MOTIVATION

• Heavy machinery
• Limited mobility
• Tedious setup
OVERVIEW

• Portable EKG device
• Infrared Transmission
• Remote processing of EKG data
• Heart rate monitoring
• Waveform display
DATA ACQUISITION

• Filtering?
• 0-5V range $\rightarrow$ 0-255 (8-bit)
• Patient ID+ CRC +Serial transmission

DATA ACQUISITION

• Transmission limited by IR channel rate 1kbps
• Start – 1 as 600/400us – 0 as 400/400us
• Down sampling 60ns at receiver
• Serial to parallel conversion
SIGNAL PROCESSING

• Responsible for processing data
• Perform mathematical calculations
• Provide the display block with the necessary outputs

![Signal Processing Diagram]
SIGNAL PROCESSING

- Peak detection will compare stored data points
- Threshold value – avoid local peaks
- Extension: detect P, R, and T peaks

SIGNAL PROCESSING

- Timer block uses counter and divider
- Heartbeat calculation keeps past four samples
- Coregen divider
- Binary to decimal conversion
DISPLAY LOGIC

- If current **position** belongs to ...
  - Text region: choose TEXT module's output
    - Pixels of characters stored in **ROM**
  - Image region: IMAGE module
    - Images of heart stored in **ROM**
  - Waveform region: WAVEFORM module
    - Waveform data retrieved from **WAVEFORM MEMORY**

WAVEFORM MEMORY

- Single-port BRAM
- reading from WAVEFORM has priority
- write operations are stored in queue
  - Wait until the BRAM is not being read
SOUND GENERATION

- Output heartbeat sound in each period
- Output alarm if detected abnormality

TIMELINE

- 11/16 - 11/22
  - Lyne: Draft for data acquisition modules
  - Wenting: Peak detection and timer
  - Szu-Po: Waveform and text display
- 11/23 - 11/29
  - Lyne: Test data acquisition and transmission
  - Wenting: Heartbeat calculation and abnormality
  - Szu-Po: Image display and sound generation
- 11/30 – 12/05: Integration and Testing
QUESTIONS?