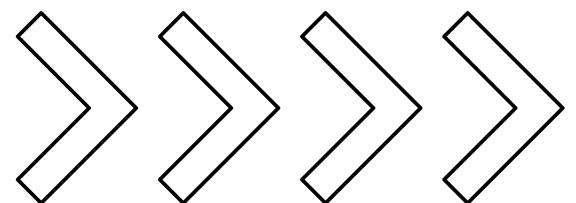
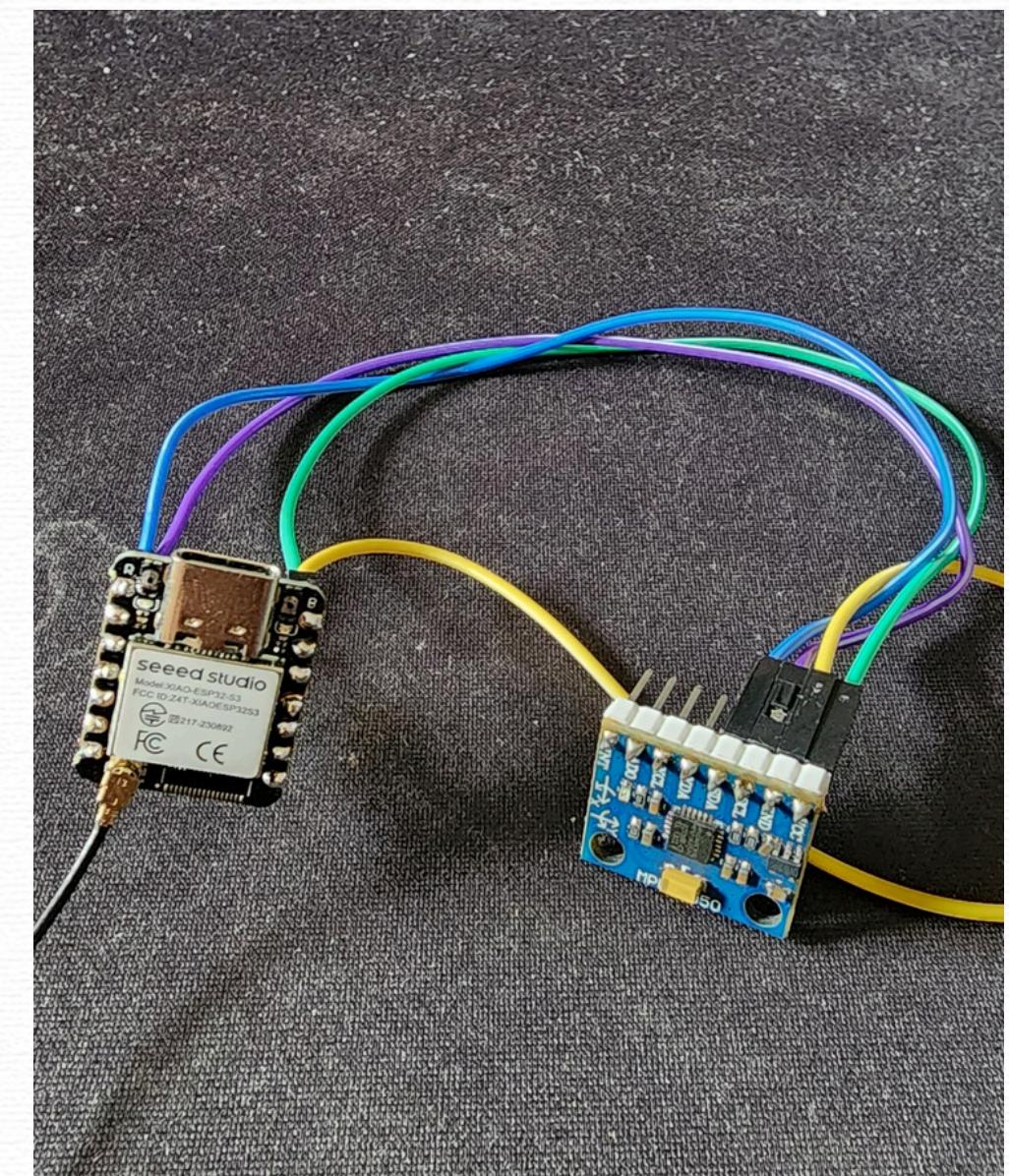
