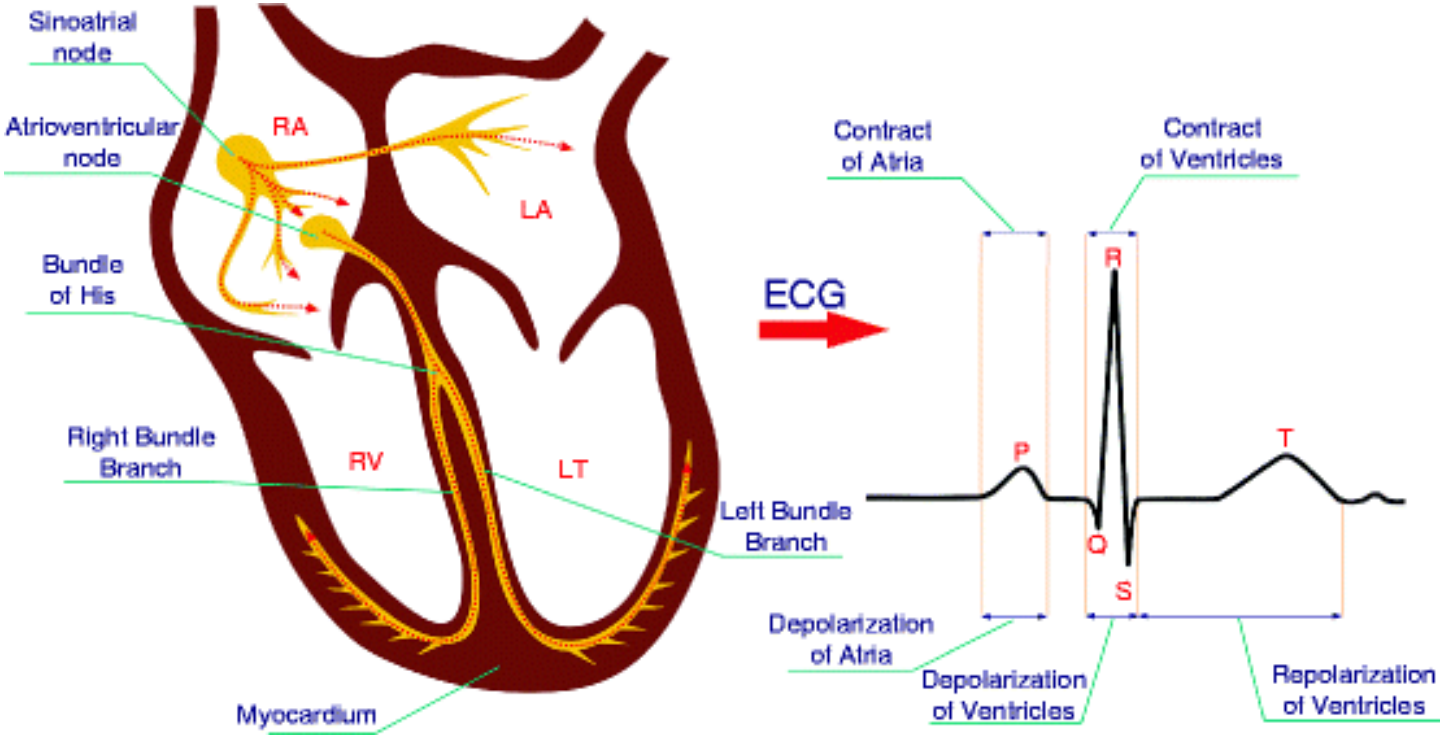
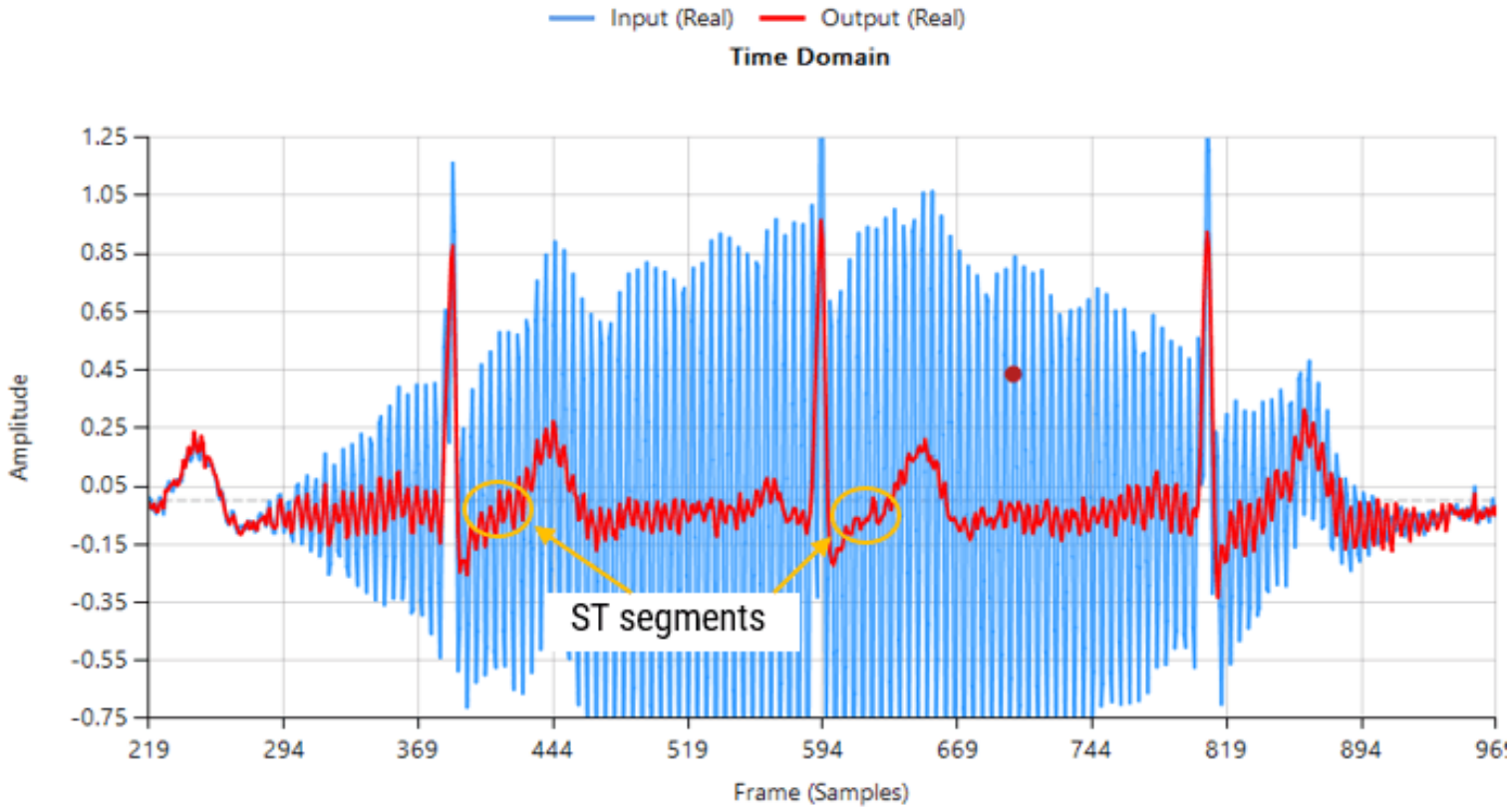
Dispozitiv de monitorizare a semnalului ECG

