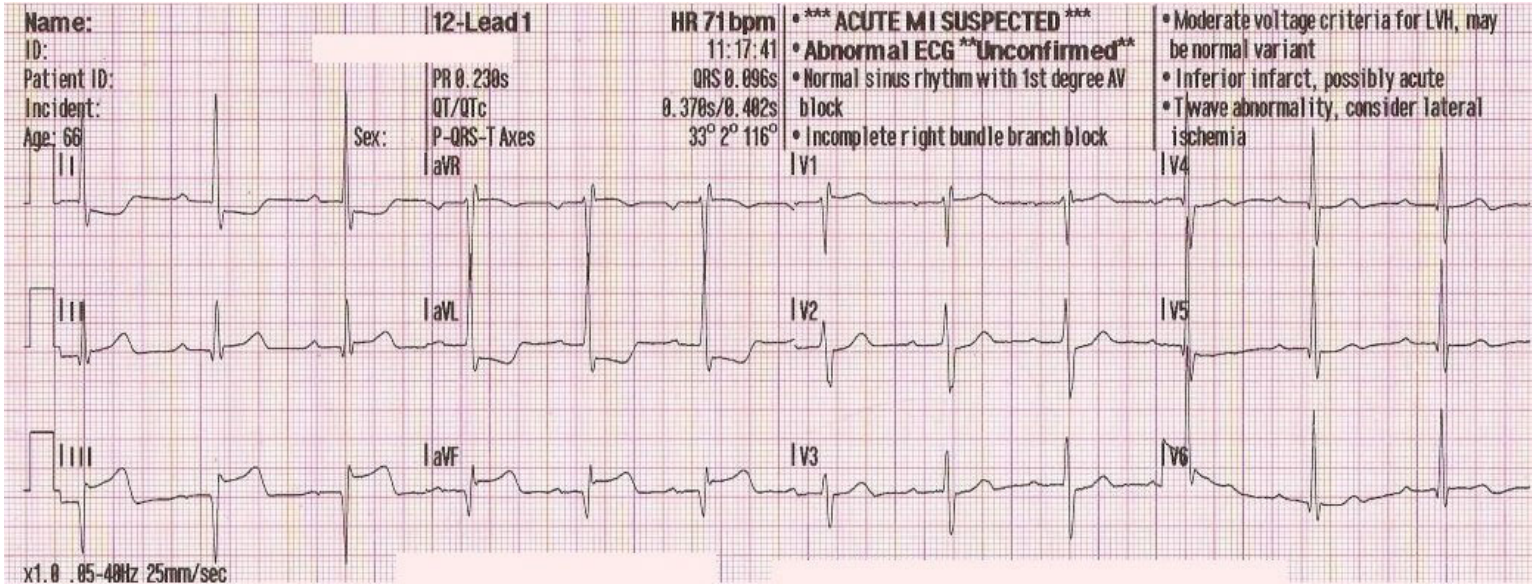
# FPGA
# 12-LEAD EKG

STONE MONTGOMERY
JEREMY ELLISON
10 NOVEMBER 2016

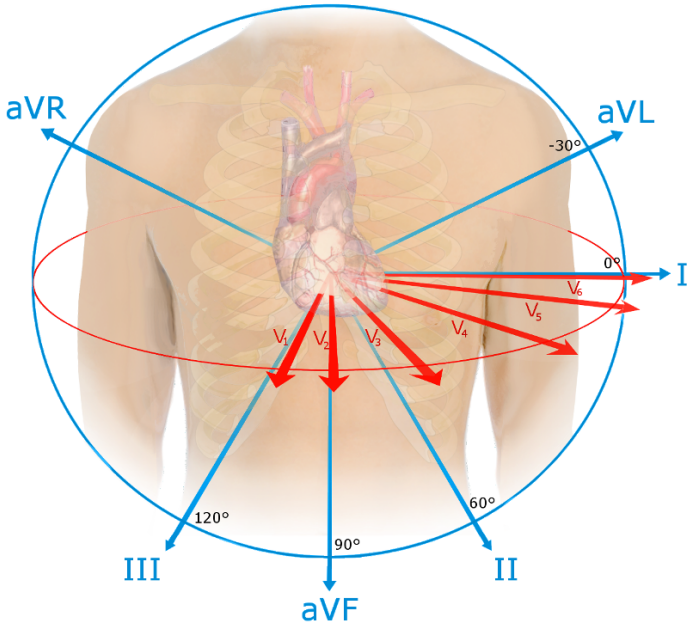
# HOW DOES AN EKG WORK ANYWAY?

