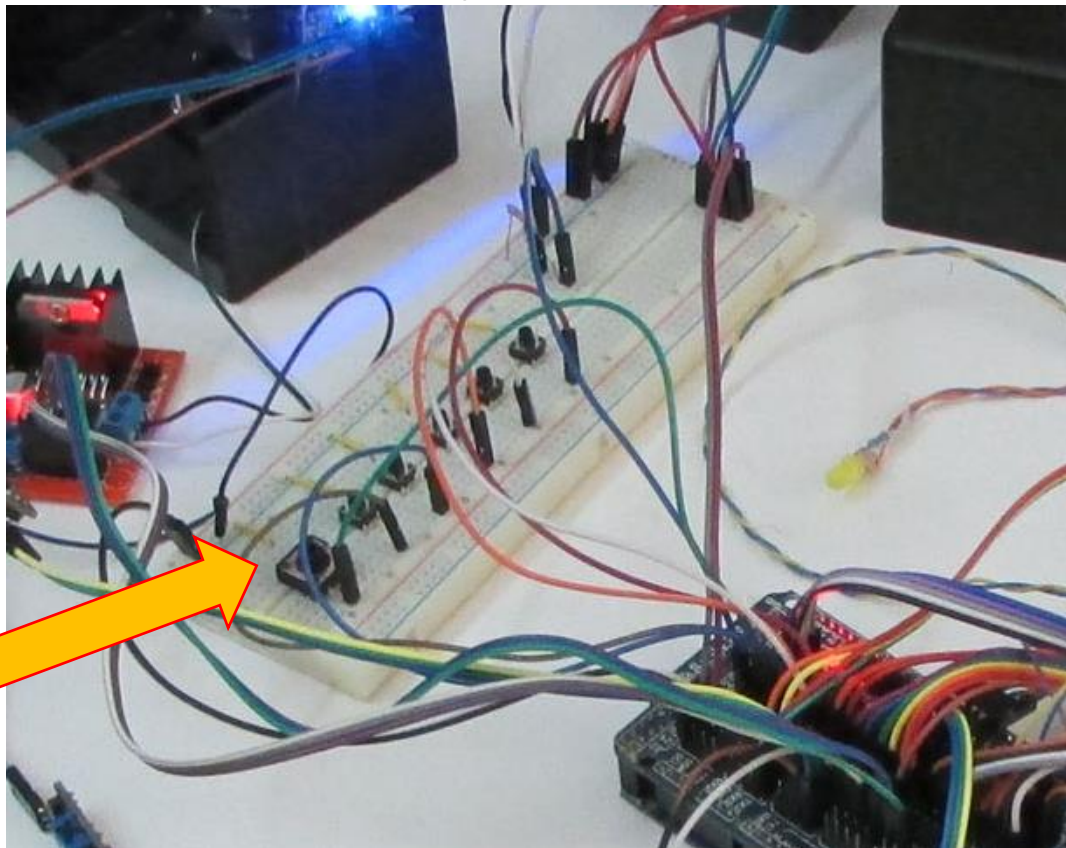


Leitor
cartão SD

Conversor
USB/TTL



Conhecendo os componentes



Push
buttons

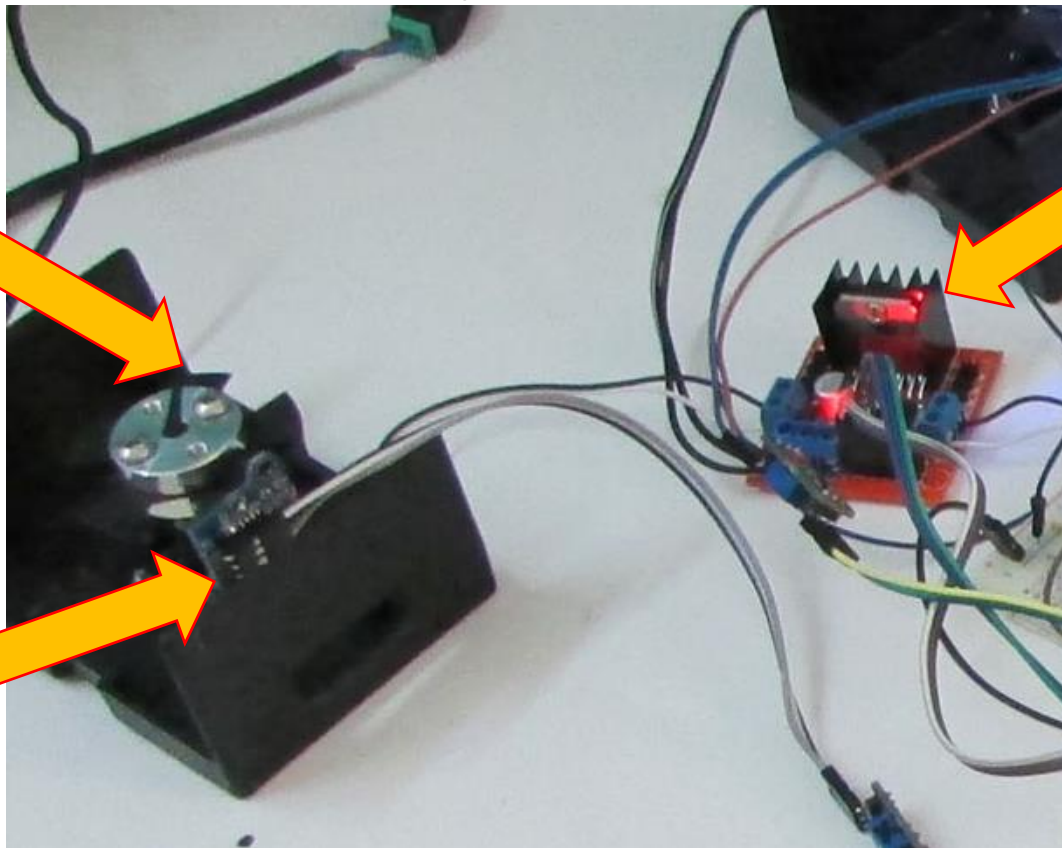


Conhecendo os componentes

Encoder
montado no
motor DC

Sensor de
contagem

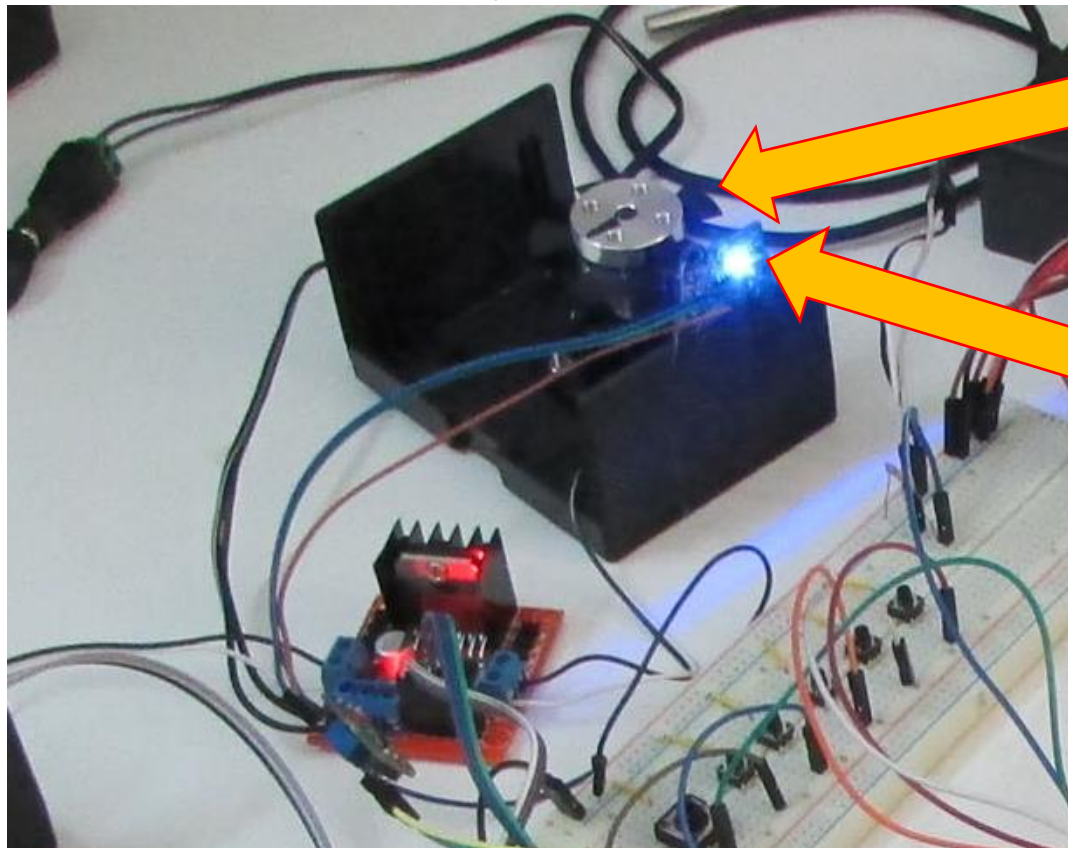
Ponte H





Conhecendo os componentes

Micromotor
N20



