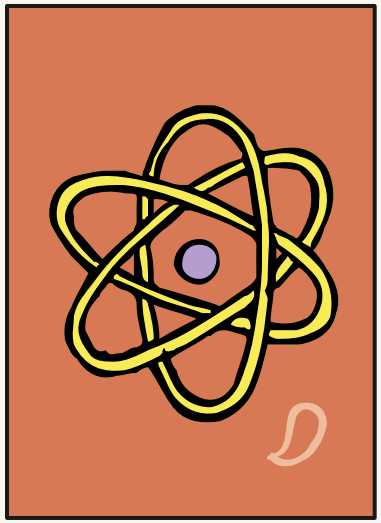
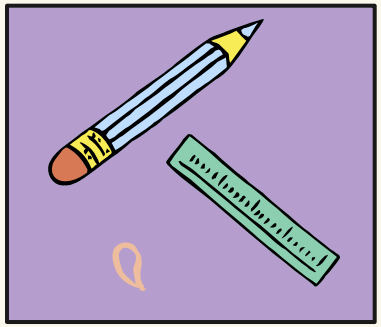
impatech

Balanço com ajuste PID

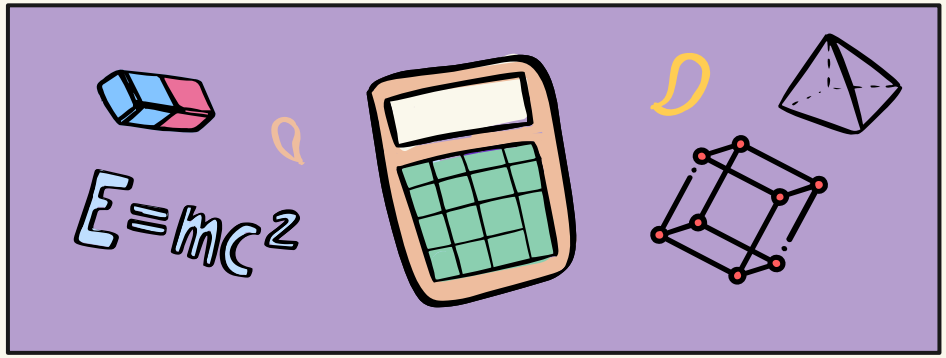


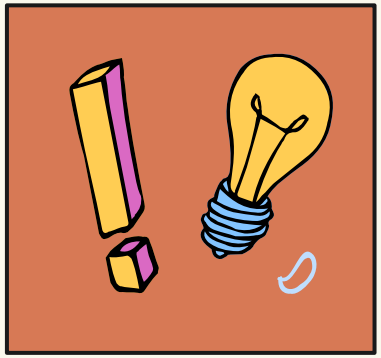


Gabriely Di Folco Rocha

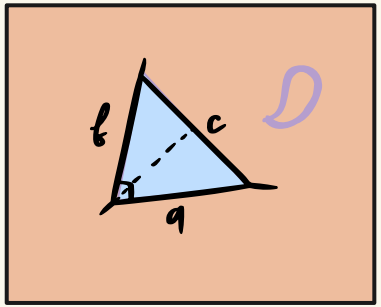
índice

01



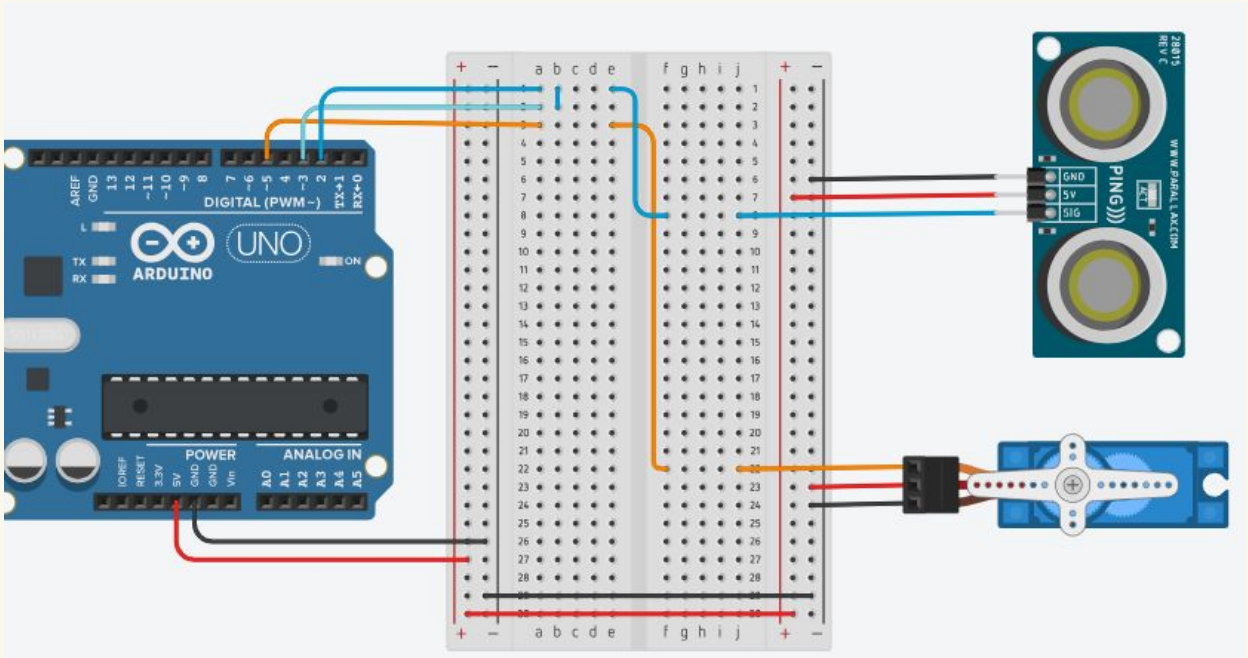


Natureza do experimento



Materiais empregados, projeto e montagem física