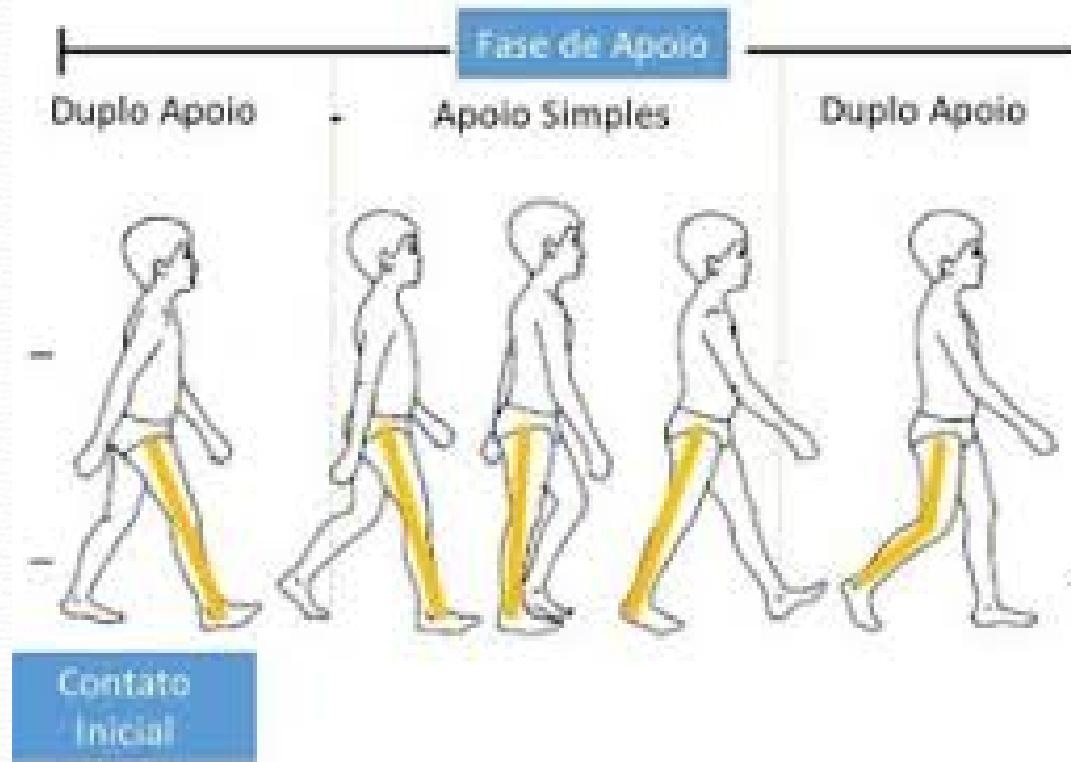