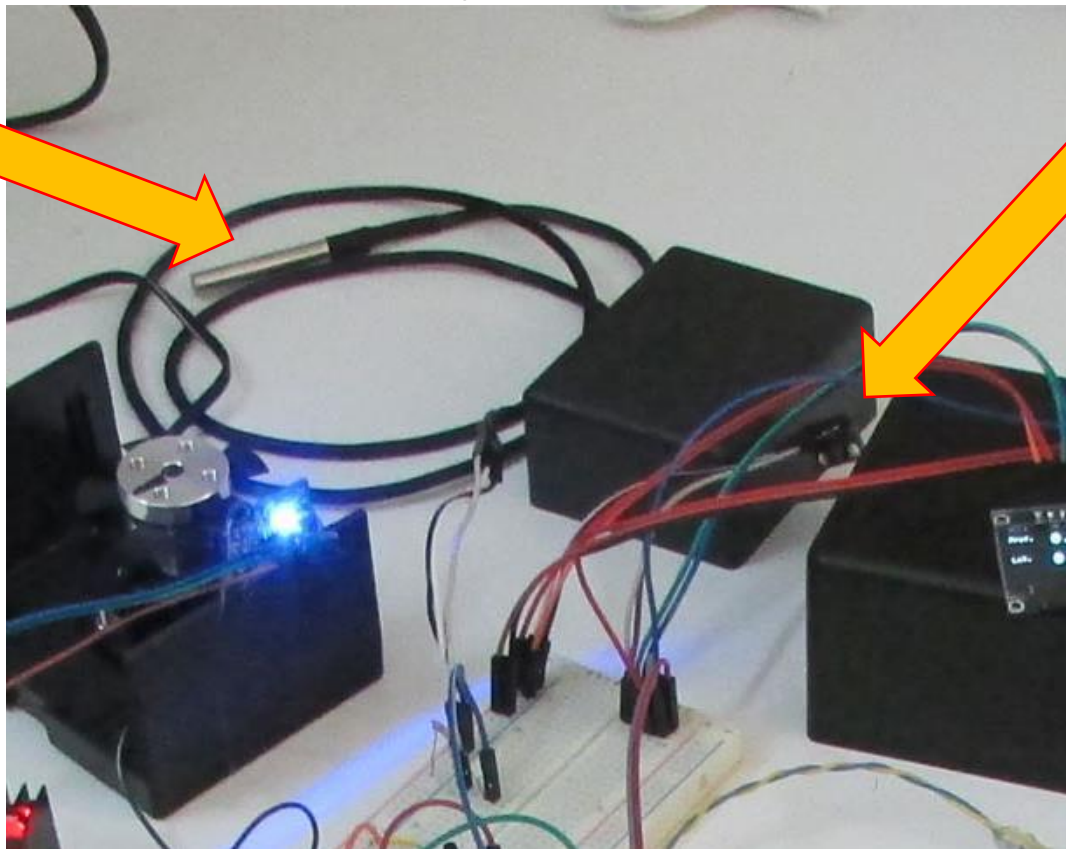
Encoder
montado no
motor DC

Sensor de
contagem



Conhecendo os componentes

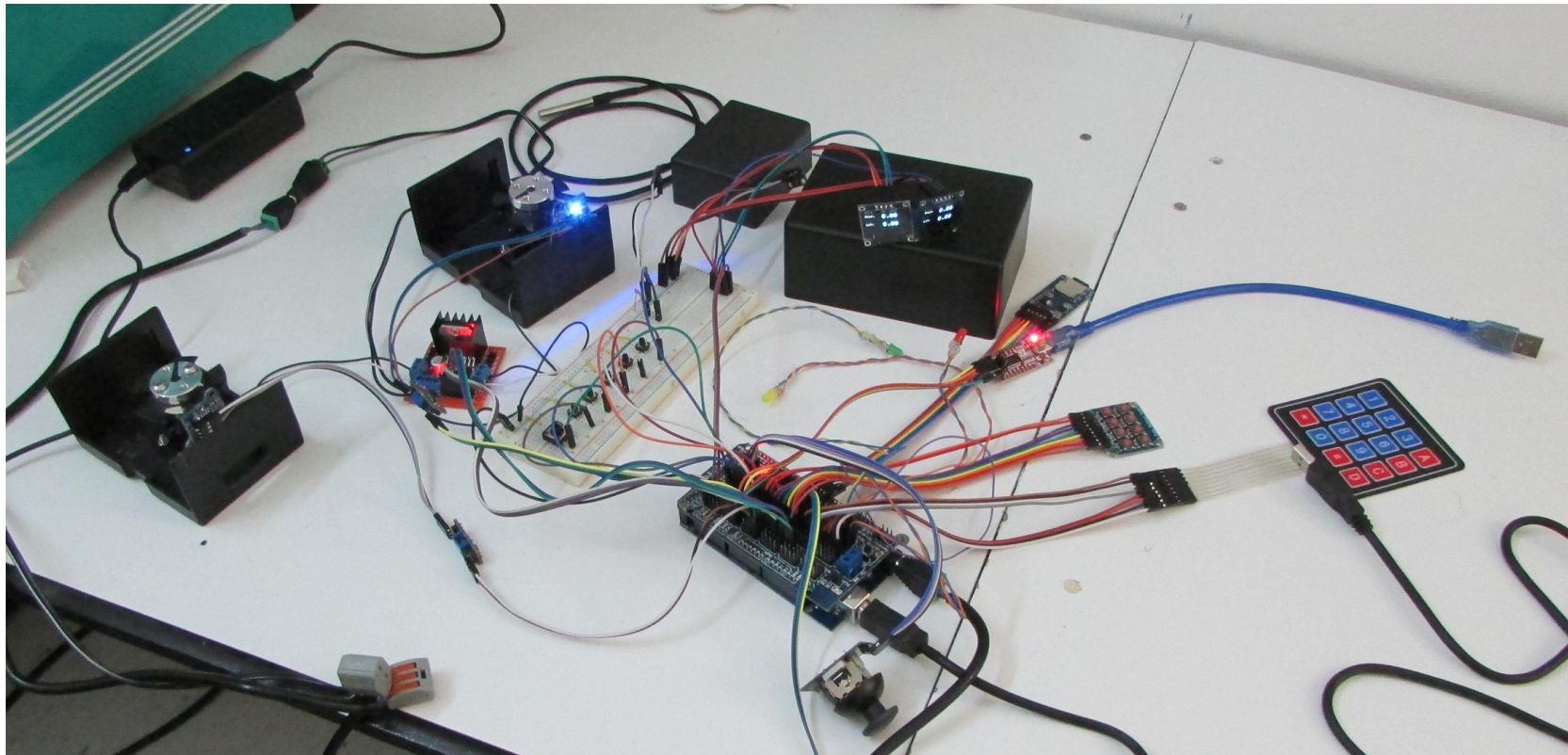
Sensor de
temperatura a
prova d'água



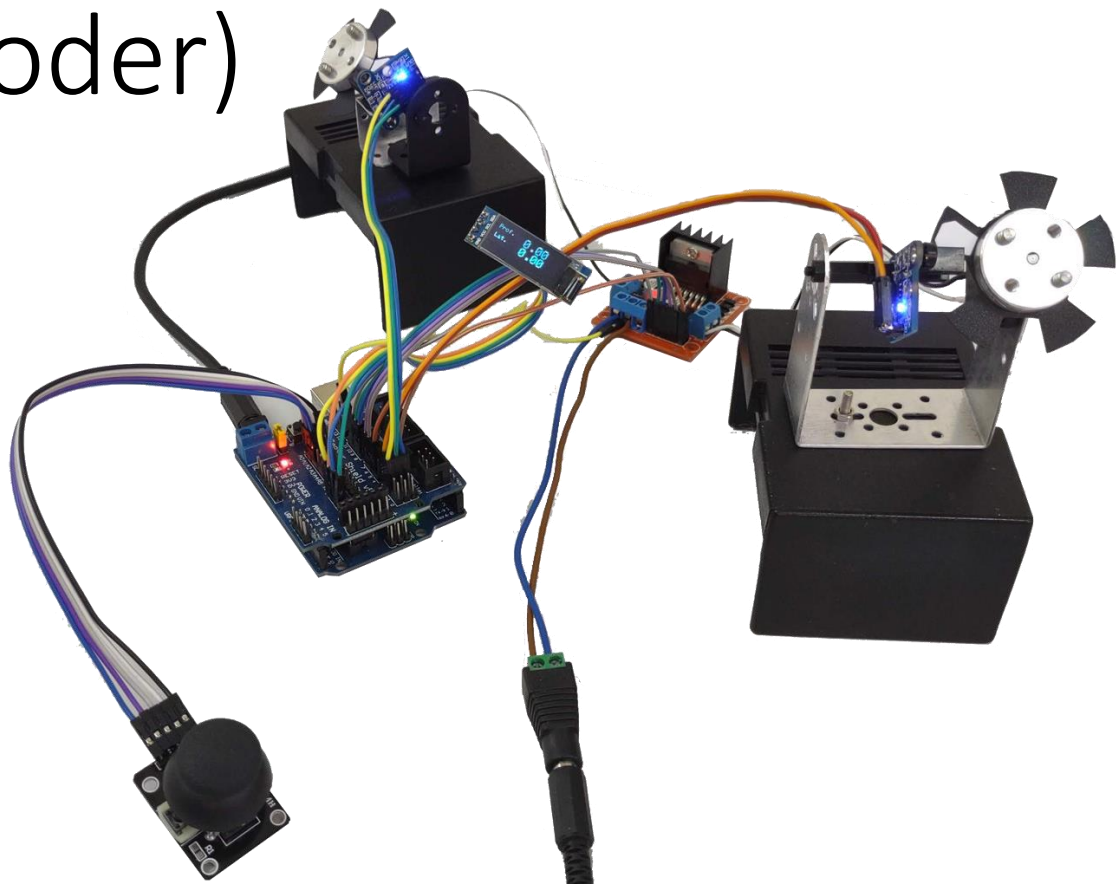
Sensor de
pressão



Conhecendo os componentes



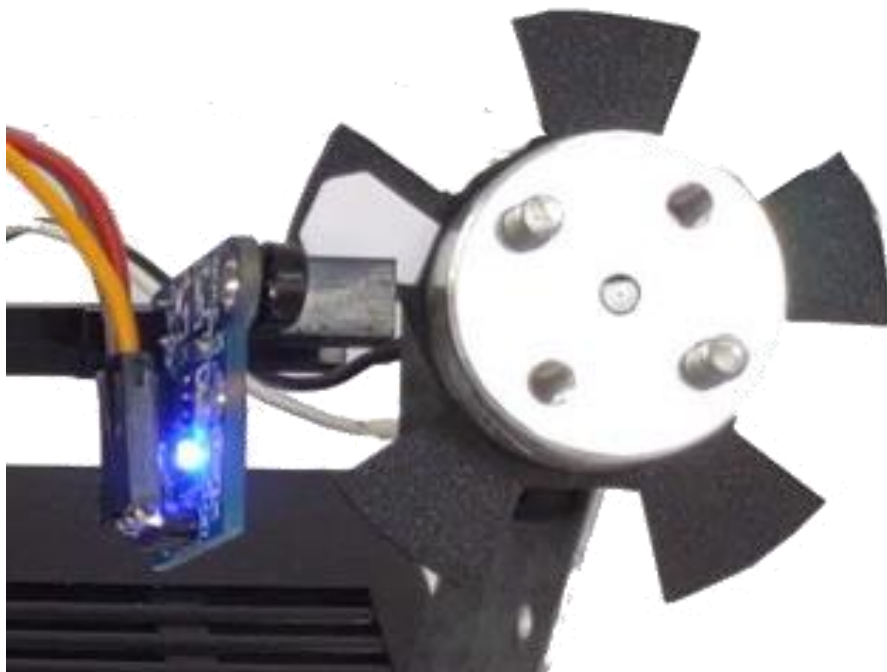
Sensor de contagem (encoder)



