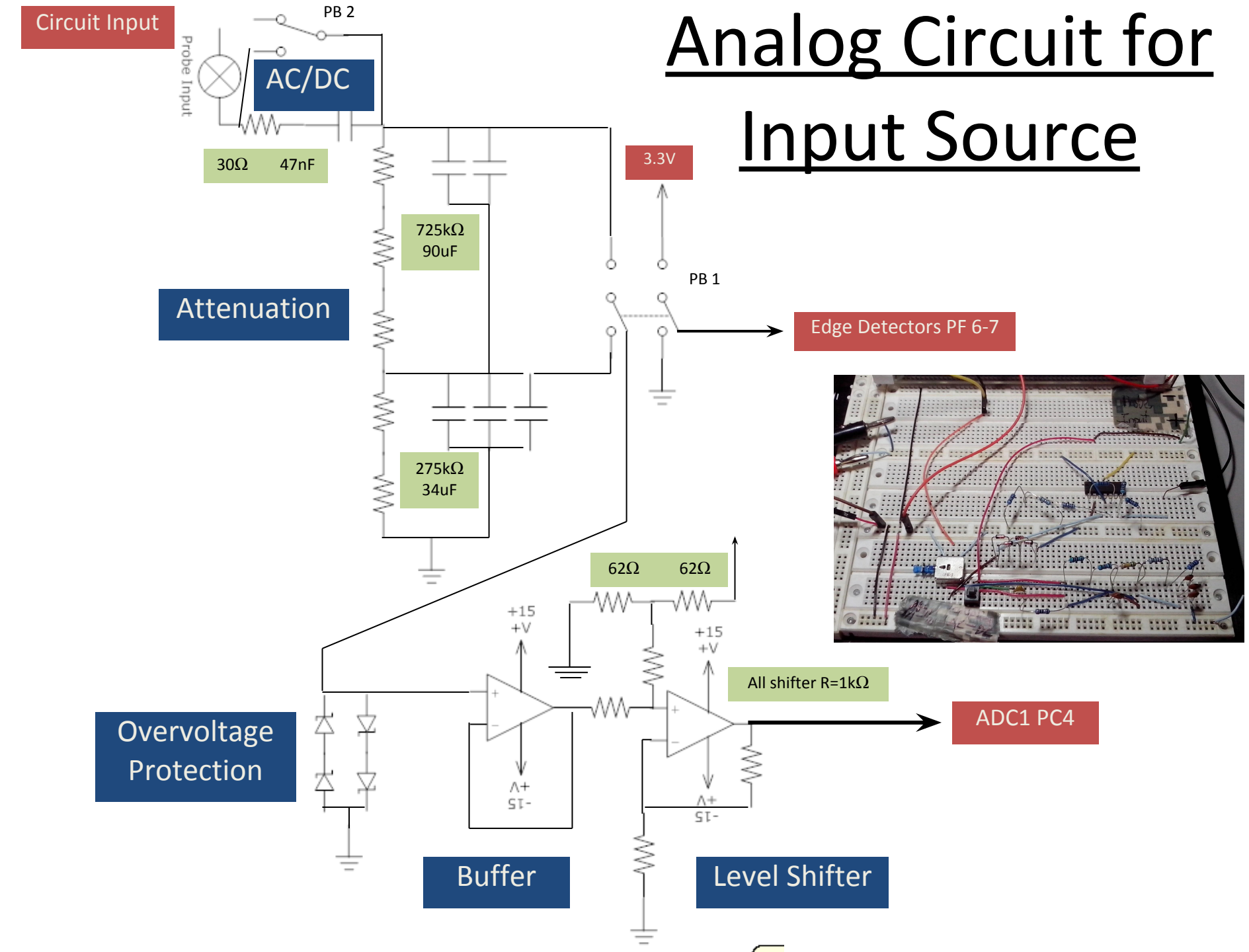
ELEC3300 Final Demo Gp.11
Digital Storage Oscilloscope

Stephen Shanko
Au Ka Wai

Hardware Specifications

- approximately 300kSamples/s
- Analog Bandwidth 4MHz @ 0dB
- Input voltage range up to +- 6.6V
  - Attenuation selectable with push button 1
- DC and AC coupling with input impedance of 30Ω 47nF
  - Attenuation selectable with push button 2
- Diode overvoltage protection amp+ADC