- Codreanu Dan
- Facultatea de Inginerie Electrică



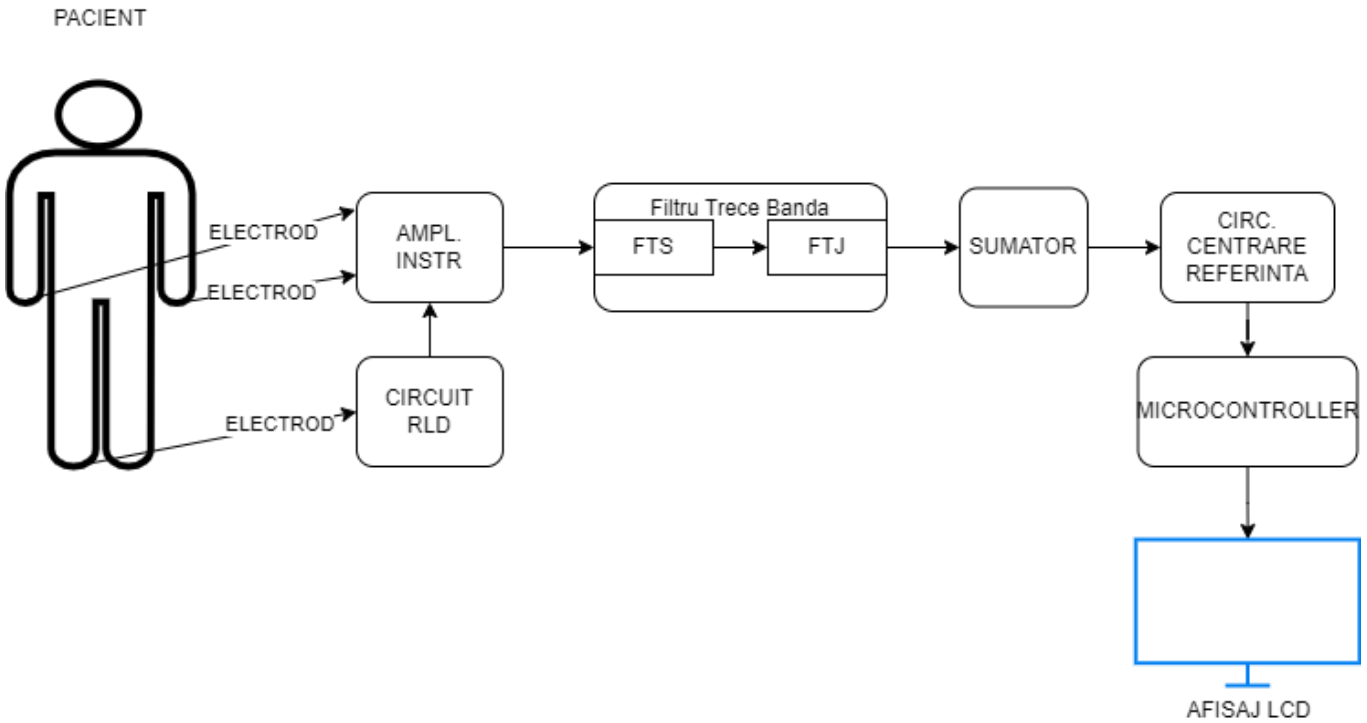
Context & Stadiul actual

- **Stadiul actual**: Sisteme ECG clasice – 12 derivatii, Trecere spre sisteme portabile / wearable, Utilizare RLD, filtrare hibrida.
- **Probleme majore**: Amplitudine mica (µV–mV), Zgomot 50Hz, Deriva liniei de baza.



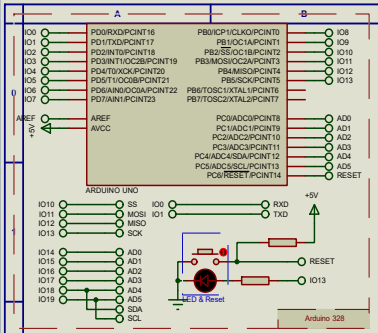
Obiectivul lucrarii

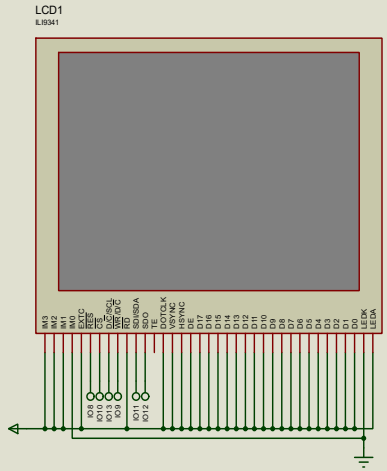
- Proiectarea unui dispozitiv ECG low-cost
- Filtrare analogica minima + procesare digitala
- Obtinerea parametrilor BPM, QRS, HRV