PLATAFORMA VESTÍVEL PARA AVALIAÇÃO DA CINEMÁTICA DO JOELHO UTILIZANDO SENSORES INERCIAIS



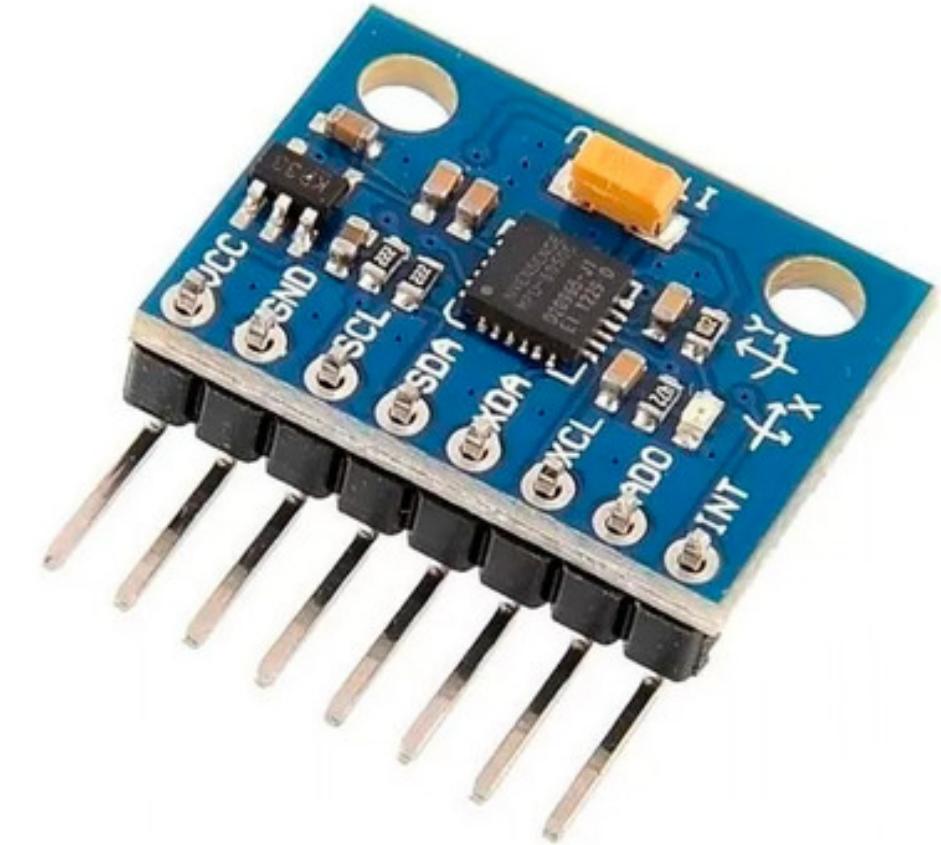
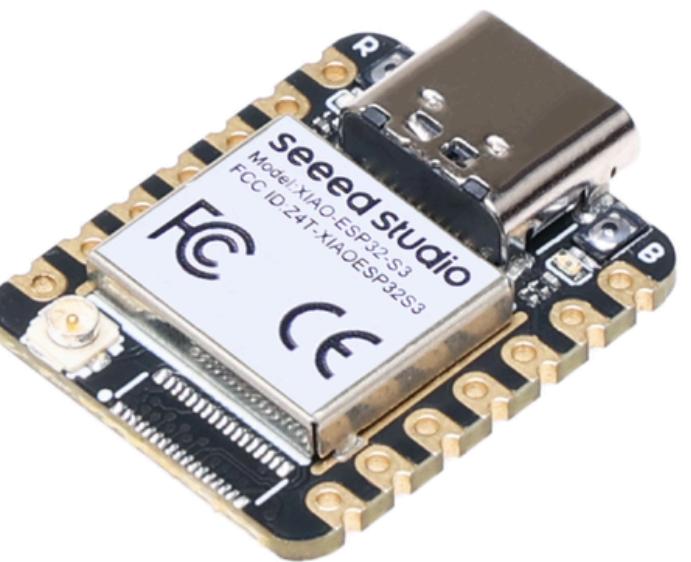
Alunos: Lucas Martins
Heitor Pereira
Marcos Gabriel
Marcella Thamires

Metodologia



Ferramentas utilizadas

- **Sensor Inercial (MPU - 6050):** combinam acelerômetro e giroscópio, medem movimentos nos três eixos espaciais (X, Y, Z).
- **ESP32 S3:** microcontrolador que inclui Wi-fi e Bluetooth Low Energy (BLE).