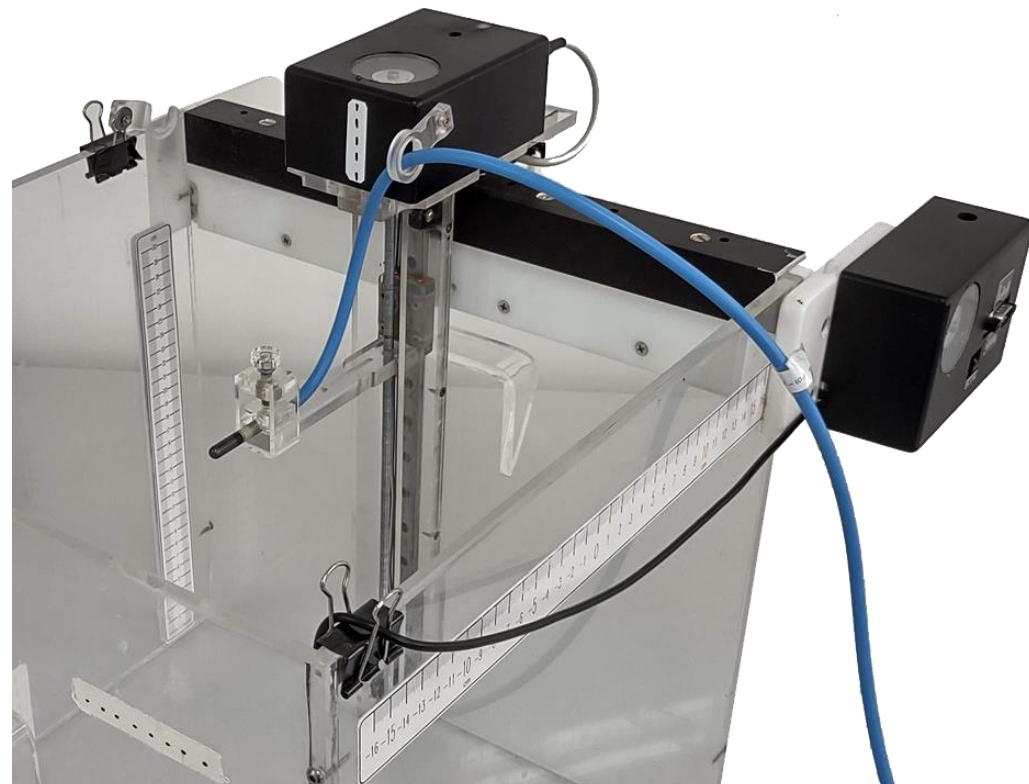


Sensor de contagem (encoder)

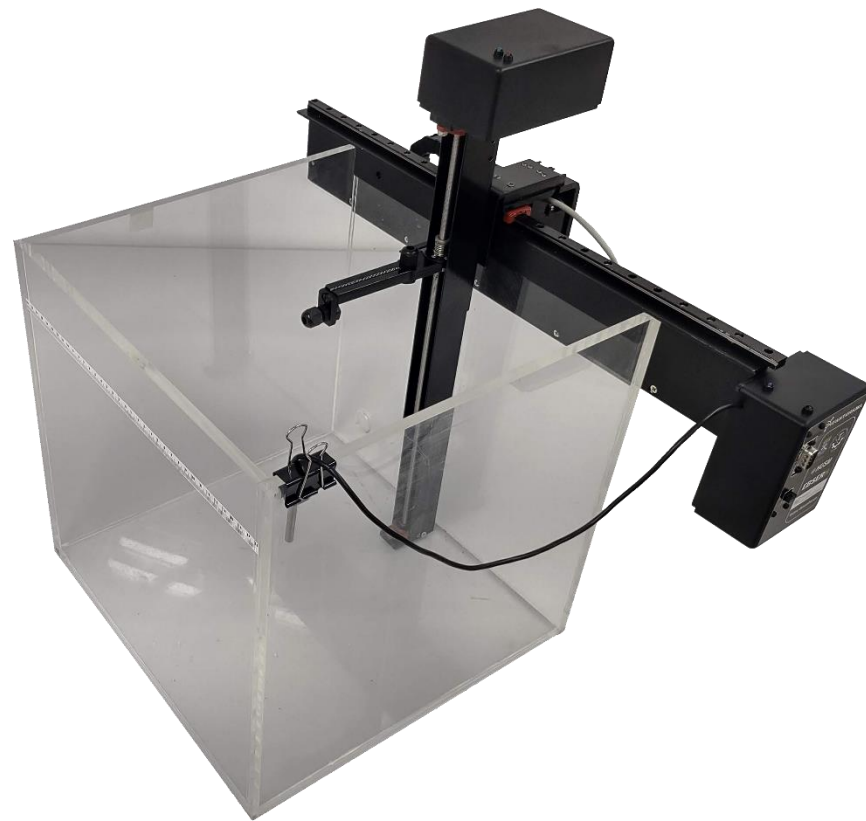
- 10 pulsos por volta
- Passo de 1mm/volta
- Posicionamento de 0,1mm