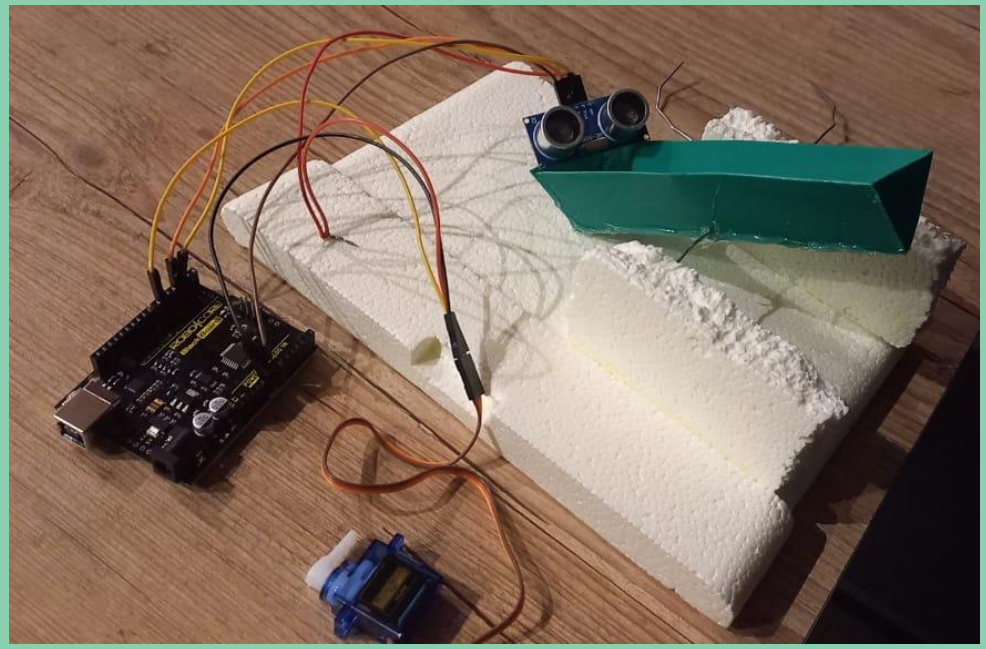
Projeto no Tinkercad



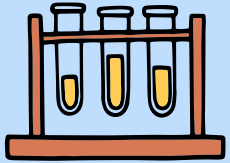
*o servomotor disponível nesse software tem apenas três entradas ao invés das quatro do componente físico, ao que uni as saídas PWM 3 e 2 para ilustração

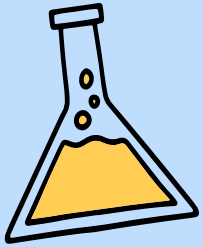
Materiais

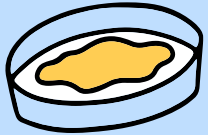
1 blackboard Robocore