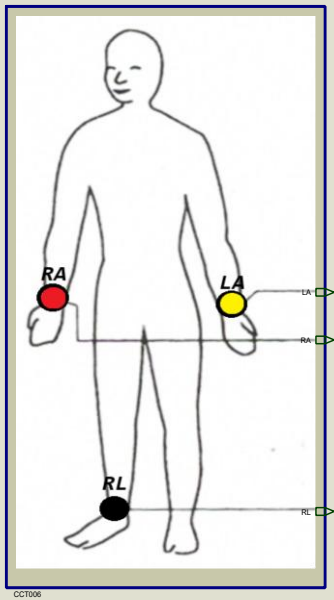
Contributii personale si implementare

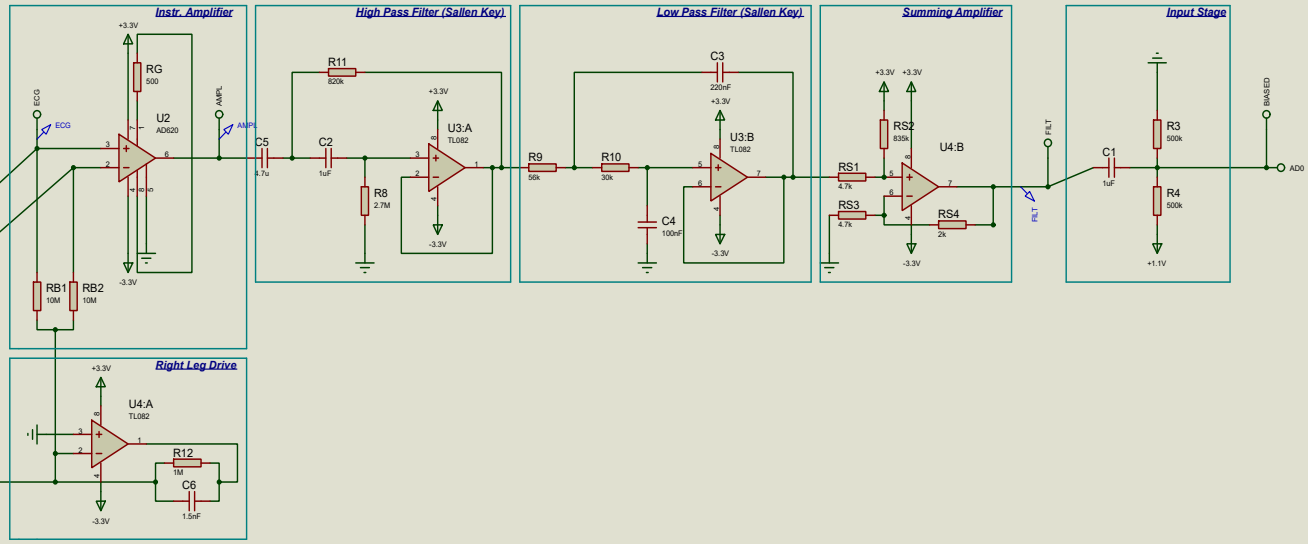
- Generare semnal ECG (Python)
- Model pacient cu simulare zgomot 50Hz
- Lant analogic: AD620 + RLD + filtre active Sallen Key
- Corectie offset + centrare ADC
- Algoritmi software:
  - R-peak,
  - BPM,
  - QRS,
  - HRV (SDNN, RMSSD, pNN50)
- Afisarea datelor pe un ecran LCD