Conjunto eletromecânico Versão 1



Conjunto eletromecânico Atual



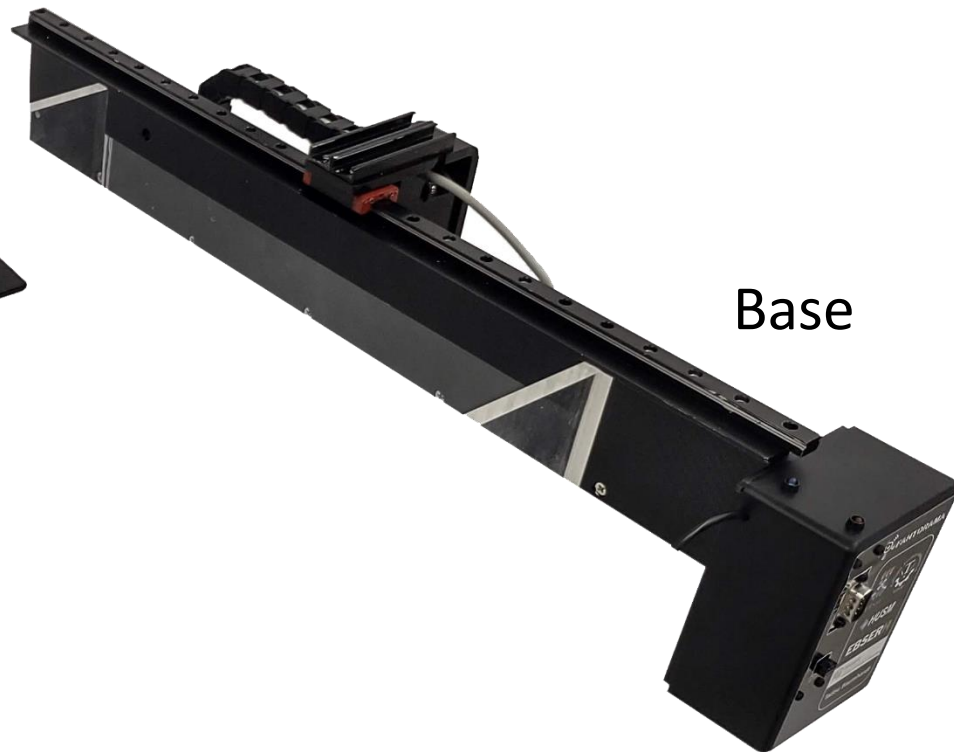


Conjunto Eletromecânico



Torre

Conexão



Base



Fixação e guia linear

Guia linear



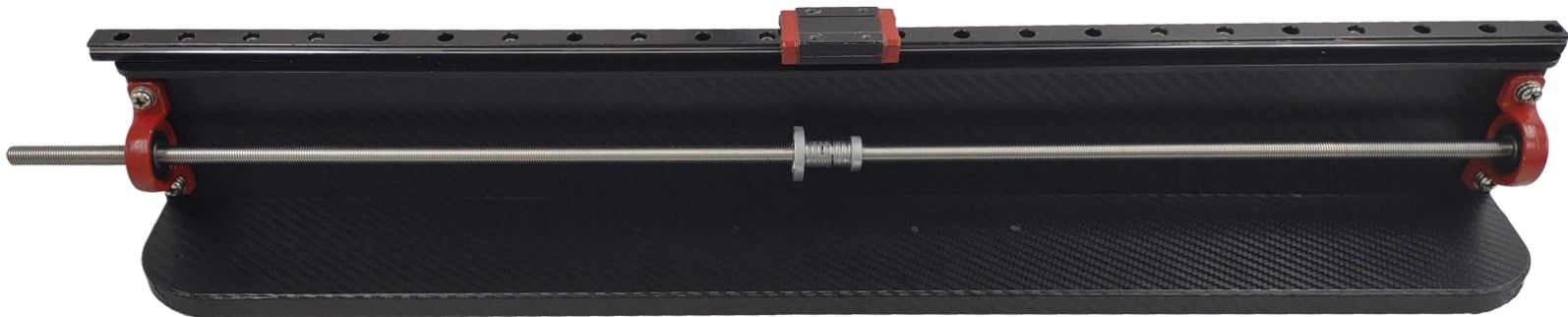


Movimentação





Limitadores de curso





Suporte para torre



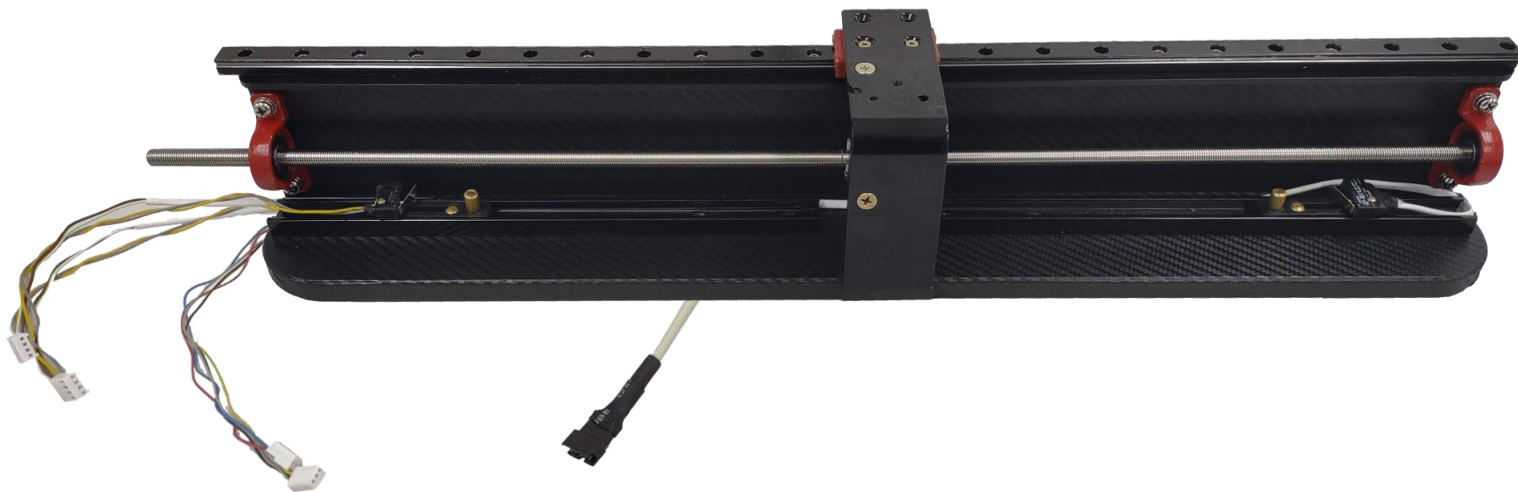


Suporte para torre



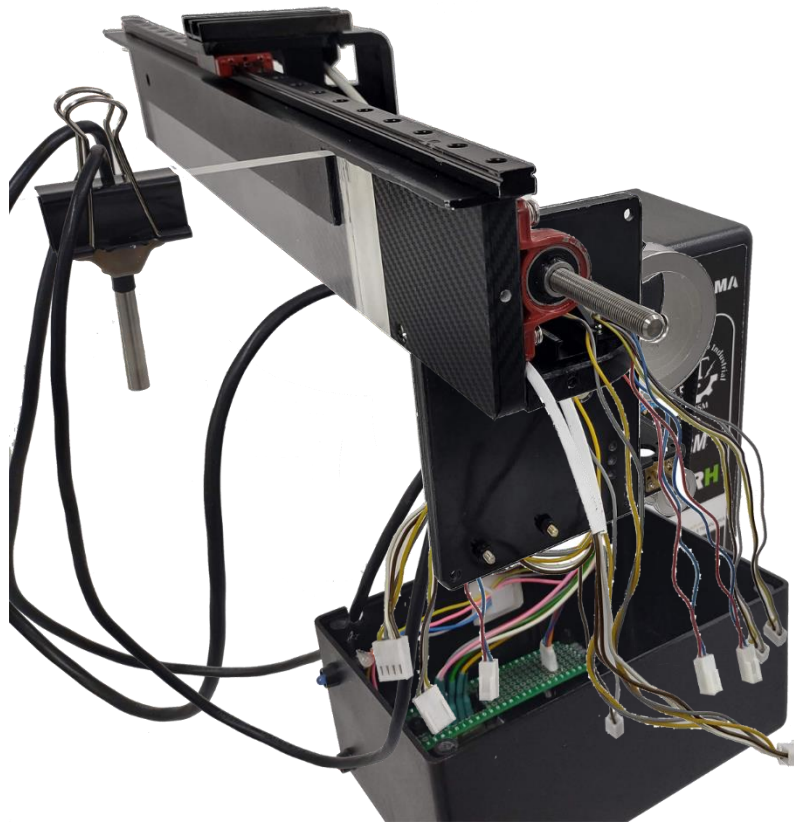


Conexão com a torre



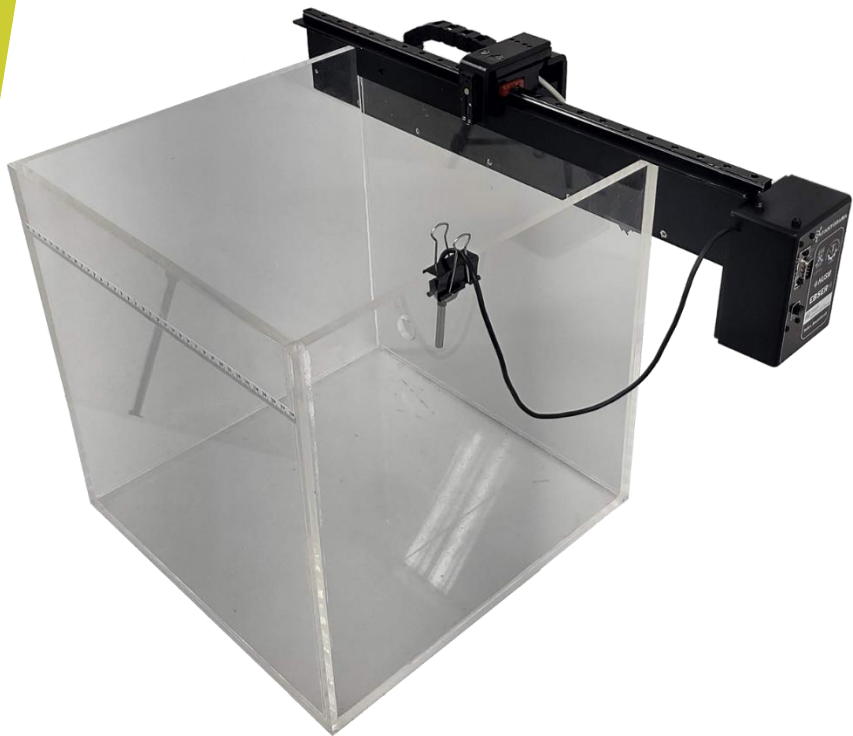


Acionamento e conexões





Base montada no fantoma



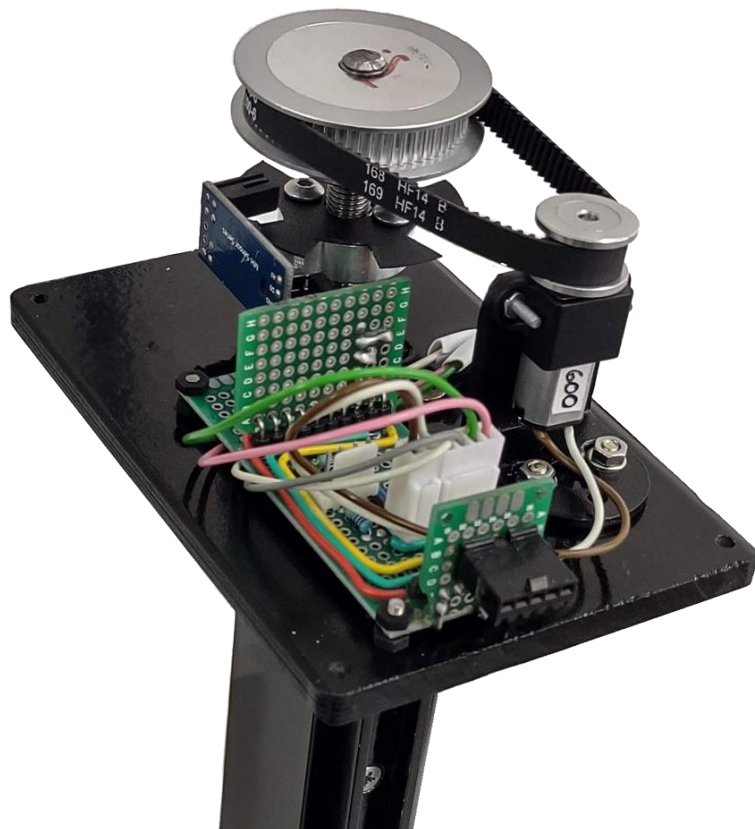


Torre





Torre



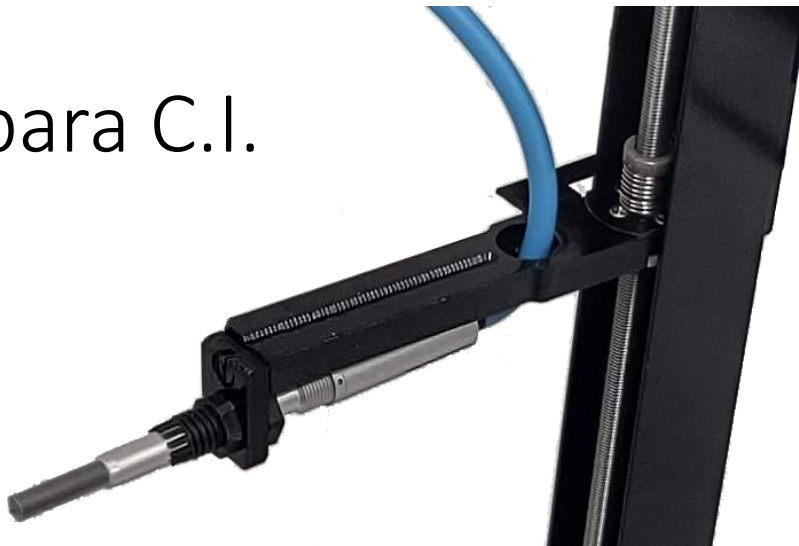


Torre – suporte para C.I.



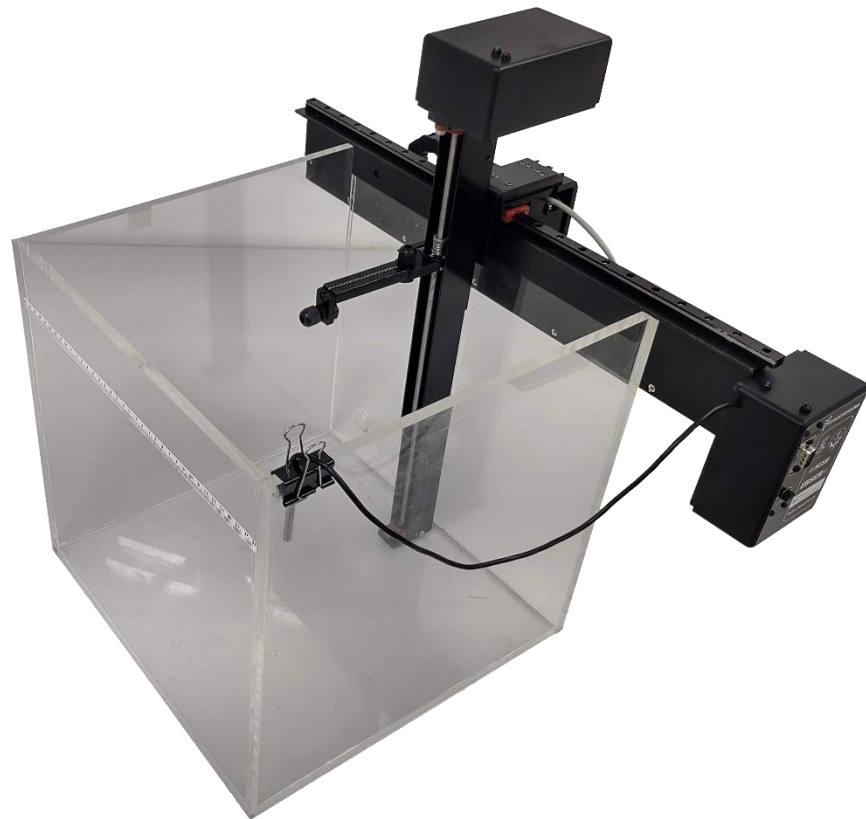


Torre – suporte para C.I.





