

Data Menders Design Review II

Nathan Payton-McCauslin,
Alexander Grzesiak and
James Todd





Fatemeh Afghah



- Assistant professor in SICCS
- Director of Wireless Networking and Information Processing Lab
- Current research focuses on developing predictive modeling techniques using game and graph theory to optimize the performance of current diagnosis methods.



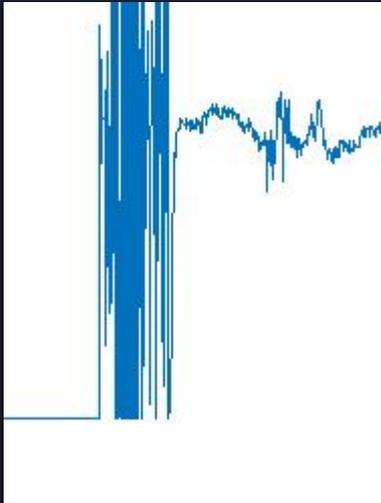
Problem Statement

- Automated monitoring has revolutionized care in modern ICU units.
- 80-99% of alarms triggered are false or meaningless.
- Emergency Care Research Institute (ECRI) placed false alarms at number one in the list, “Top 10 Health Technology Hazards” for the years 2012, 2013 and 2015.

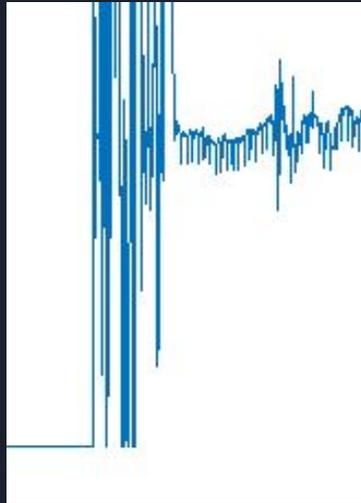
False Alarm Example

- Most efforts to reduce false alarm rate are focused on improving hardware.

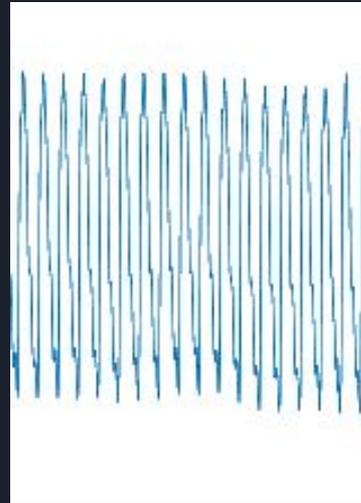
ECG II



ECG V



ABP



Solution

Our solution is to make a software package that can take signals from multiple devices and analyze the data from the devices. Once that data is analyzed, it can be determined if an alarm should go off or not.

- Global

Global refers to data from that available data set. Meaning the data set that is used, is used as the average by other devices.

- Local

Local data is the patient's data that is being collected over the stay of their visit. So after time has passed, we will start comparing the incoming data to the collected data from the patient. This gives more accurate results in for alarm detection.



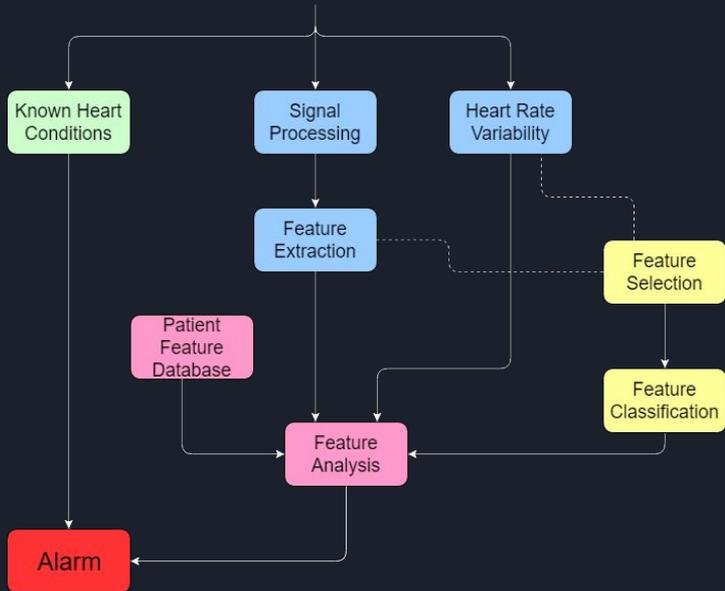
Implementation Overview

- A better solution → Our software package:
 - MATLAB programming language with and without the library WFDB
 - WEKA