Analog Circuit for Input Source



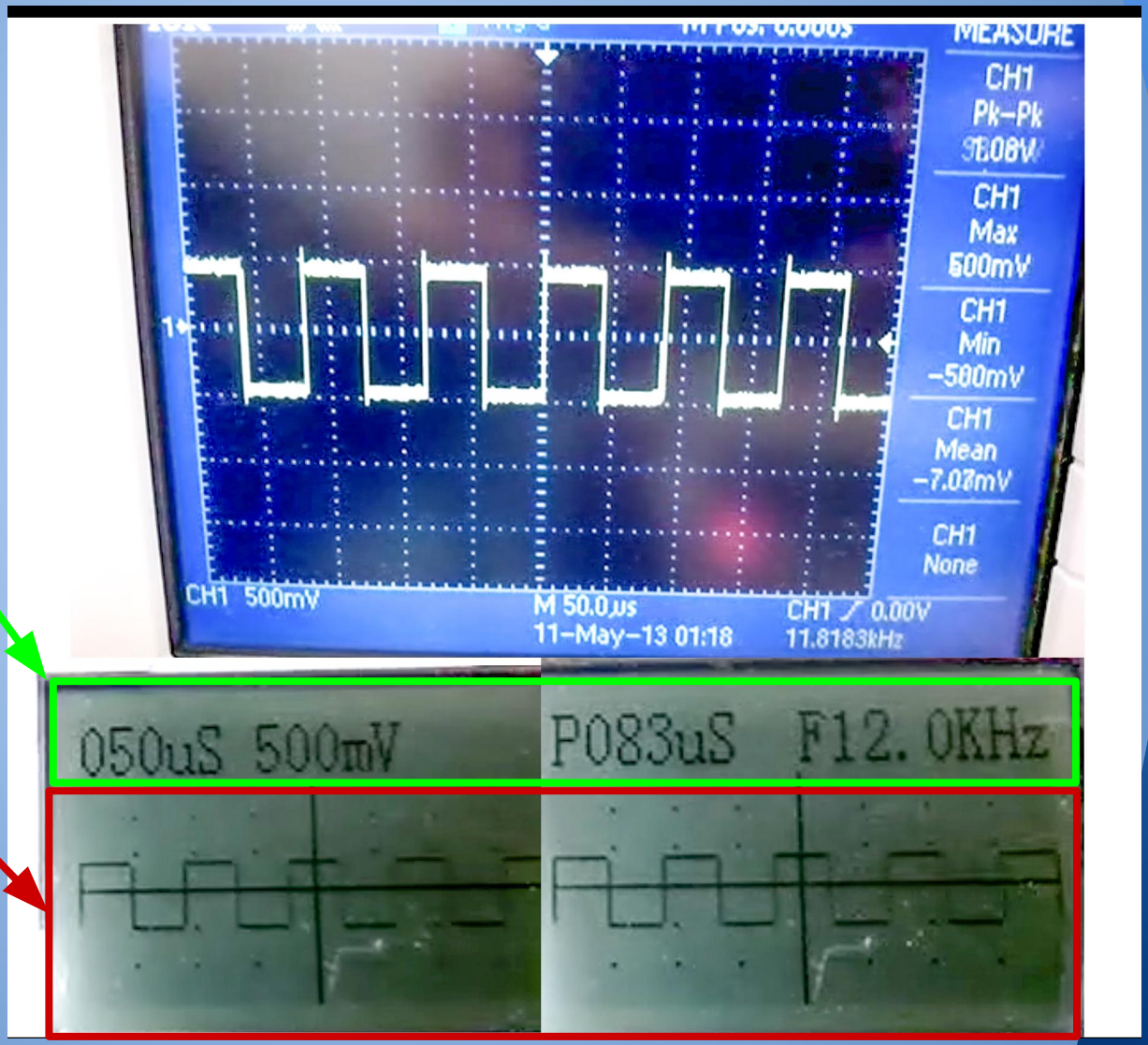
Software Specifications

- Automatic triggering, frequency, period, RMS, maximum, minimum, mean, and peak to peak voltage calculations
  - Measurements appear in the header and may be cycled with joy select
- Voltage scale 20mV to 3V per division
  - {20, 50, 100, 200, 500}mV, {1, 2, 3}V
  - selectable with joy up/down
- Time scale 50uS to 500mS per division
  - {50, 100, 200, 500}uS, {1, 2, 5, 10, 20, 50, 100, 200, 500}mS
  - selectable with joy left/right

Oscilloscope Readout

Header - (16 x 128 px)
Typically displays two calculations at once

Waveform display area and grid - (48 x 128 px)



Limitations

- Attenuator capacitance
  - The attenuator introduces significant deformation to the waveforms, especially those with a very fast rate of change (ie square waves)
- Interrupt processing rate
  - The STM32 saturates in it's ability to process ADC interrupts in the range of 300kHz
- Interpolation
  - {5,10,25}uS required interpolation, which was algorithmically challenging, thus we decided to drop these ranges, further decreasing our maximum measurable signal to about 40kHz
- Screen size
  - Due to time constraints and struggles with the screen controller, we were forced to settle for the built in LCD on the Eval Board. This considerably limits the mV/px ratio