Conjunto mecânico

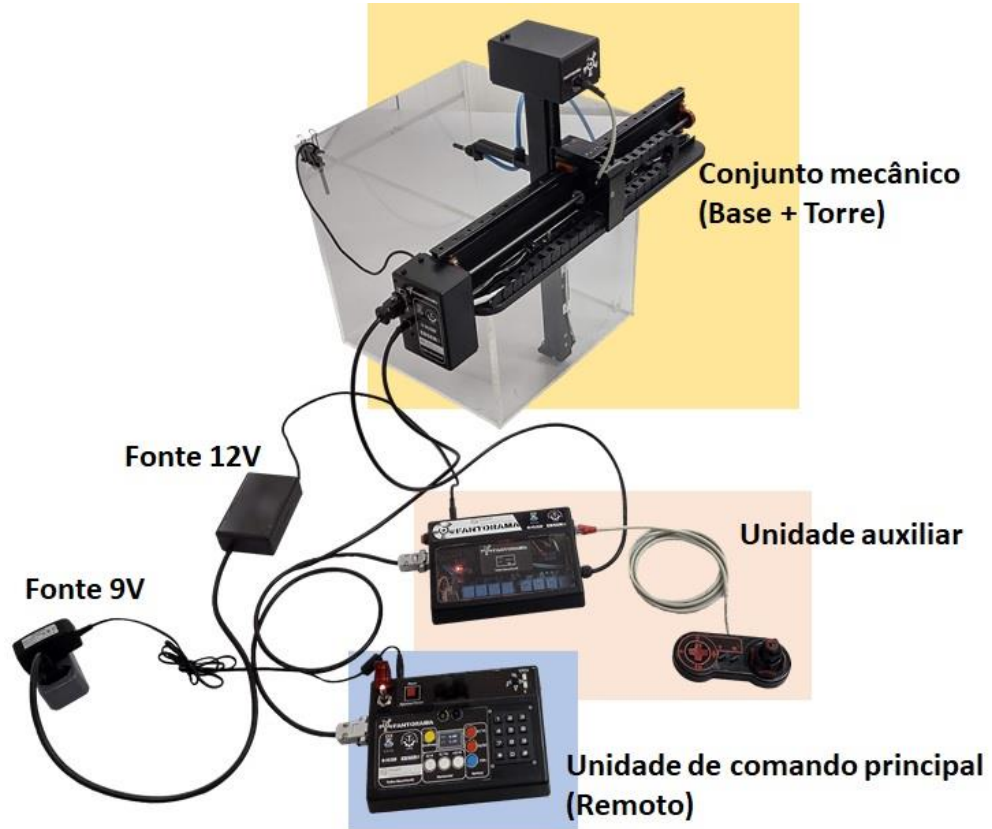




Conexão entre Torre e a Base



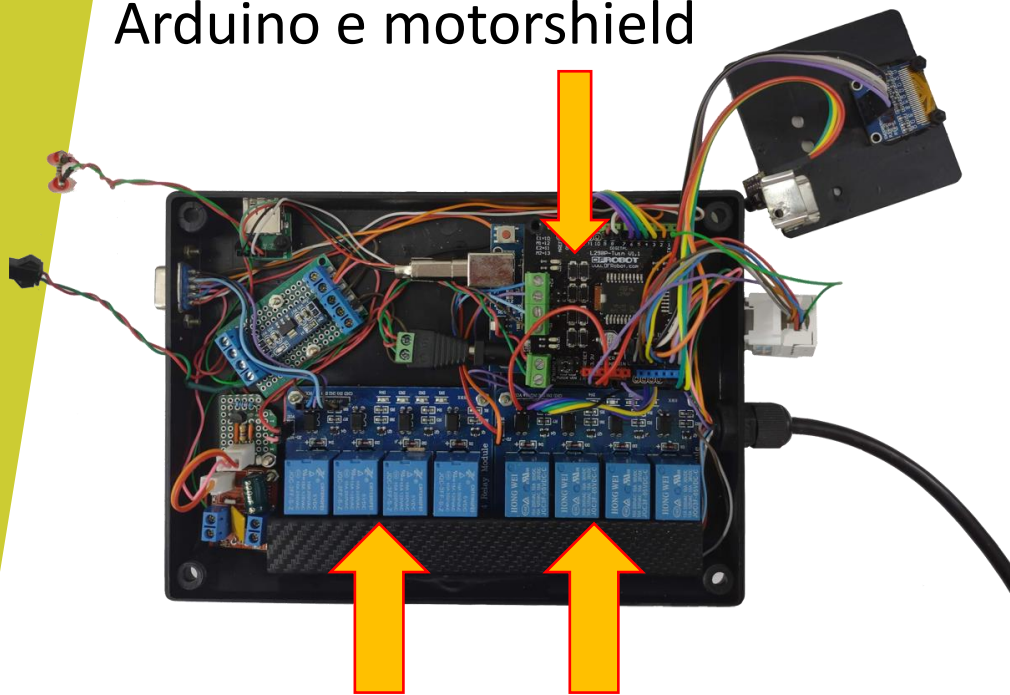
Sistema completo





Unidade auxiliar

Arduino e motorshield

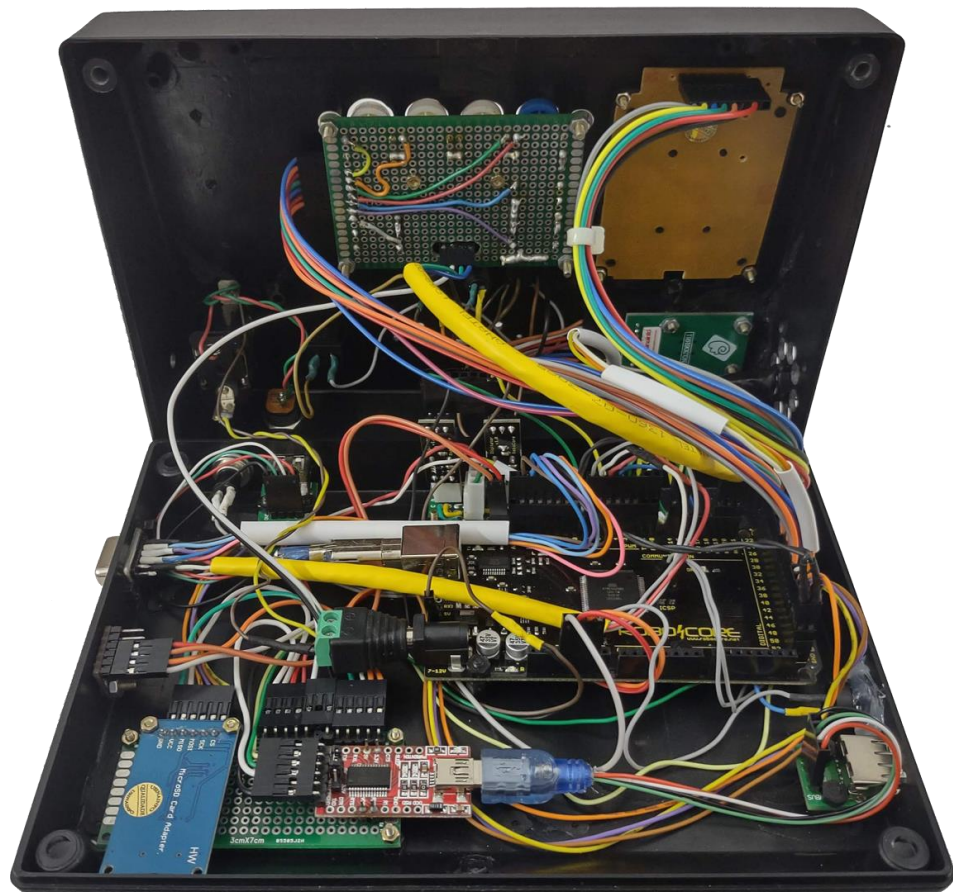


Conjunto de relés





Unidade principal





Unidade principal

Chave
liga/desliga

Conjunto de
botões

Leds

Display

Teclado
numérico

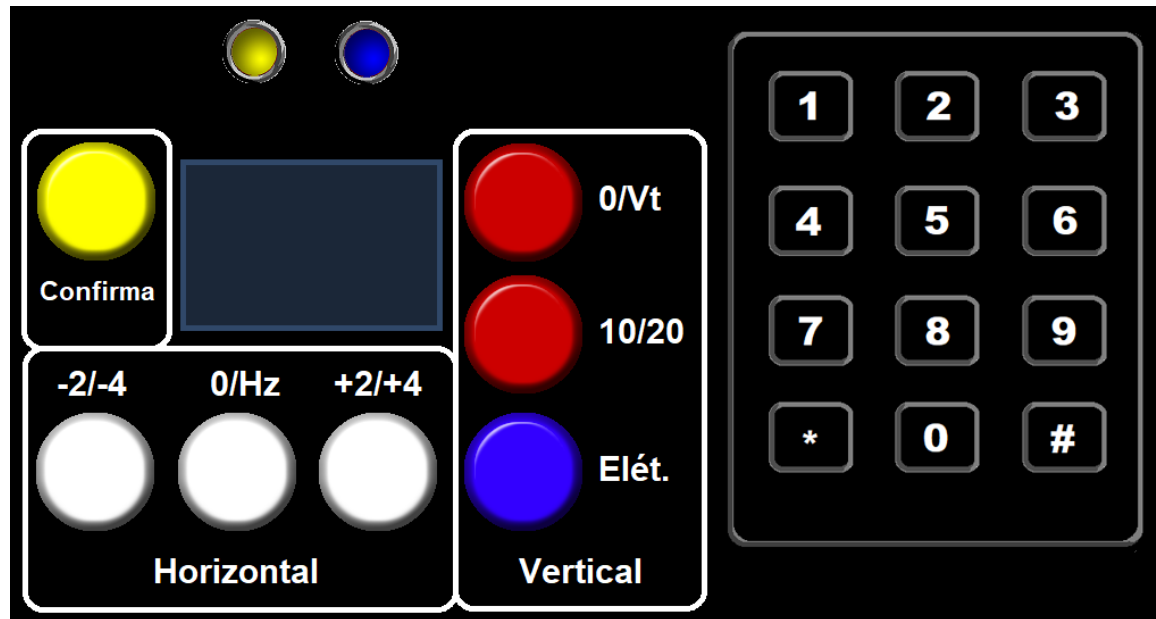




Unidade principal



**Cartão
microSD**



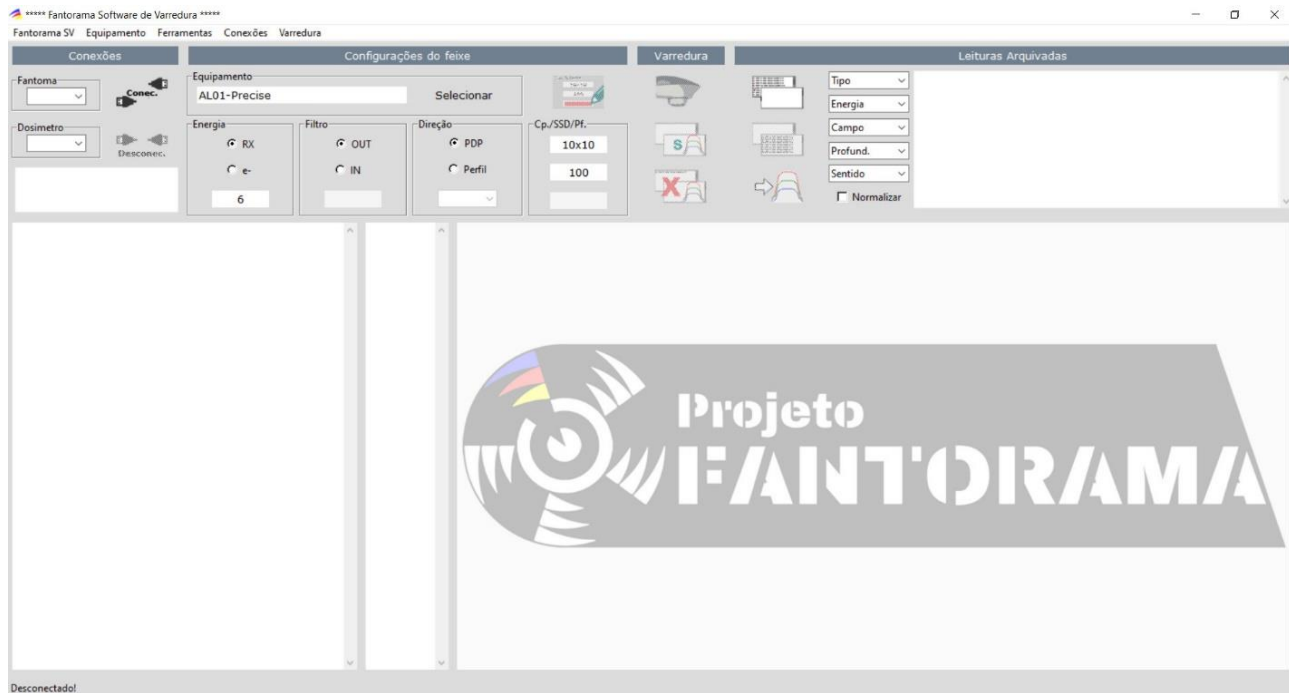


Unidade principal

**Porta USB para
conexão com PC**



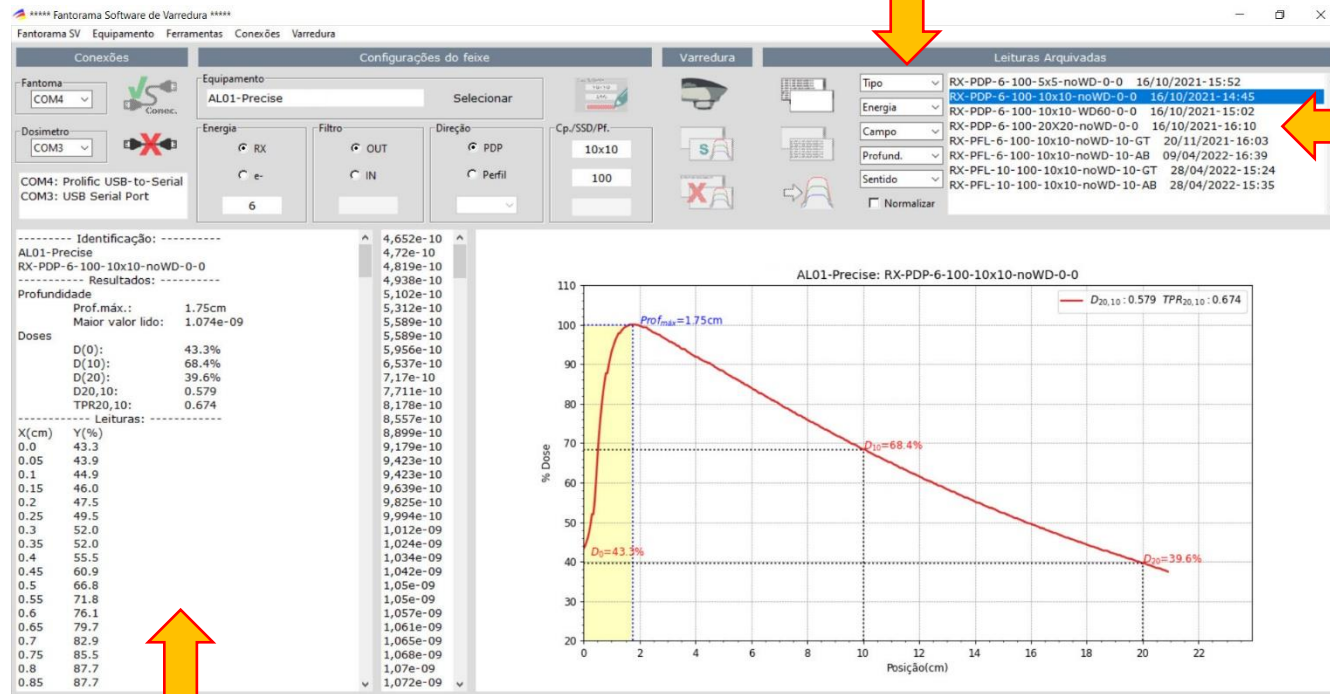
Software de varredura





FantorramaSV

Filtros de seleção



Leituras armazenadas

Leitura/Resultados



FantorramaSV

**** Fantorrama Software de Varredura ****

Fantorrama SV Equipamento Ferramentas Conexões Varredura