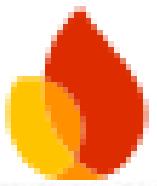


Ferramentas utilizadas

- **Flutter:** framework que auxilia no desenvolvimento de apps.
- **Firebase Realtime Database:** é um serviço de banco de dados em tempo real baseado na nuvem.
- **Firebase Authentication:** é um serviço de autenticação do Firebase que permite a segurança de dados.



Flutter

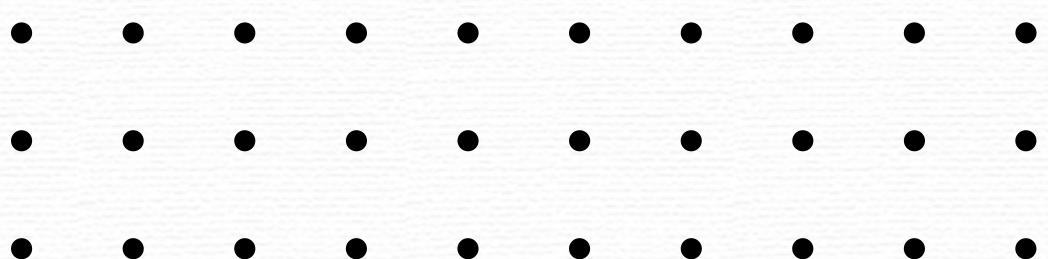
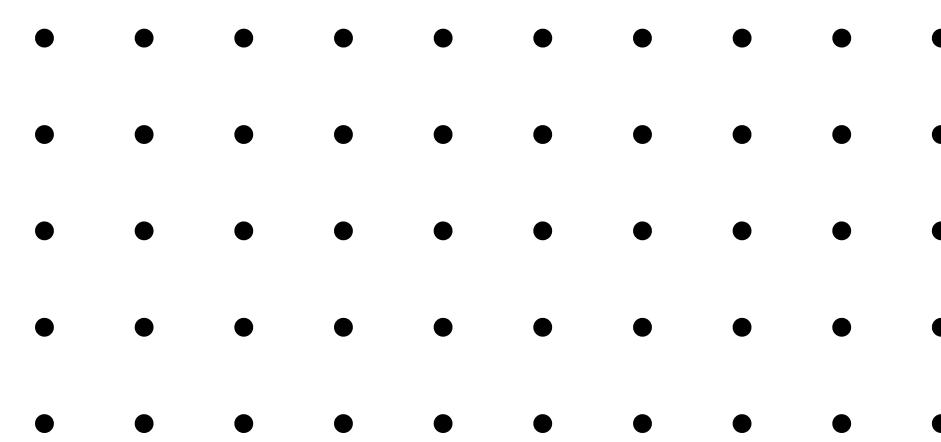