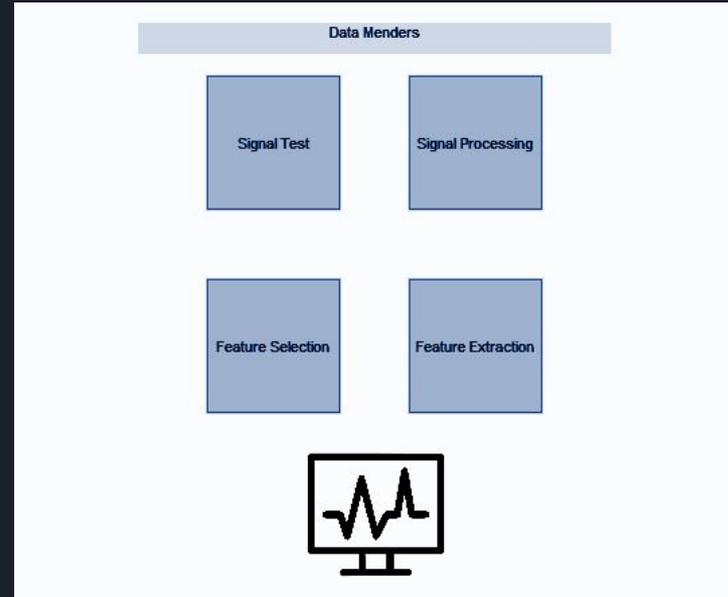


Architecture Overview

Back End



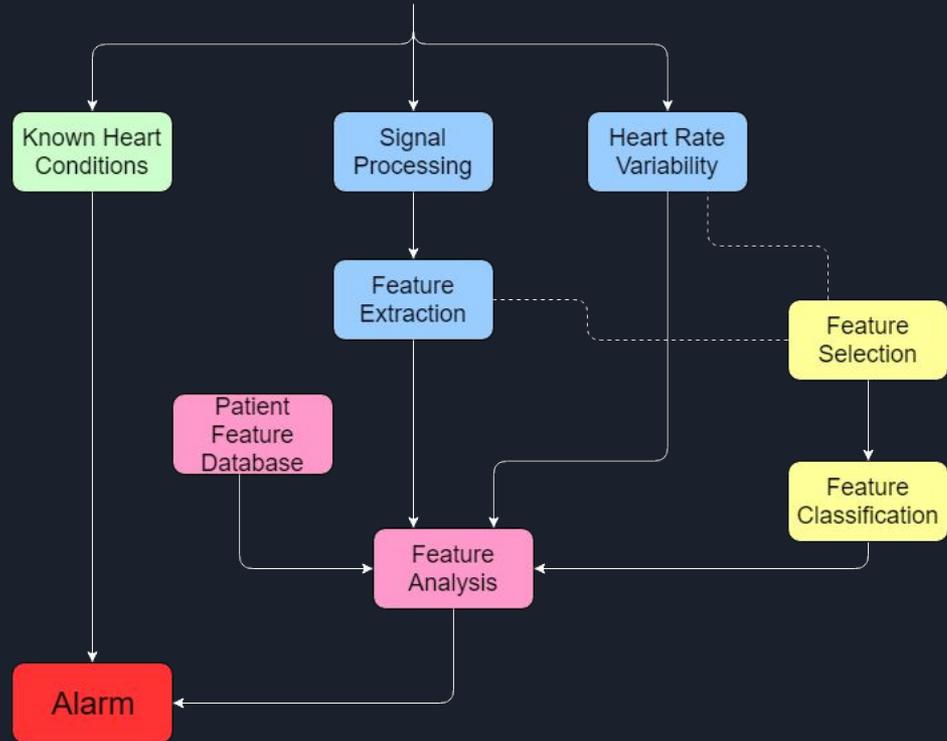
Front End



Architecture Overview

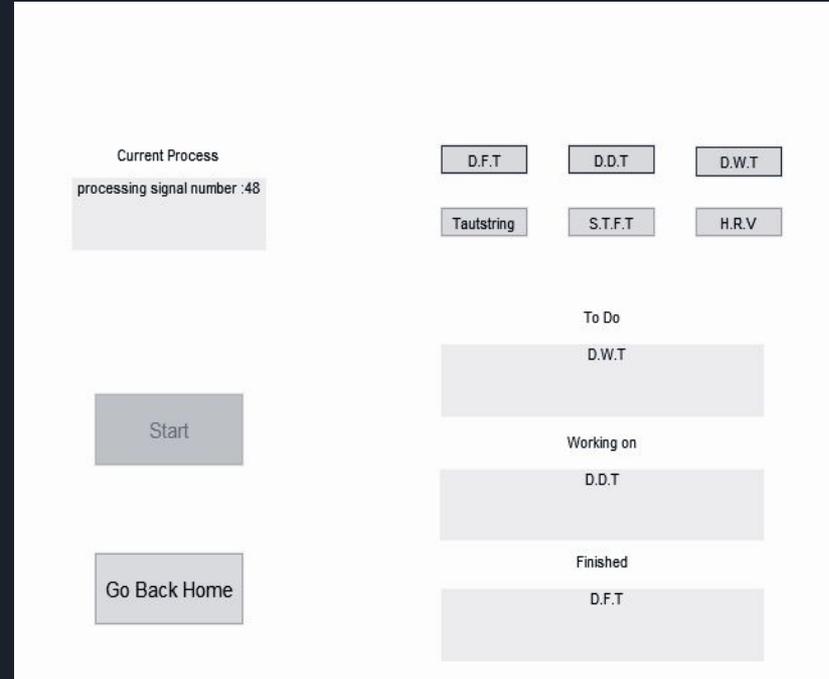
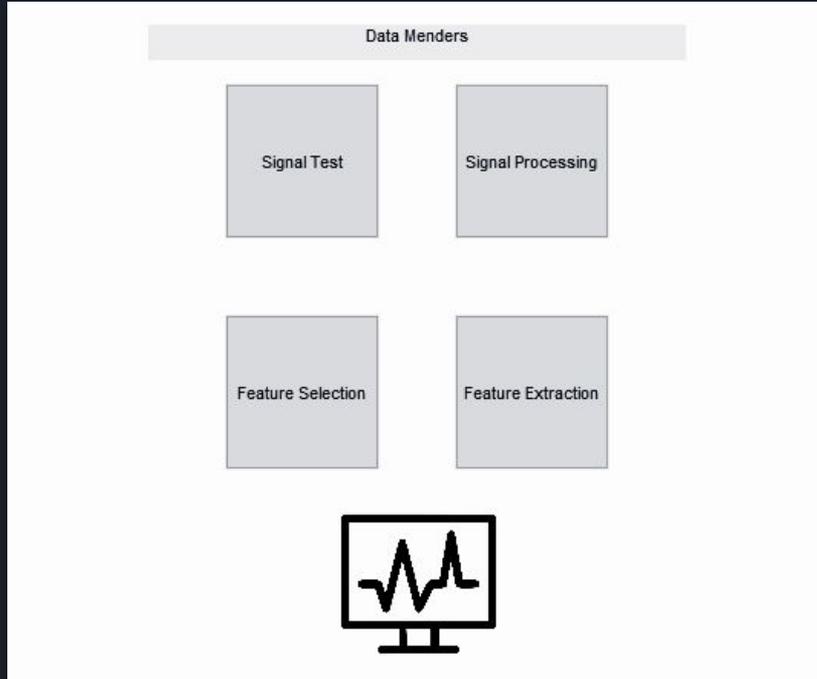
Back-End

- Check ECG for easily detectable heart conditions
- Use signal processing to get statistical features
- Get heart rate features
- Use machine learning to get a representative set of features
- Use patients own data to make a decision to sound an alarm



Architecture Overview

Front-End





Challenges and Resolutions

- Making a user interface in MatLab is cumbersome.
- “Filling in” an ECG that flatlines (Corrupt ECG)
 - Useful for when alarm specific features are trying to be found

Schedule



Tasks	Jan					Feb				Mar				
	Dec 31	Jan 7	Jan 14	Jan 21	Jan 28	Feb 4	Feb 11	Feb 18	Feb 25	Mar 4	Mar 11	Mar 18	Mar 25	
Signal Processing			█											
Feature Extraction						█								
Feature Selection								█						
Write to CSV/File Structer											█			
GUI						█								
Anything Else if Needed						█								

Conclusion

- In the end, the goal for our project is to develop a software that reduces false alarms in the ICU.
- This can give nurses and patients a more relaxed environment.
- Nurses can have better reaction times.
- This is not only helpful, but important to help people and save lives.