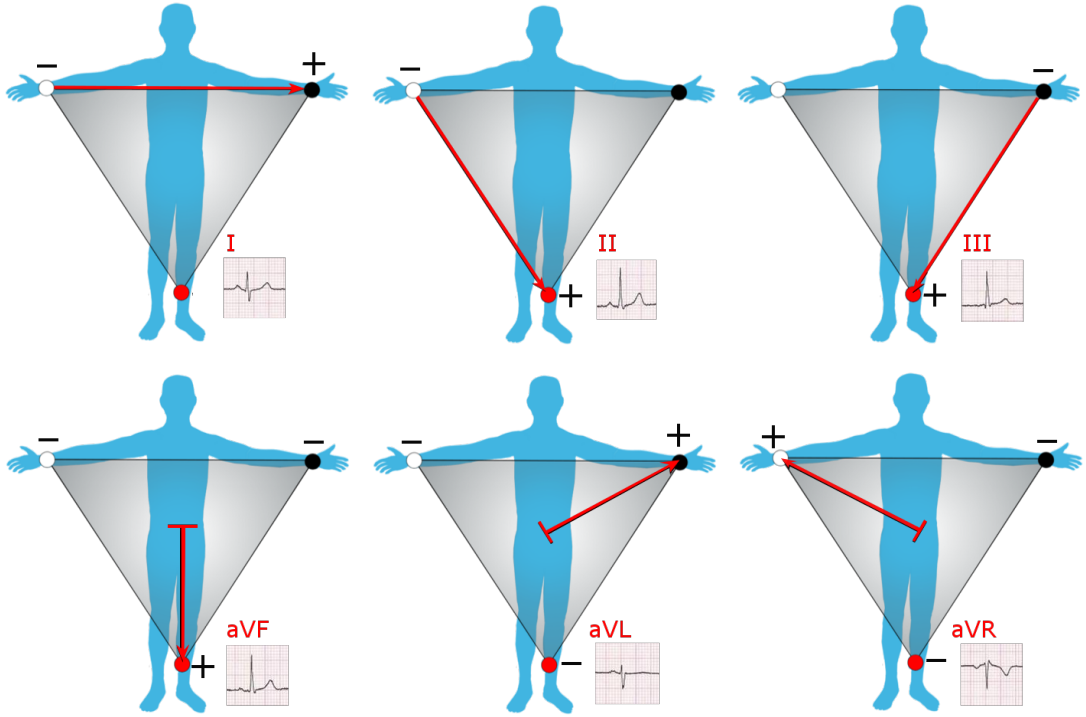
- Voltage Potential of the Heart
- Can use 4 or 10 leads (monitor vs. 12-lead)
- Leads: I, II, III aVR, aVL, aVF, V1, V2, V3, V4, V5, V6
- Used to diagnose heart problems