Firebase

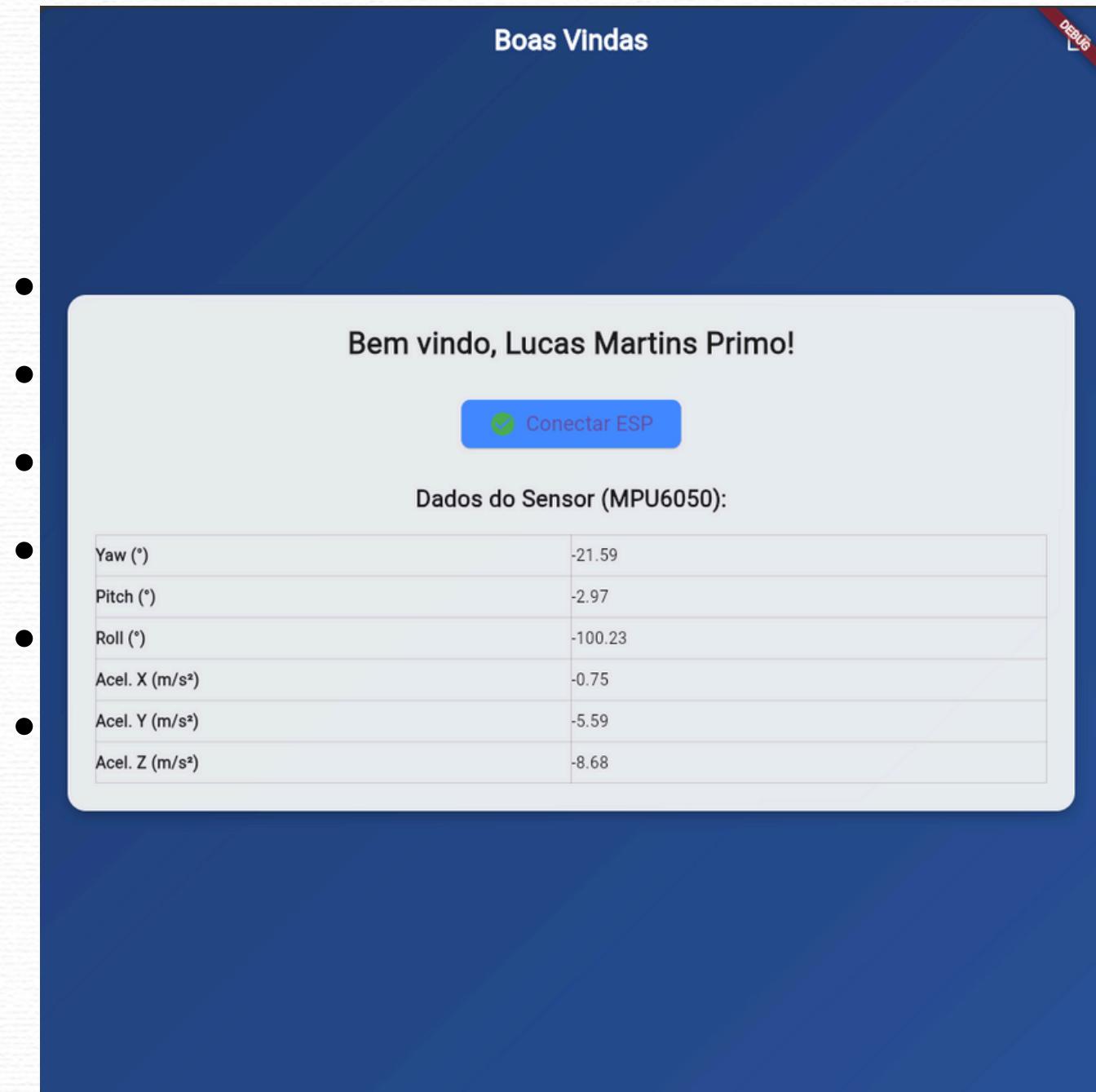
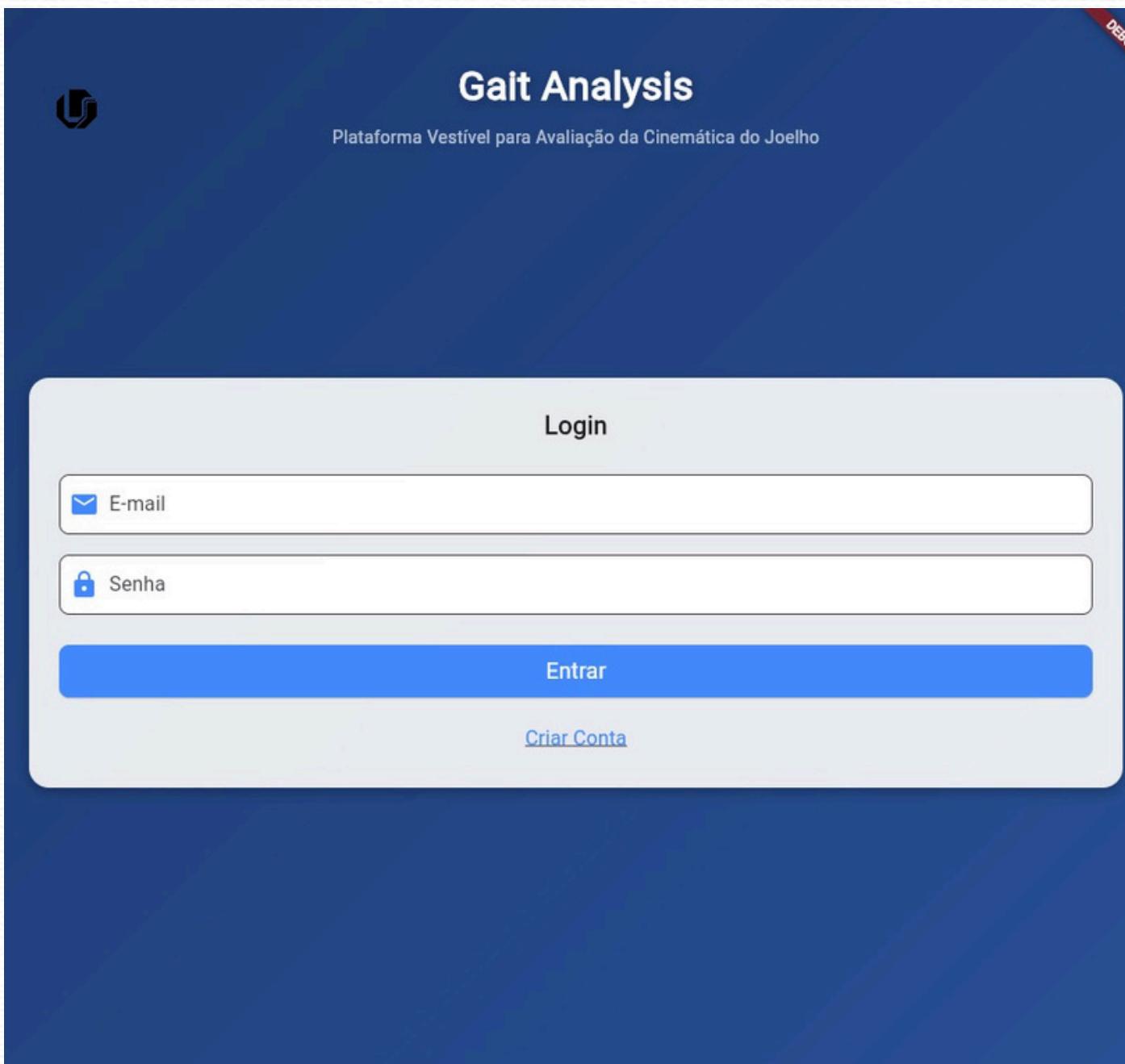
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Desenvolvimento do Firmware

