HEARTBEAT MONITOR

Eric Nilsson

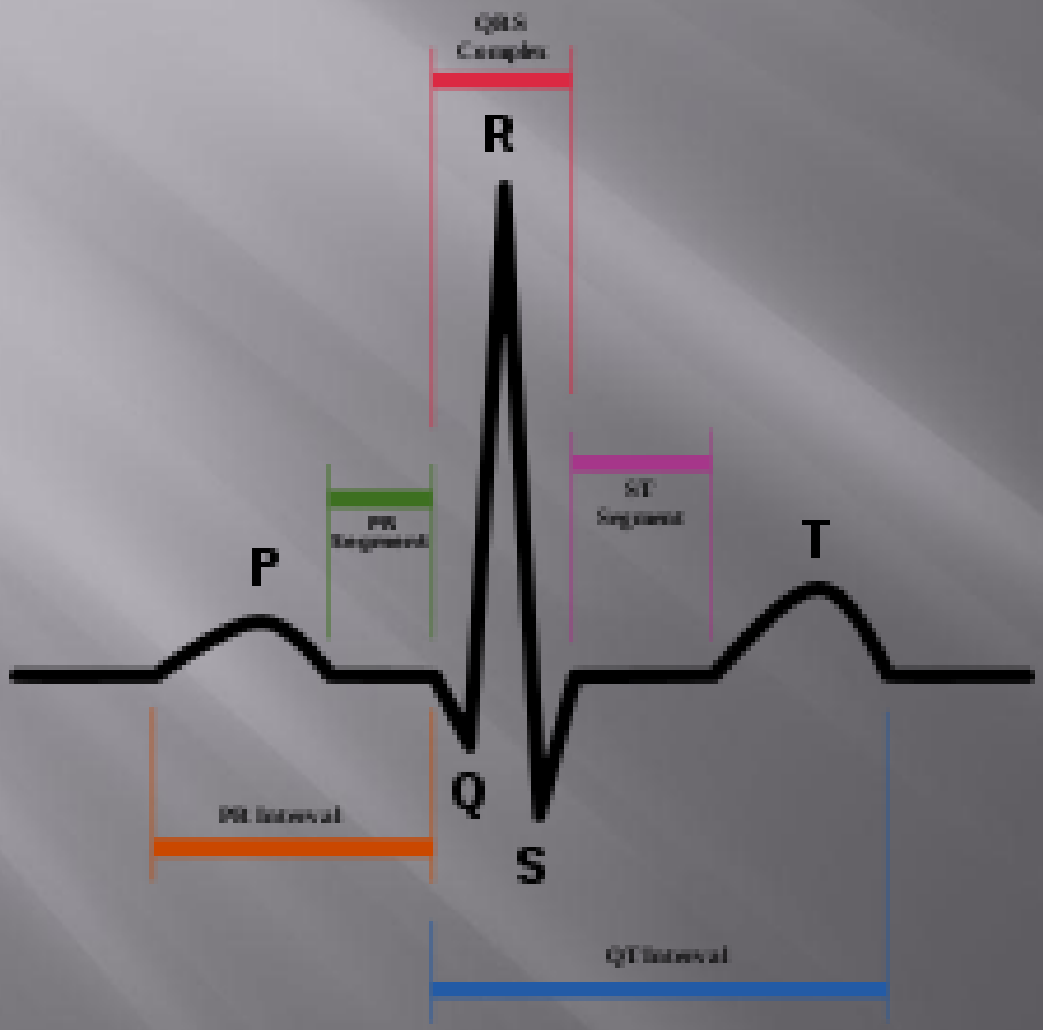
ECE 641

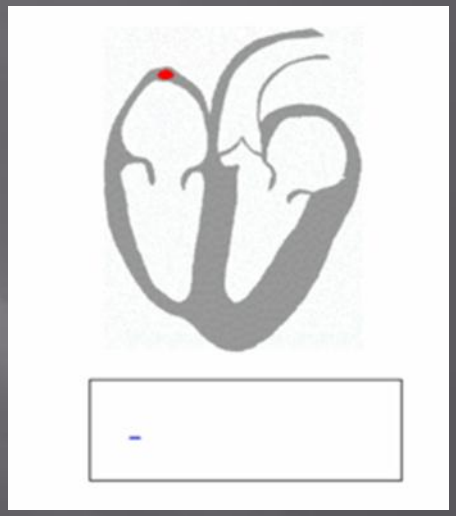
5/3/2012

The Electrocardiogram (ECG)