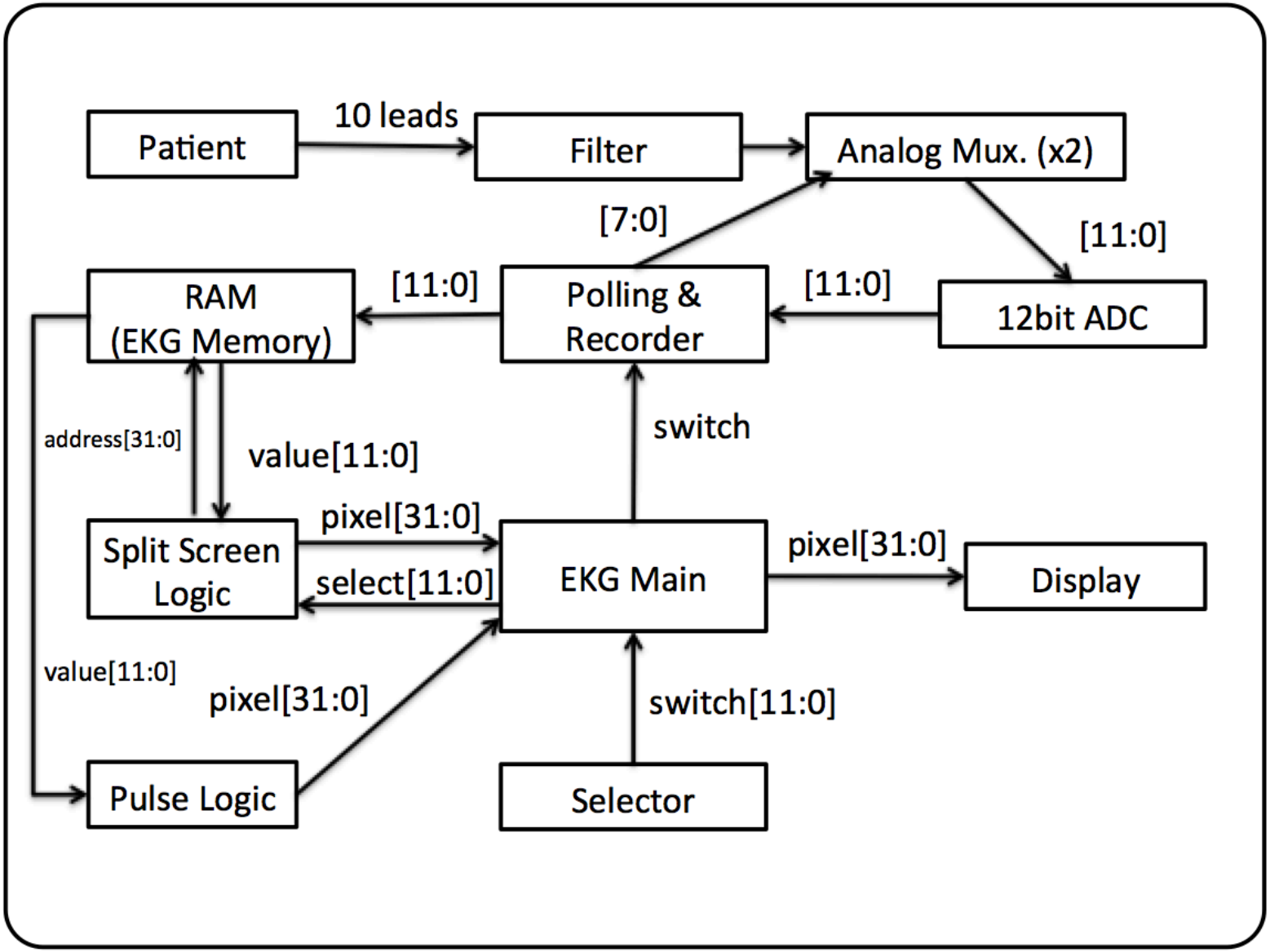
# HOW DOES AN EKG WORK ANYWAY?