Código e fonte de energia (pc)
1 servomotor
1 sensor de distância ultrassônico
1 bola ou regulador
Base de ispopor
Fios jumper macho-macho e macho-fêmea

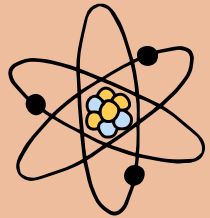


02

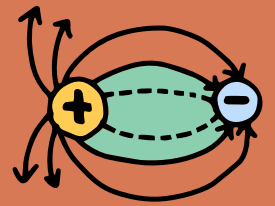








Análise teórica



Conceitos necessários e revisão da bibliografia

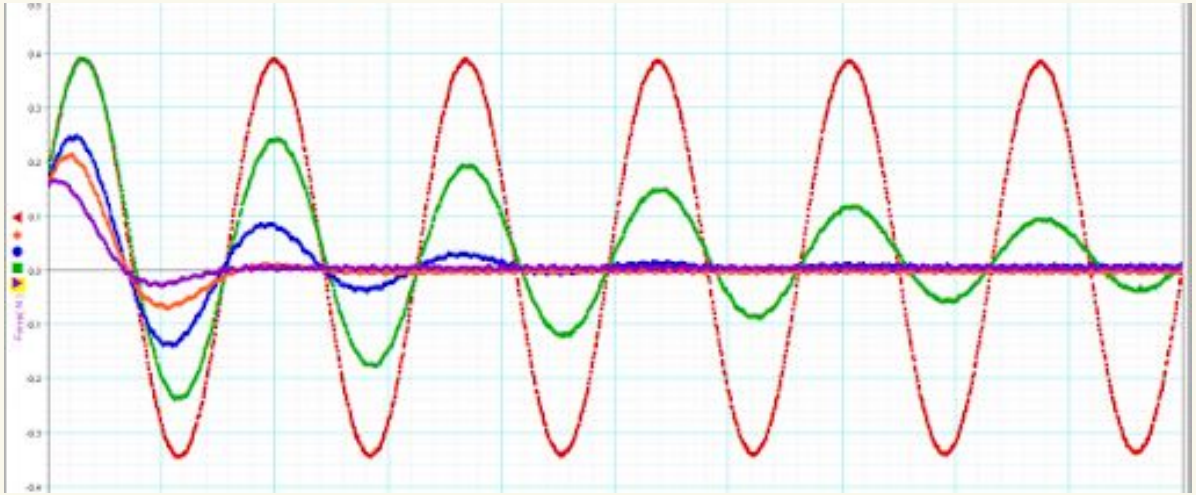
Como funciona um controle PID?