- Plataforma
 - Aquisição de Dados → I2C
- Cálculo da Cinemática
 - Filtro Kalman → Roll, Pitch e redução de ruído
- Transmissão via Bluetooth



Desenvolvimento do Aplicativo



Desenvolvimento do Aplicativo



Firebase

Eclin2 ▾

Realtime Database Precisa de ajuda com o Realtime Database? Peça ao Gemini!

Dados Regras Backups Uso Extensions

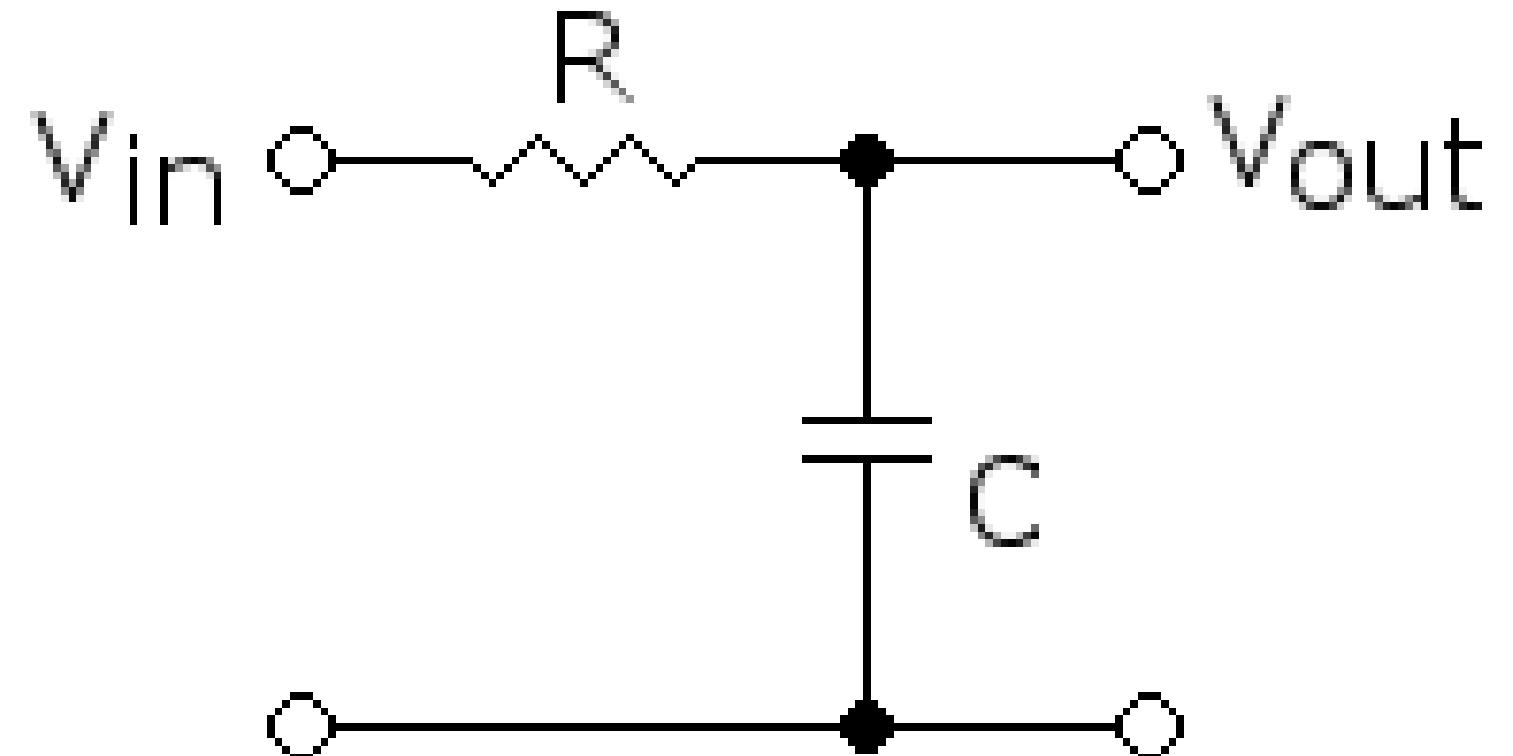
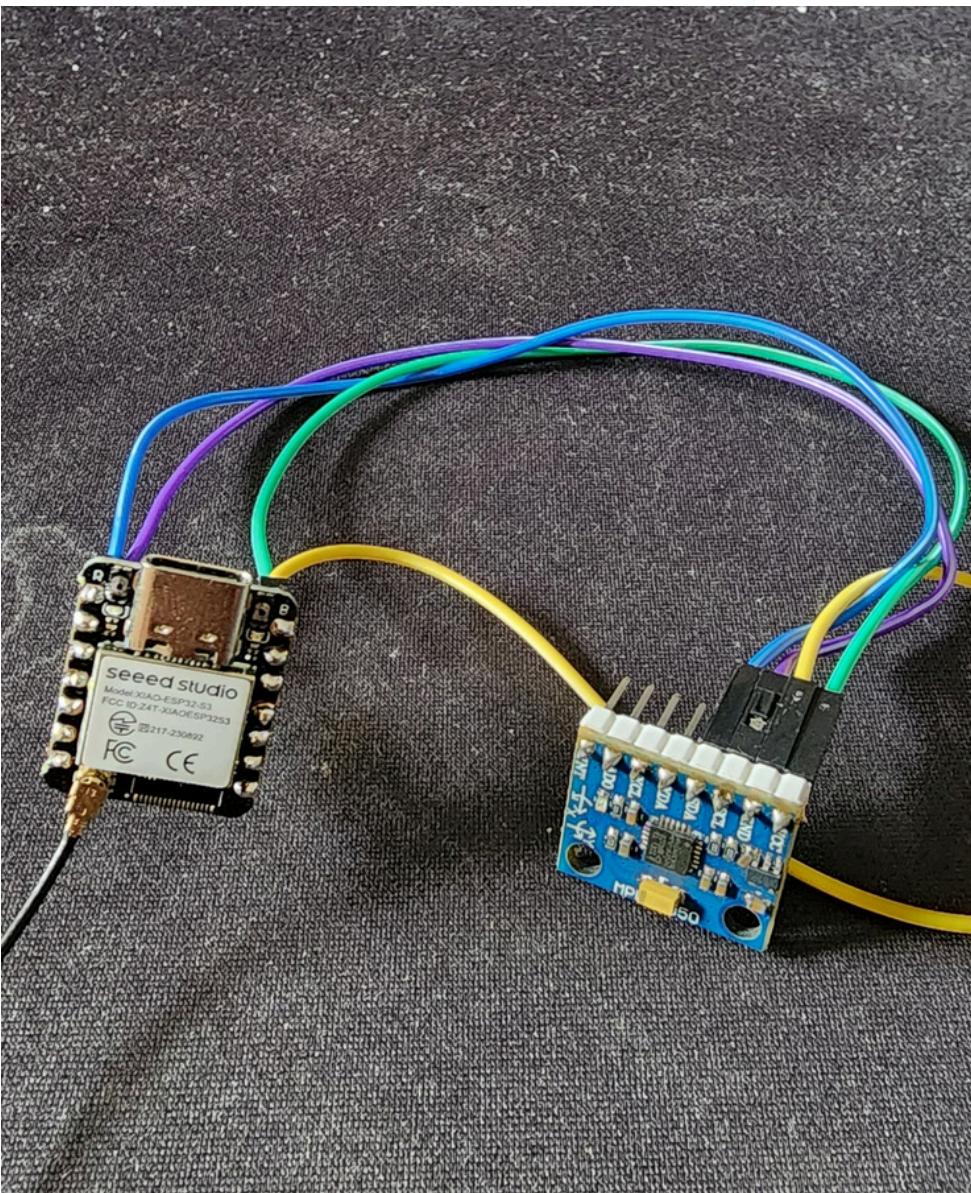
https://eclin2-d3998-default.firebaseio.com

```
sensor_data
  -OM1Rn2GtVq7FYYZpMzg
    ax: -0.75
    ay: -5.59
    az: -8.68
    pitch: -2.97
    roll: -100.23
    timestamp: 1743512613606
    yaw: -21.59

users
  administradores
    InhXEMAnUdYC6ru8JK59wYvqsPU2
  colaboradores
    8vRr34RWADhkuB0WBeDGswMD8NR2
      createdAt: "2024-10-01T01:32:59.480"
      dateOfBirth: "12/09/2001"
      email: "emailteste@gmail.com"
      name: "Lucas Martins Primo"
```

Local do banco de dados: Estados Unidos (us-central1)

Próximos passos...



Referências

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- [8] TAO, W.; LIU, T.; ZHENG, R.; FENG, H. Gait analysis using wearable sensors. *Sensors*, v. 12, n. 2, p. 2255–2283, 2012.