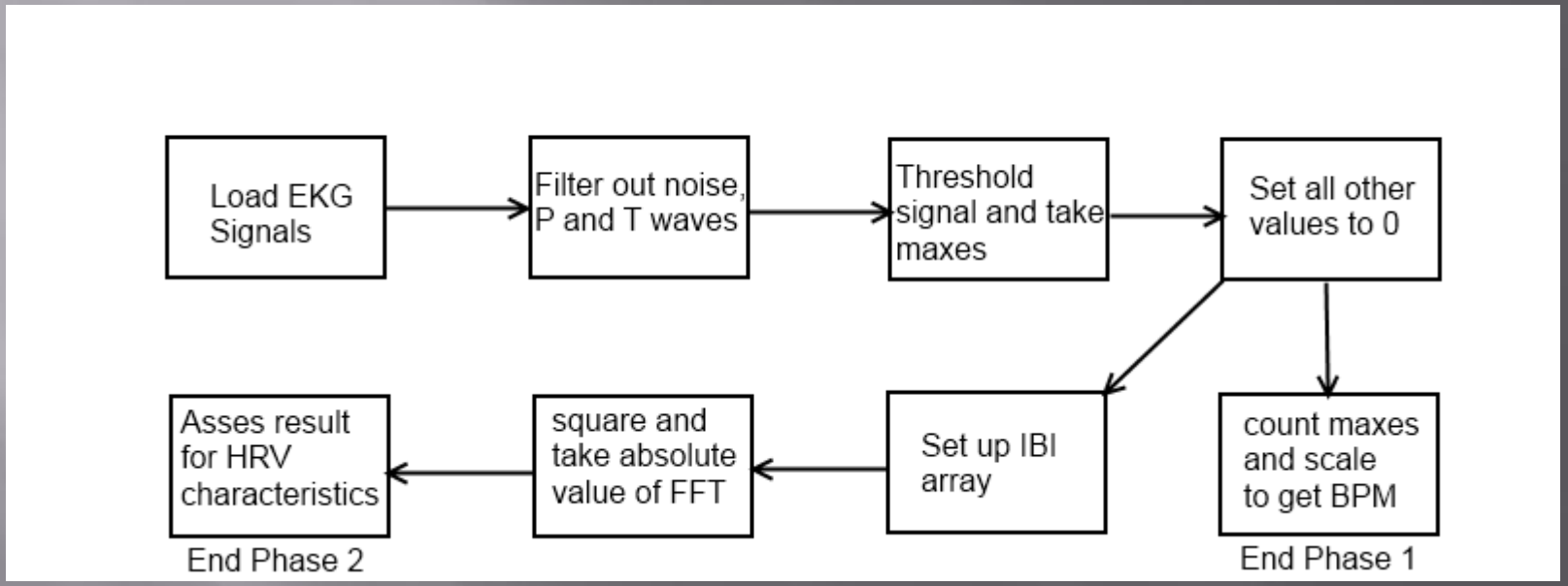
- ECGs measure the voltage differentials on the skin that are generated by the heart.
- Usually measured across the chest with reference electrodes on the wrists and one ankle.
- The heart generates the signals as the electrical activity inside the heart causes it to contract.