Conexões		Configurações do feixe				Varre
Fantoma COM4	 Conec.	Equipamento AL01-Precise Selecionar				
Dosimetro COM3		Energia ☒ RX ☐ e- 6	Filtro ☒ OUT ☐ IN	Direção ☒ PDP ☐ Perfil	Cp./SSD/Pf. 10x10 100	 

COM4: Prolific USB-to-Serial
COM3: USB Serial Port

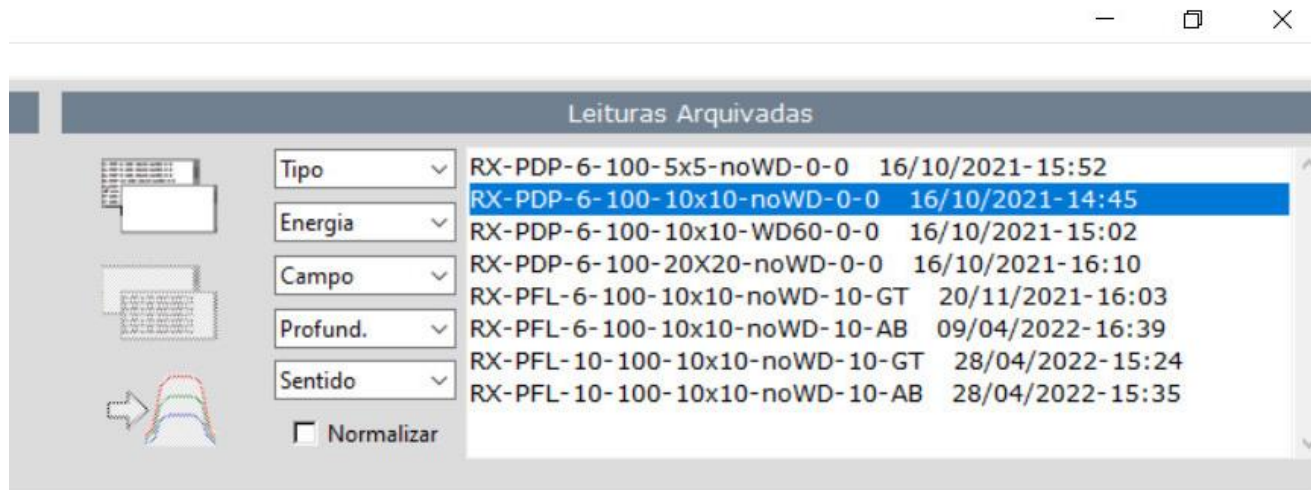


FantoramasV





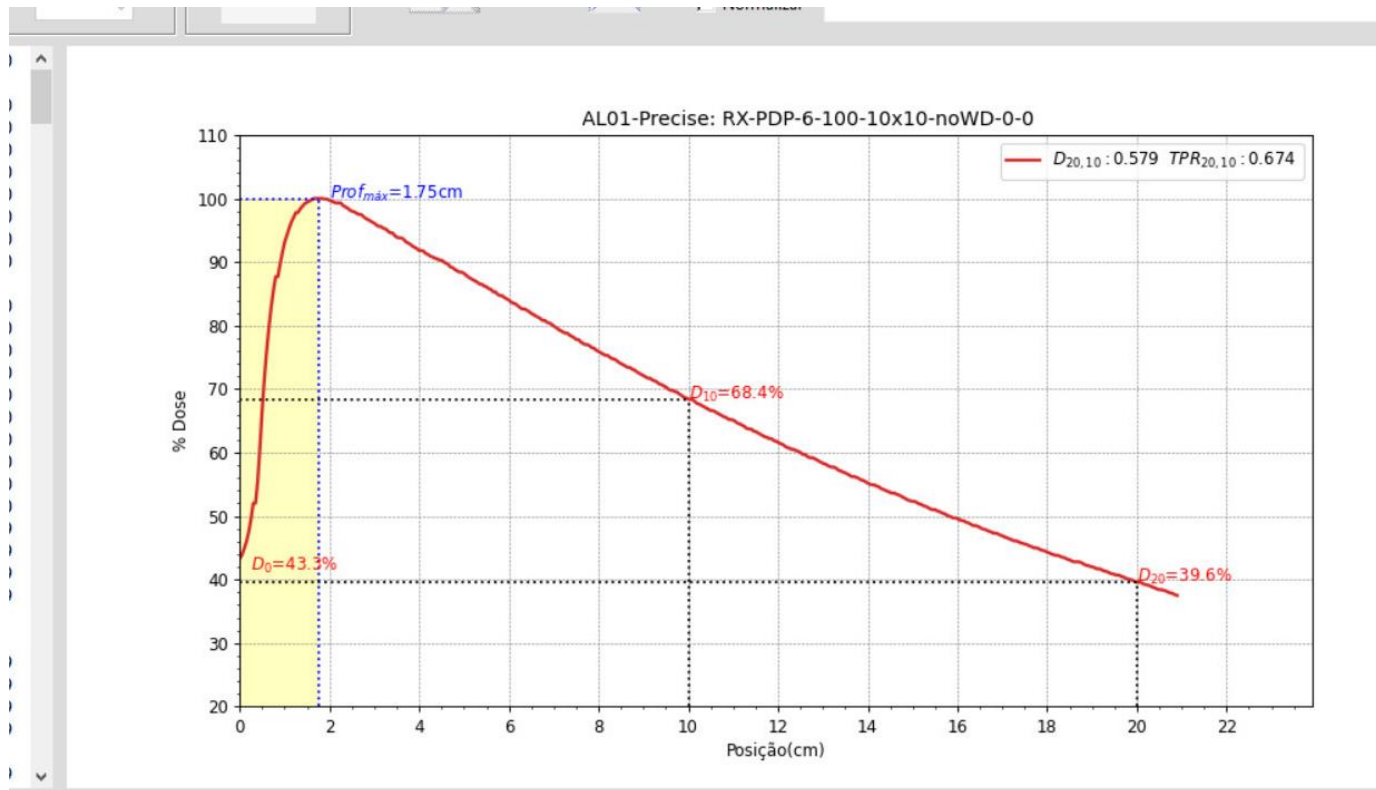
FantorramaSV



Leituras Arquivadas	
Tipo	RX-PDP-6-100-5x5-noWD-0-0 16/10/2021-15:52
Energia	RX-PDP-6-100-10x10-noWD-0-0 16/10/2021-14:45
Campo	RX-PDP-6-100-10x10-WD60-0-0 16/10/2021-15:02
Profund.	RX-PDP-6-100-20X20-noWD-0-0 16/10/2021-16:10
Sentido	RX-PFL-6-100-10x10-noWD-10-GT 20/11/2021-16:03
	RX-PFL-6-100-10x10-noWD-10-AB 09/04/2022-16:39
	RX-PFL-10-100-10x10-noWD-10-GT 28/04/2022-15:24
	RX-PFL-10-100-10x10-noWD-10-AB 28/04/2022-15:35