PATIENT





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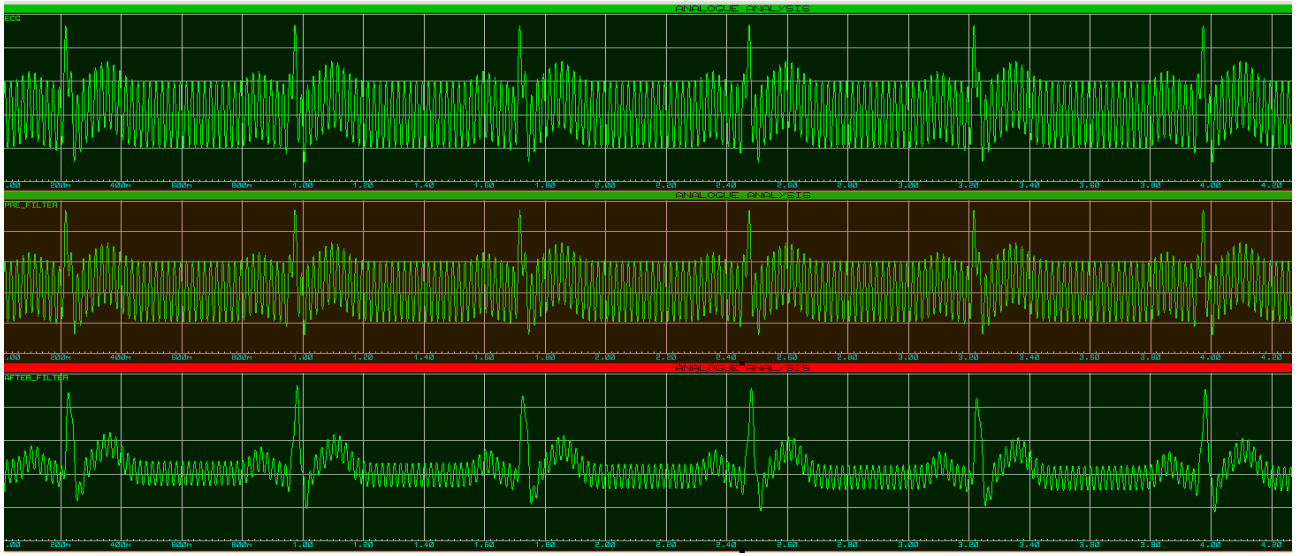
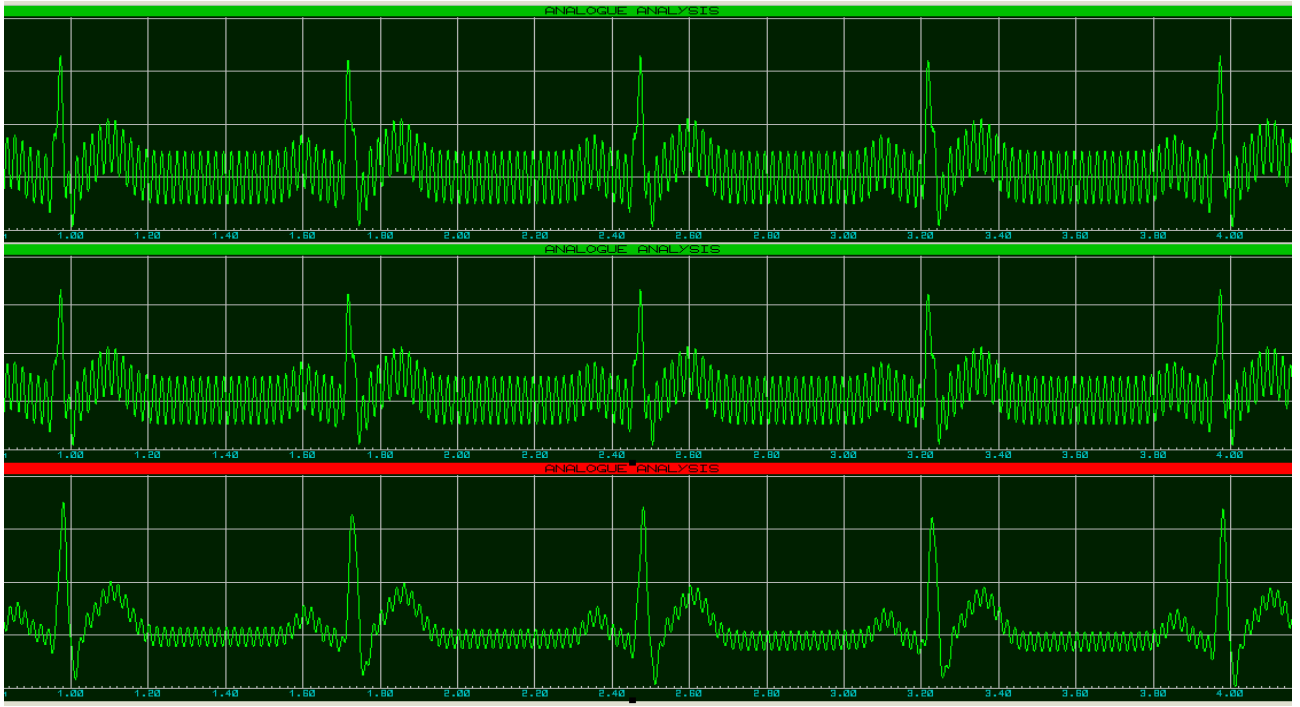
Metodologie & validare