Erro = setpoint - valor medido

PID = erro x kp + ki x ∫(erro)dt
+ kd x d(erro)/dt

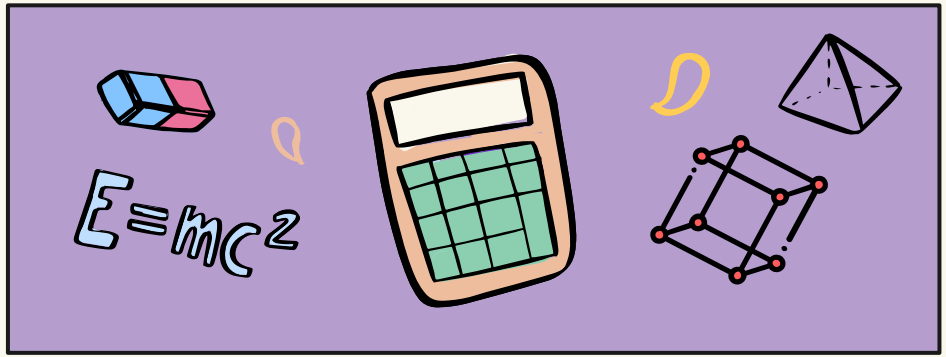
```
Servo servo;
#define trig 2
#define echo 3

#define kp 15
#define ki 0.02
#define kd 20

double priError = 0;
double toError = 0;
```

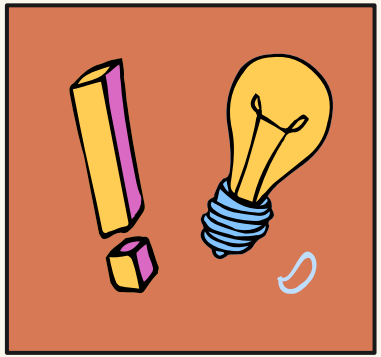
Nesse caso funciona como um...



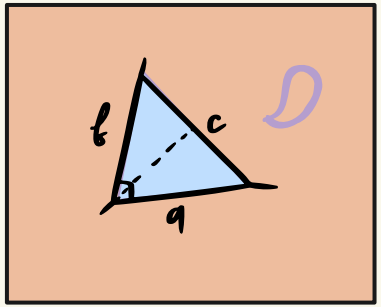
Oscilador harmônico amortecido!