FantorramaSV



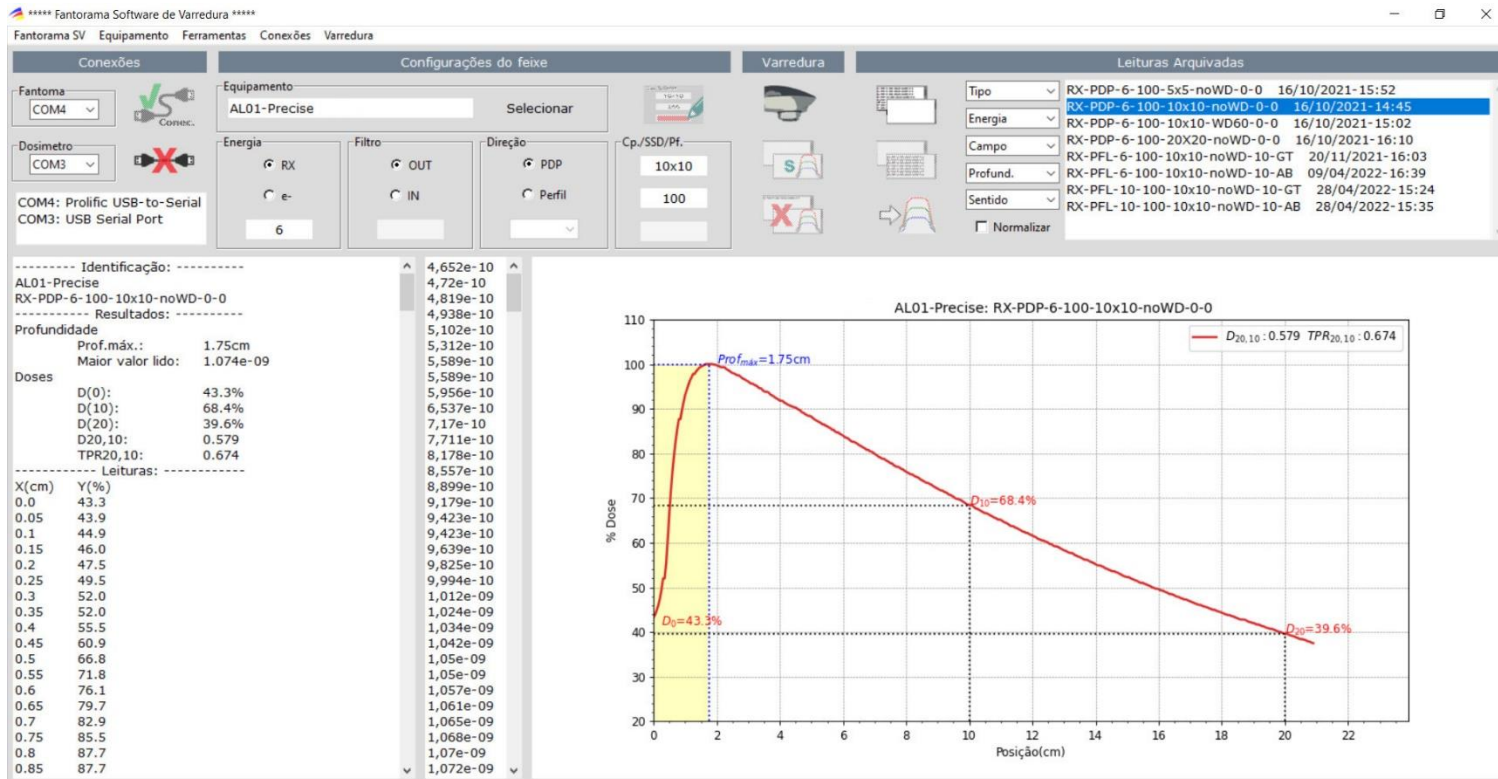


FantorramaSV

----- Identificação: -----			4,652e-10	
AL01-Precise			4,72e-10	
RX-PDP-6-100-10x10-noWD-0-0			4,819e-10	
----- Resultados: -----			4,938e-10	
Profundidade			5,102e-10	
Prof.máx.:	1.75cm		5,312e-10	
Maior valor lido:	1.074e-09		5,589e-10	
Doses			5,589e-10	
D(0):	43.3%		5,956e-10	
D(10):	68.4%		6,537e-10	
D(20):	39.6%		7,17e-10	
D20,10:	0.579		7,711e-10	
TPR20,10:	0.674		8,178e-10	
----- Leituras: -----			8,557e-10	
X(cm)	Y(%)		8,899e-10	
0.0	43.3		9,179e-10	
0.05	43.9		9,423e-10	
0.1	44.9		9,423e-10	
0.15	46.0		9,639e-10	
0.2	47.5		9,825e-10	
0.25	49.5		9,994e-10	
0.3	52.0		1,012e-09	
0.35	52.0		1,024e-09	
0.4	55.5		1,034e-09	
0.45	60.9		1,042e-09	
0.5	66.8		1,05e-09	
0.55	71.8		1,05e-09	
0.6	76.1		1,057e-09	
0.65	79.7		1,061e-09	
0.7	82.9		1,065e-09	
0.75	85.5		1,068e-09	
0.8	87.7		1,07e-09	
0.85	87.7		1,072e-09	