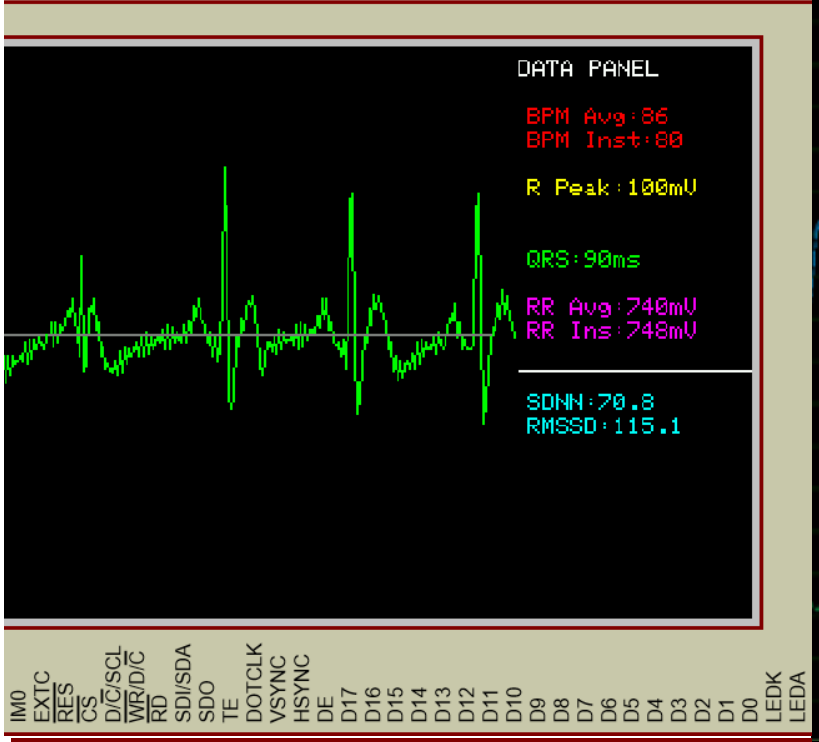
- Simulare completa în Proteus
- Testare cu zgomot redus si ridicat
- Compararea rezultatelor obtinute