03



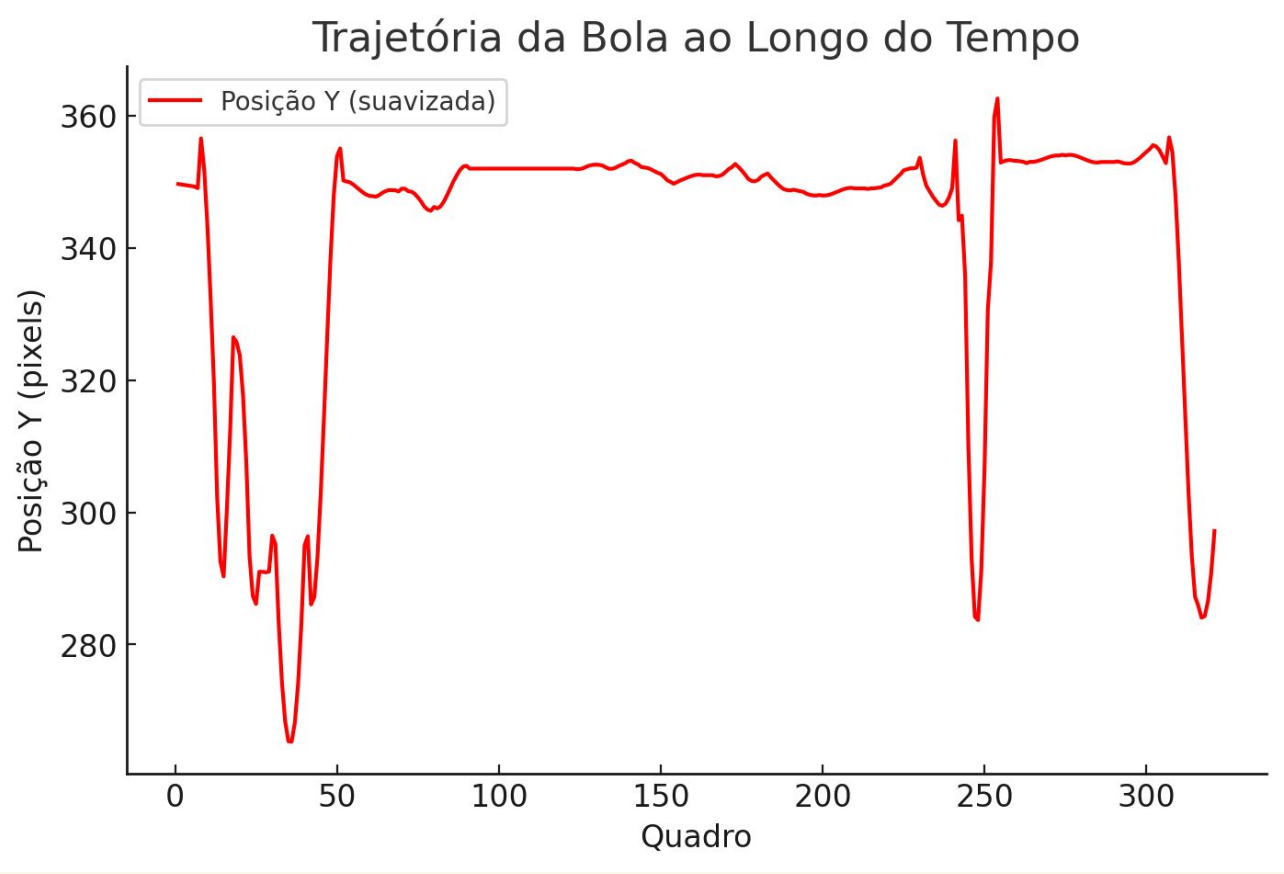


Resultados



Códigos utilizados, gráficos e suas interpretações

Vídeo 1: referência do balanço


Trajetória da Bola ao Longo do Tempo
Posição Y (suavizada)
Posição Y (pixels)
360
340
320
300
280
0
50
100
150
200
250
300
Quadro

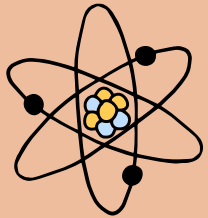
Sugestões de aprimoramento

- densidade do material utilizado

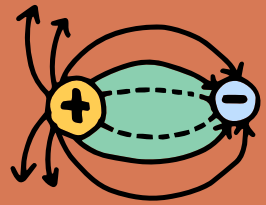
- centro de massa no eixo

- base firme
- impressão 3d (cad no git)

04



Referências

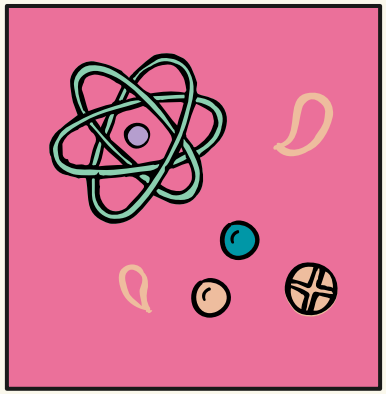


Agradecimenentos, divisão de tarefas e referências

Bibliografia

https://github.com/ghostfoxgoddes3/PID-balance
https://srituhobby.com/what-is-a-pid-controller-and-how-does-it-work-with-an-arduino/
https://en.wikipedia.org/wiki/Proportional%E2%80%93integral%E2%80%93derivative_controller
https://www.instructables.com/PID-Controlled-Ball-Balancing-Stewart-Platform/

Obrigada!



Estou aberta a perguntas

al.gabriely.rocha@impatech.org.br

https://github.com/ghostfoxgoddes3

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