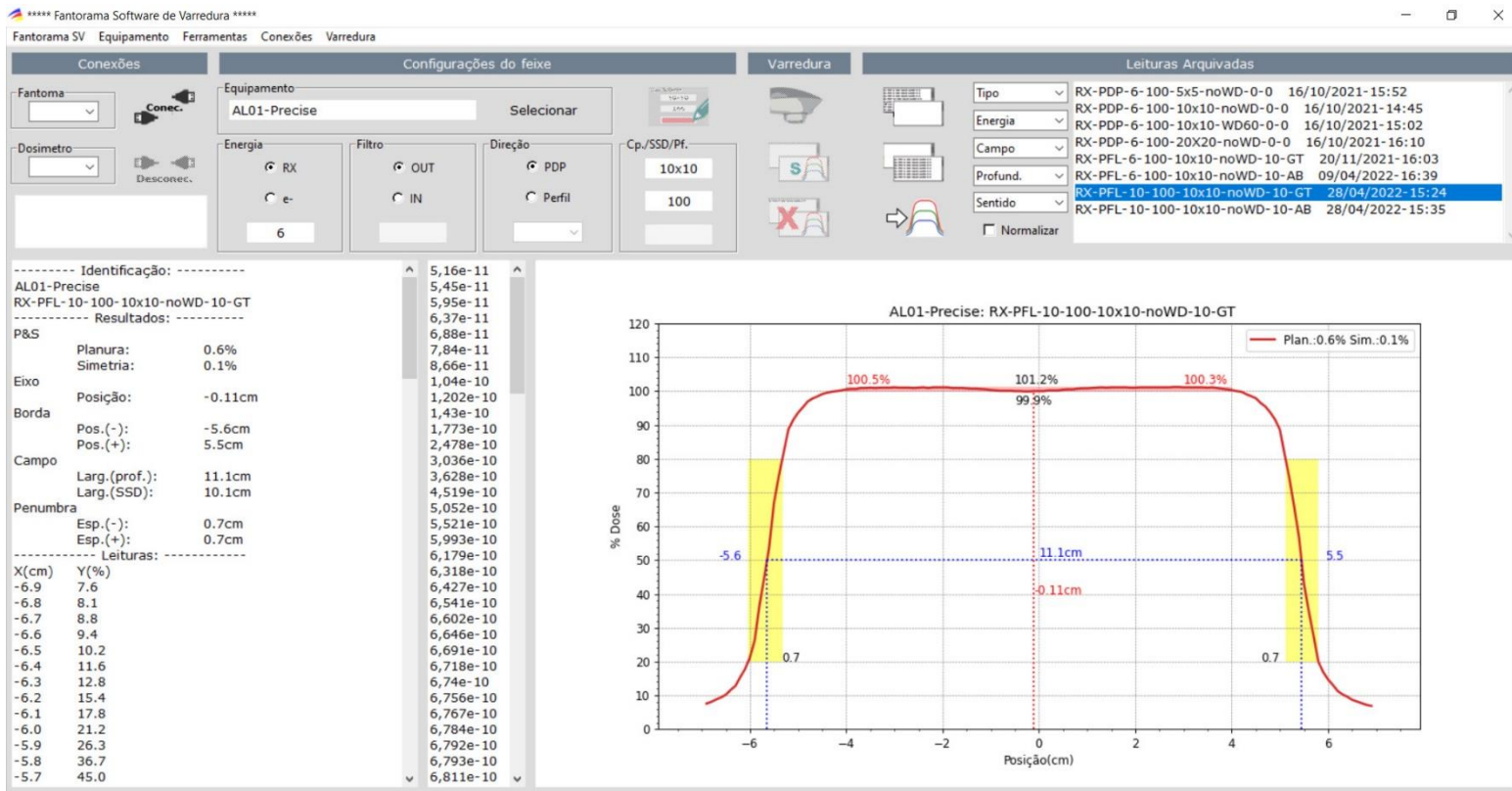


FantorramaSV





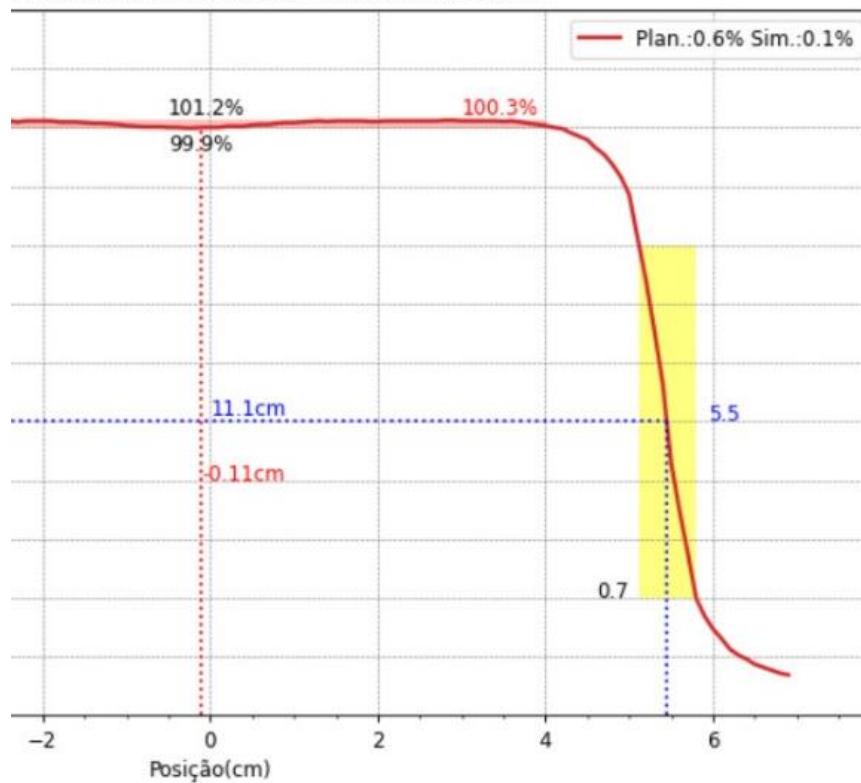
FantorramaSV





FantoramasV

-Precise: RX-PFL-10-100-10x10-noWD-10-GT



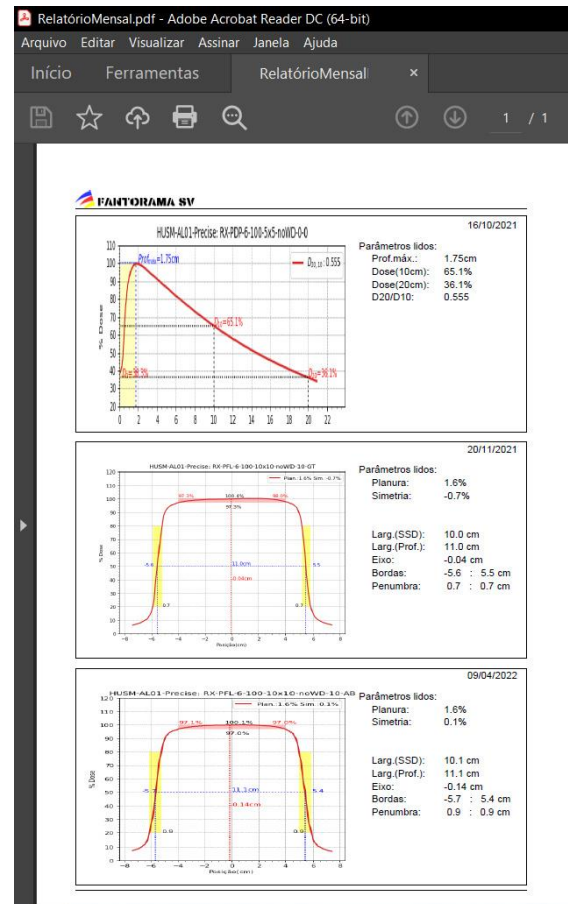
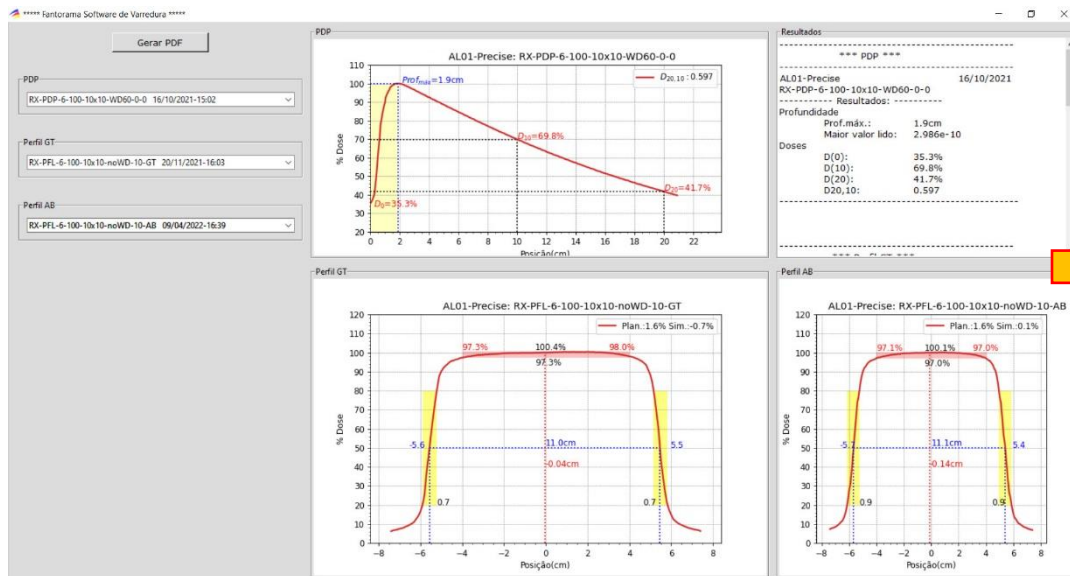


FantorramaSV

		e-	IN	
		6		
----- Identificação: -----				5,16e-11
AL01-Precise				5,45e-11
RX-PFL-10-100-10x10-noWD-10-GT				5,95e-11
----- Resultados: -----				6,37e-11
P&S				6,88e-11
	Planura:	0.6%		7,84e-11
	Simetria:	0.1%		8,66e-11
Eixo				1,04e-10
	Posição:	-0.11cm		1,202e-10
Borda				1,43e-10
	Pos.(-):	-5.6cm		1,773e-10
	Pos.(+):	5.5cm		2,478e-10
Campo				3,036e-10
	Larg.(prof.):	11.1cm		3,628e-10
	Larg.(SSD):	10.1cm		4,519e-10
Penumbra				5,052e-10
	Esp.(-):	0.7cm		5,521e-10
	Esp.(+):	0.7cm		5,993e-10
----- Leituras: -----				6,179e-10
X(cm)	Y(%)			6,318e-10
-6.9	7.6			6,427e-10
-6.8	8.1			6,541e-10
-6.7	8.8			6,602e-10
-6.6	9.4			6,646e-10
-6.5	10.2			6,691e-10
-6.4	11.6			6,718e-10
-6.3	12.8			6,74e-10

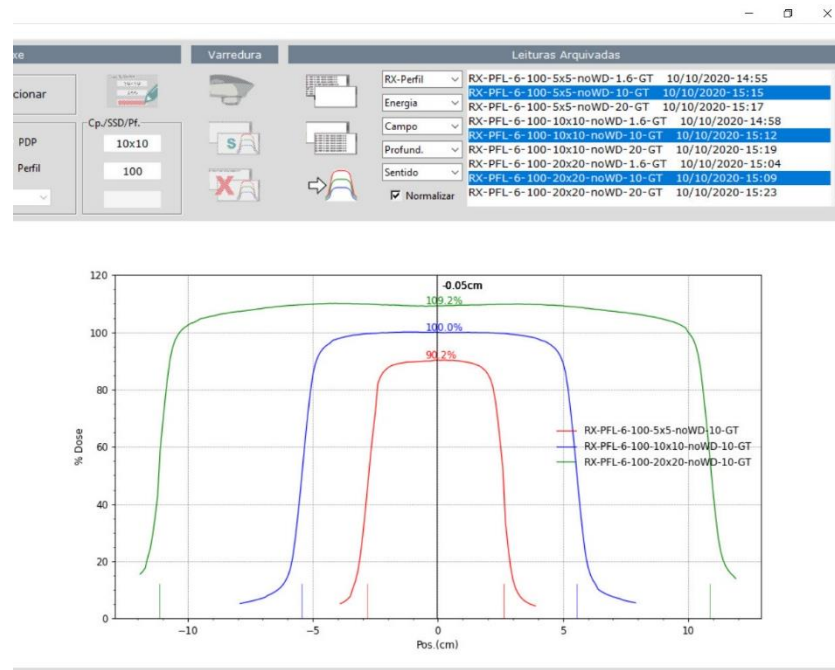
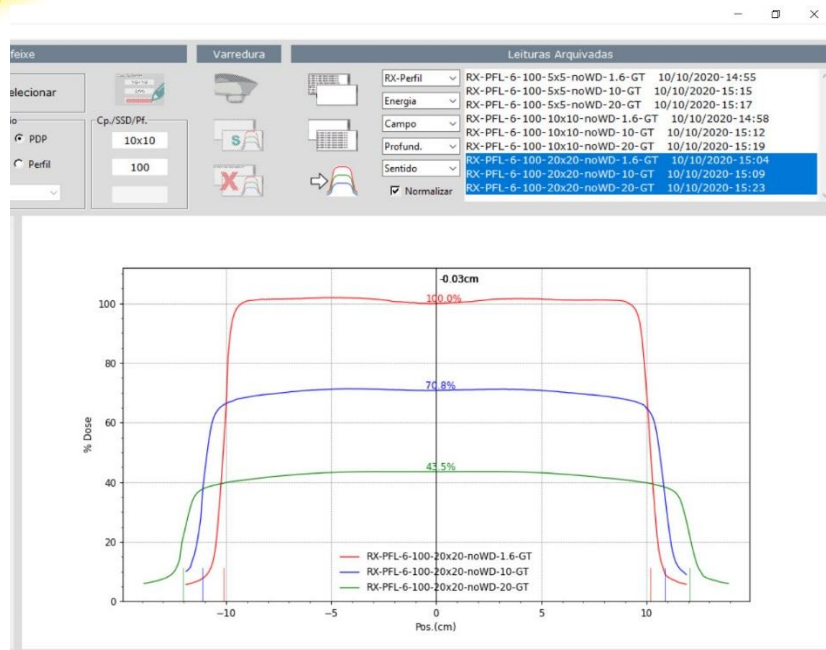


FantorramaSV





FantorramaSV





Obrigado pela
oportunidade de
apresentar o projeto.

<https://sites.google.com/view/projetofantorama>