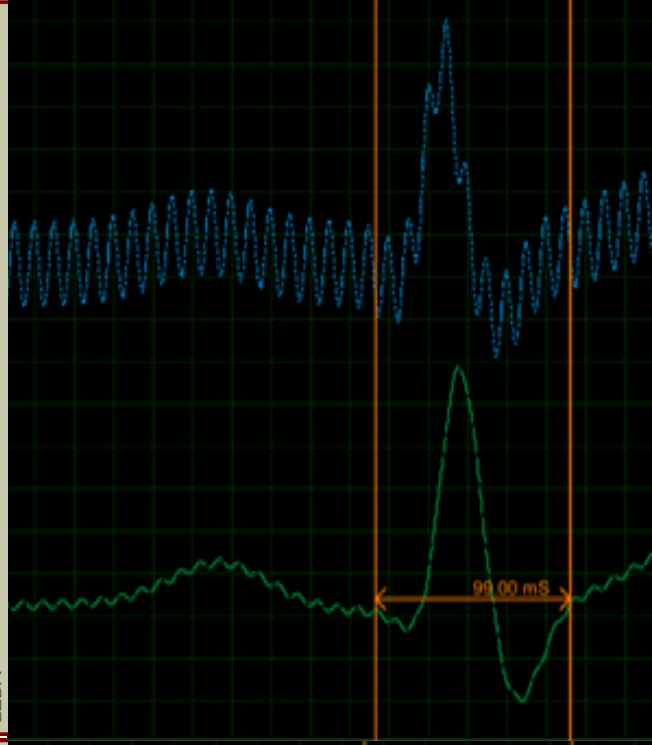


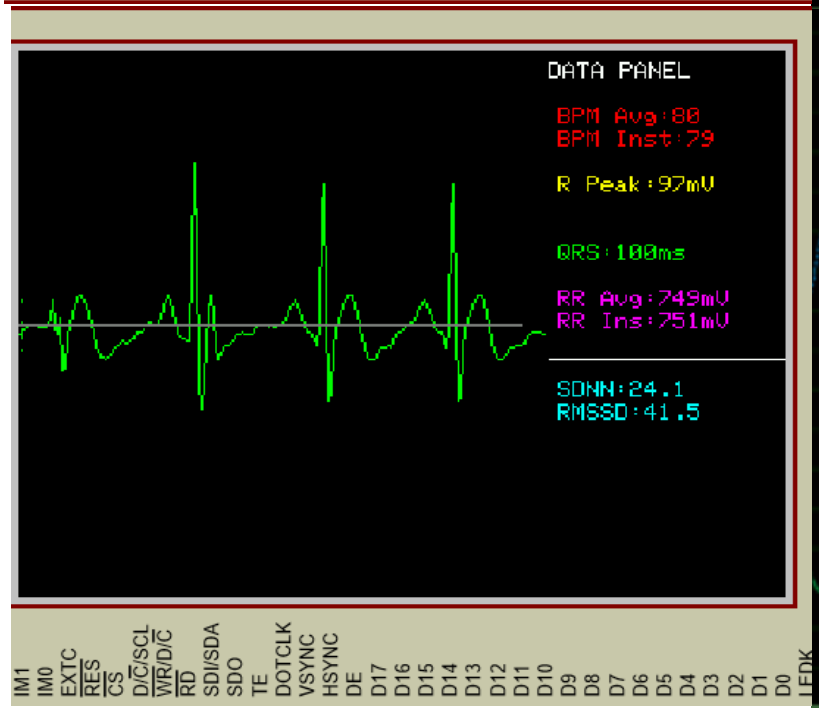


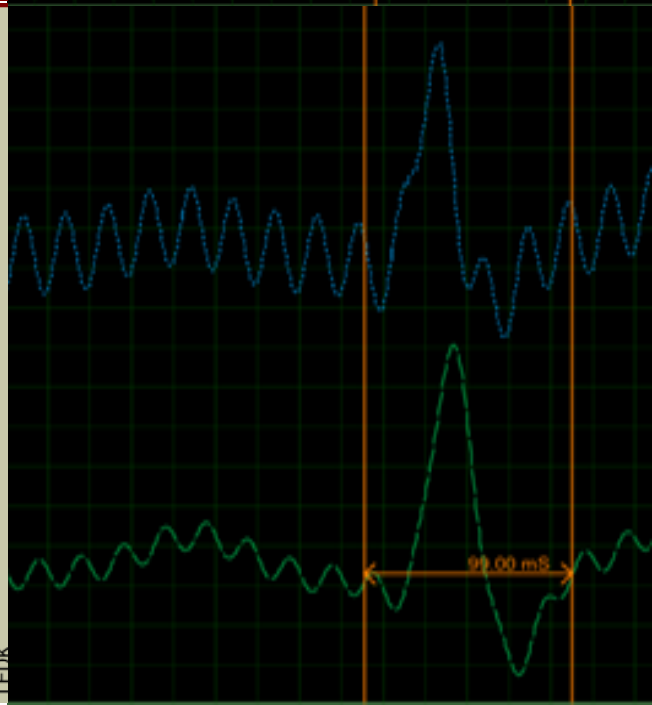
Rezultate

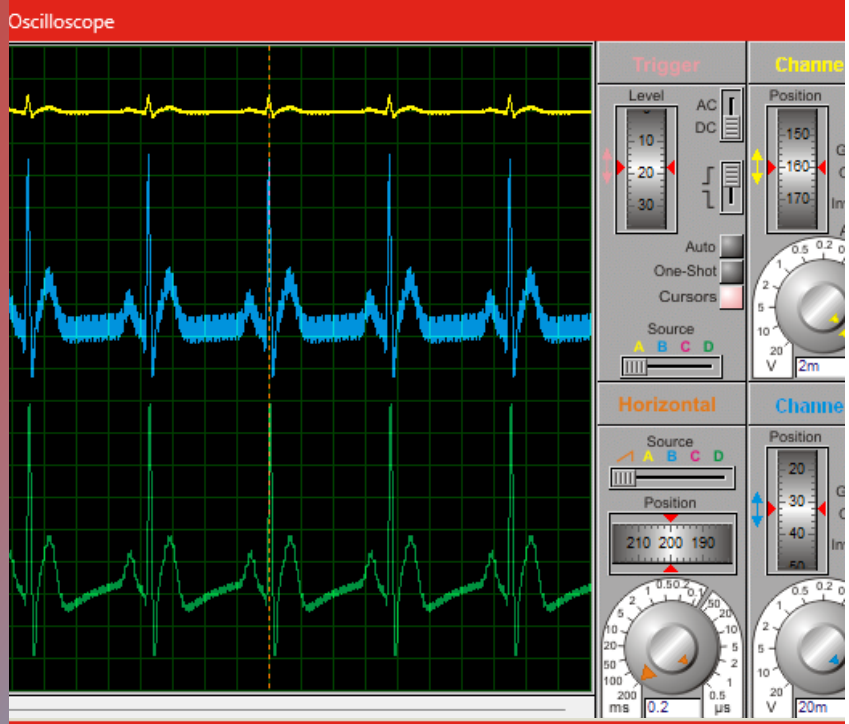
- BPM stabil chiar si cu zgomot
- Detecție corecta QRS