The waveform

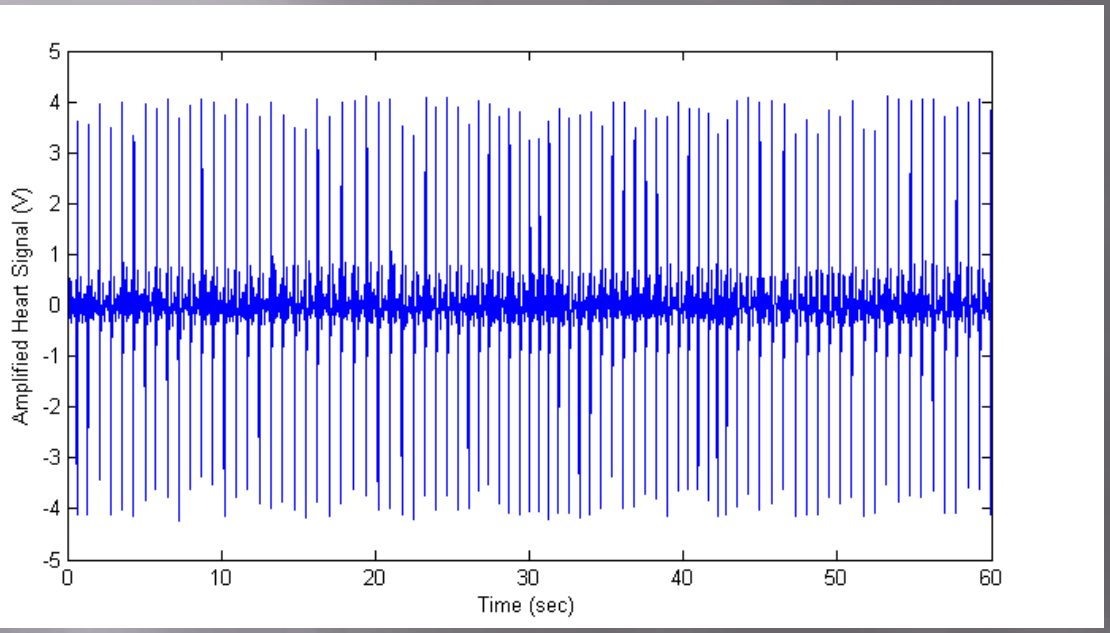




The Algorithm

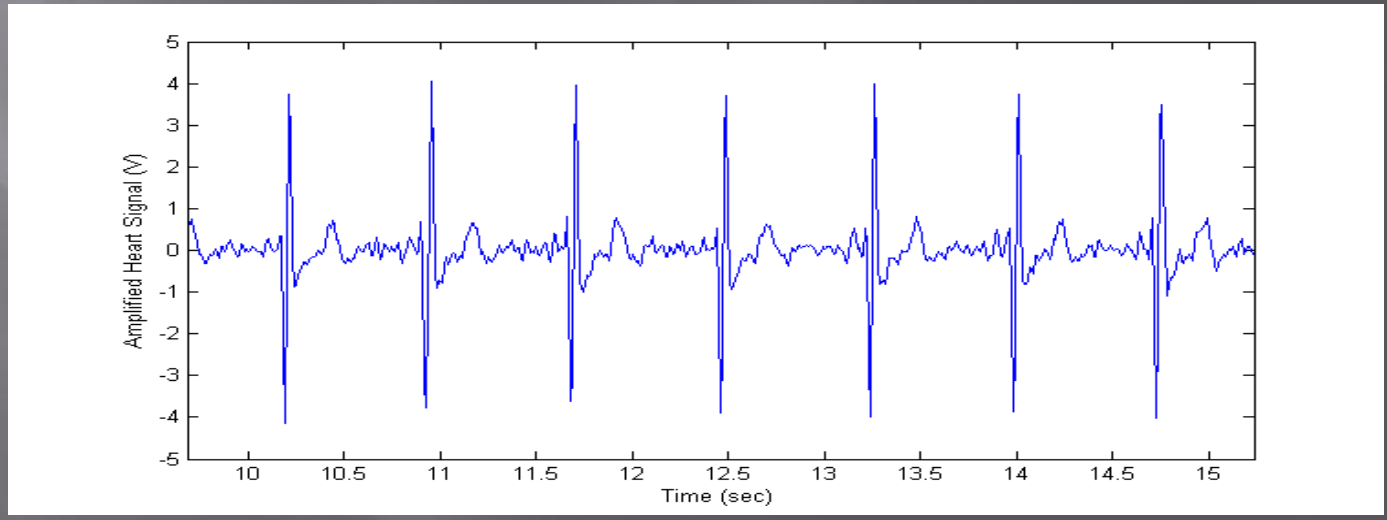


Example signal

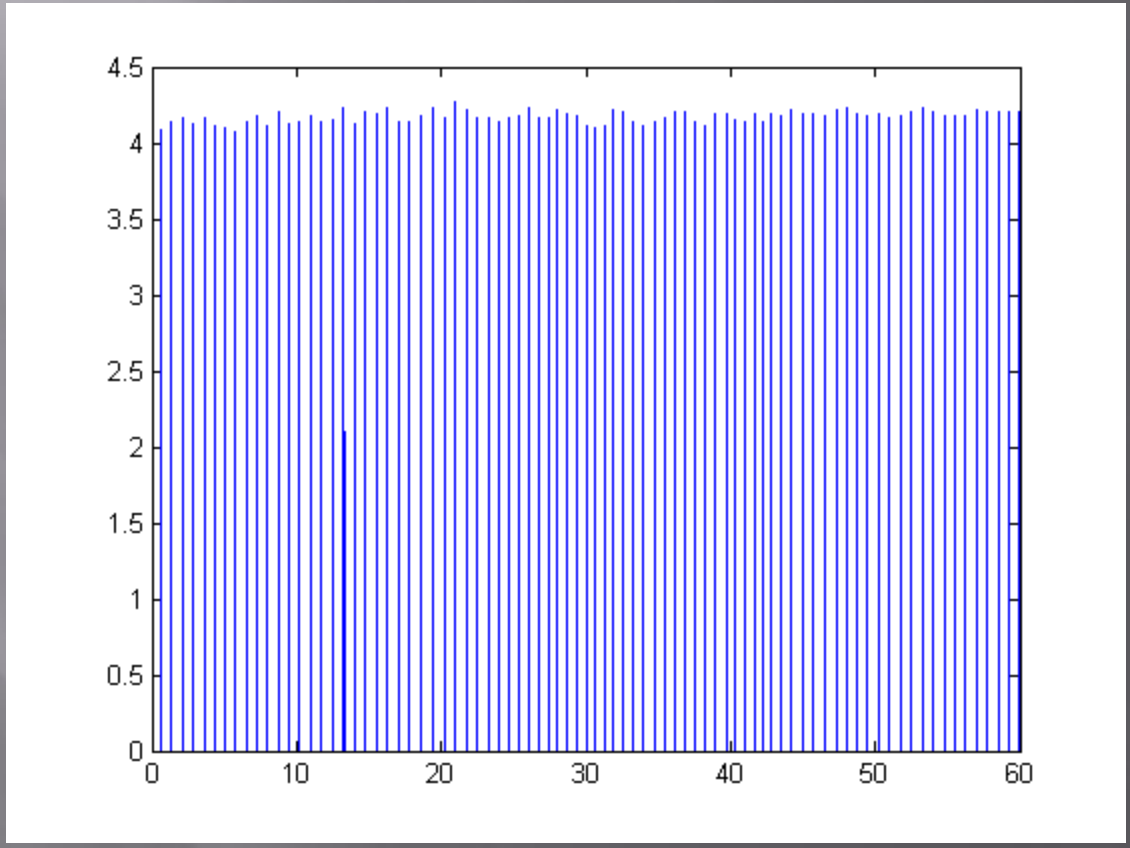


Full signal
(length: 60 seconds)

Close up of signal



Example signal



Processed signal showing only instance of peaks

Addr	+0	+1	+2	+3	+4	+5	+6	+7
0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
64	1	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	1
136	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0
152	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0
176	0	0	0	0	0	0	0	0
184	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0
208	0	0	1	0	0	0	0	0
216	0	0	0	0	0	0	0	0

- Peak instances loaded into a .mif which is utilized from M4K blocks.
- Program counts through addresses and an LED lights up whenever a ‘1’ is present.
- Keeps count of total beats and scales that value every five seconds to display the beats per minute with the 7 segment display.

Future Work

- Use VHDL to do all the signal processing.
- Make it universal and automated to make the processing easier.