- **Goldberger's Central Terminal:** $$V_W = \frac{1}{3}(RA + LA + LL)$$



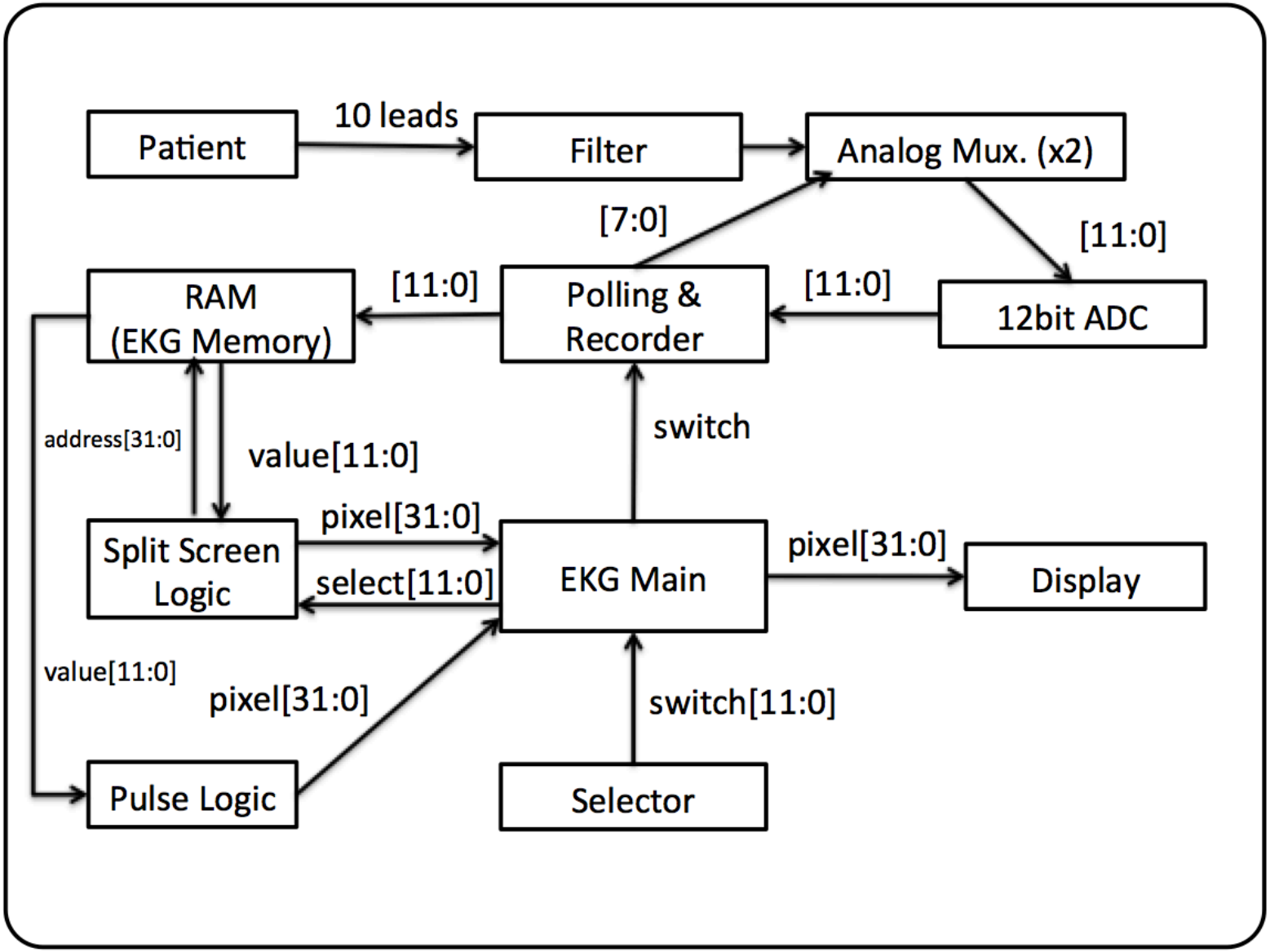
# BLOCK DIAGRAM



# FRONT END

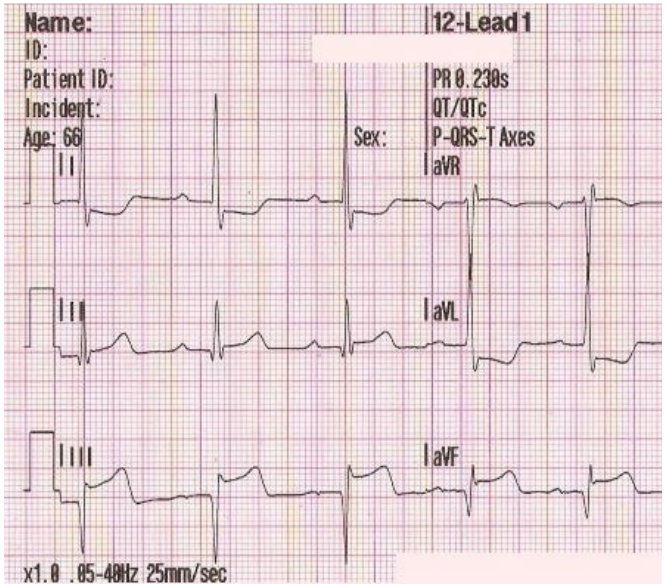
- 10 Physical Leads (+60Hz Notch Filter)
- Two Analog Mux’s
- Polling
- Single Instrumentation Amp
- Single 12-bit ADC
- Digital Filtering
- Saving to RAM
- Testing: Arbitrary Function Generator

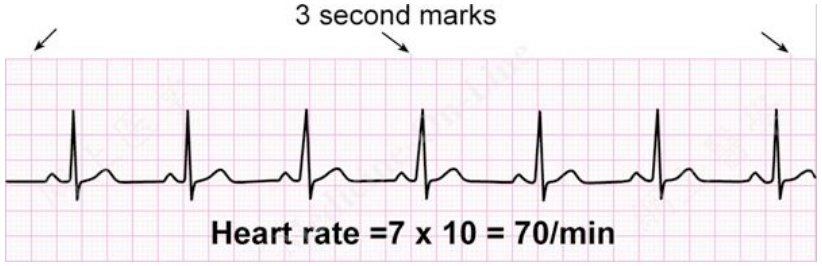
# BLOCK DIAGRAM



# BACKEND & DISPLAY

- Selector Switches
- Split Screen Logic
- Pulse Logic
- EKG Main
- Display
- Testing: MATLAB & Function Generator



# SCHEDULE

| Week of | 10/31 | 11/7 | 11/14 | 11/21 | 11/28 | 12/5 | 12/12 |
|---|---|---|---|---|---|---|---|
| Block Diagram | Both | | | | | | |
| MUX Select / ADC Input | | Stone | | | | | |
| Split Screen Logic / Display | | Jeremy | Jeremy | | | | |
| Analog Filtering | | | Stone | | | | |
| Proof of Concept | | | | Both | | | |
| Advanced Filtering | | | | | Stone | | |
| Pulse / HR detection | | | | | Jeremy | | |
| Debugging / Finalization | | | | | | Both | |
| Final Presentation | | | | | | | Both |

# QUESTIONS