- HRV sensibil la perturbatii

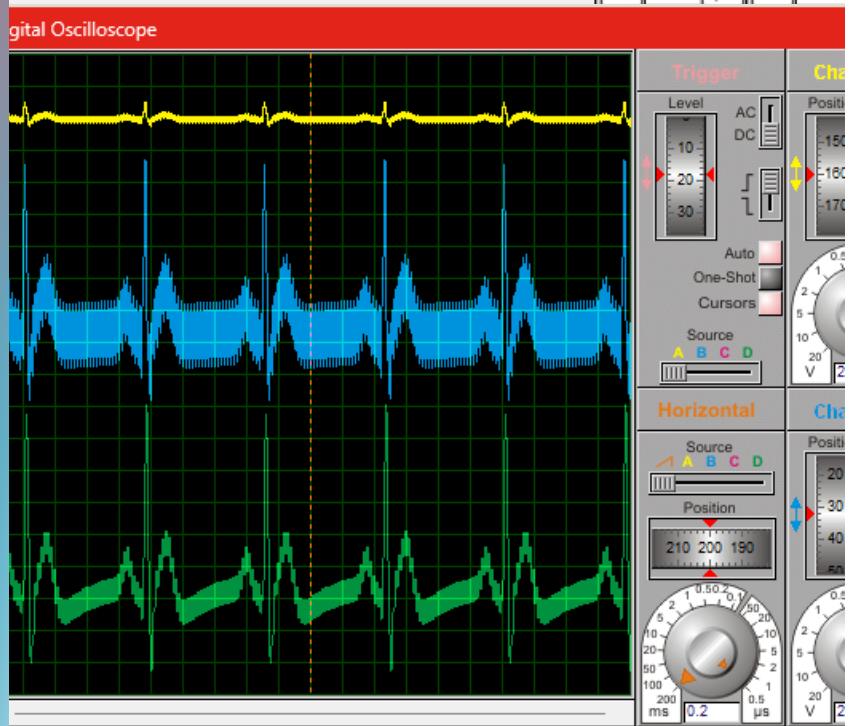












Concluzii & dezvoltari viitoare

- Filtrare hibrida eficienta
- Sistem stabil pe platforma simpla
- Posibil upgrade hardware si testare reala