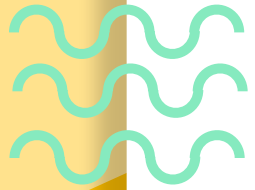




Wave Visualizer

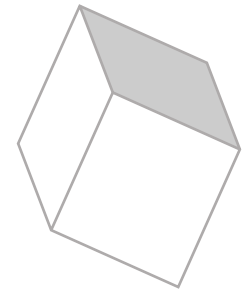
Tvisha Gangwani, Jino Haro, Ishraq Khandaker, Klarizsa Padilla, Zhongtai Ren





”

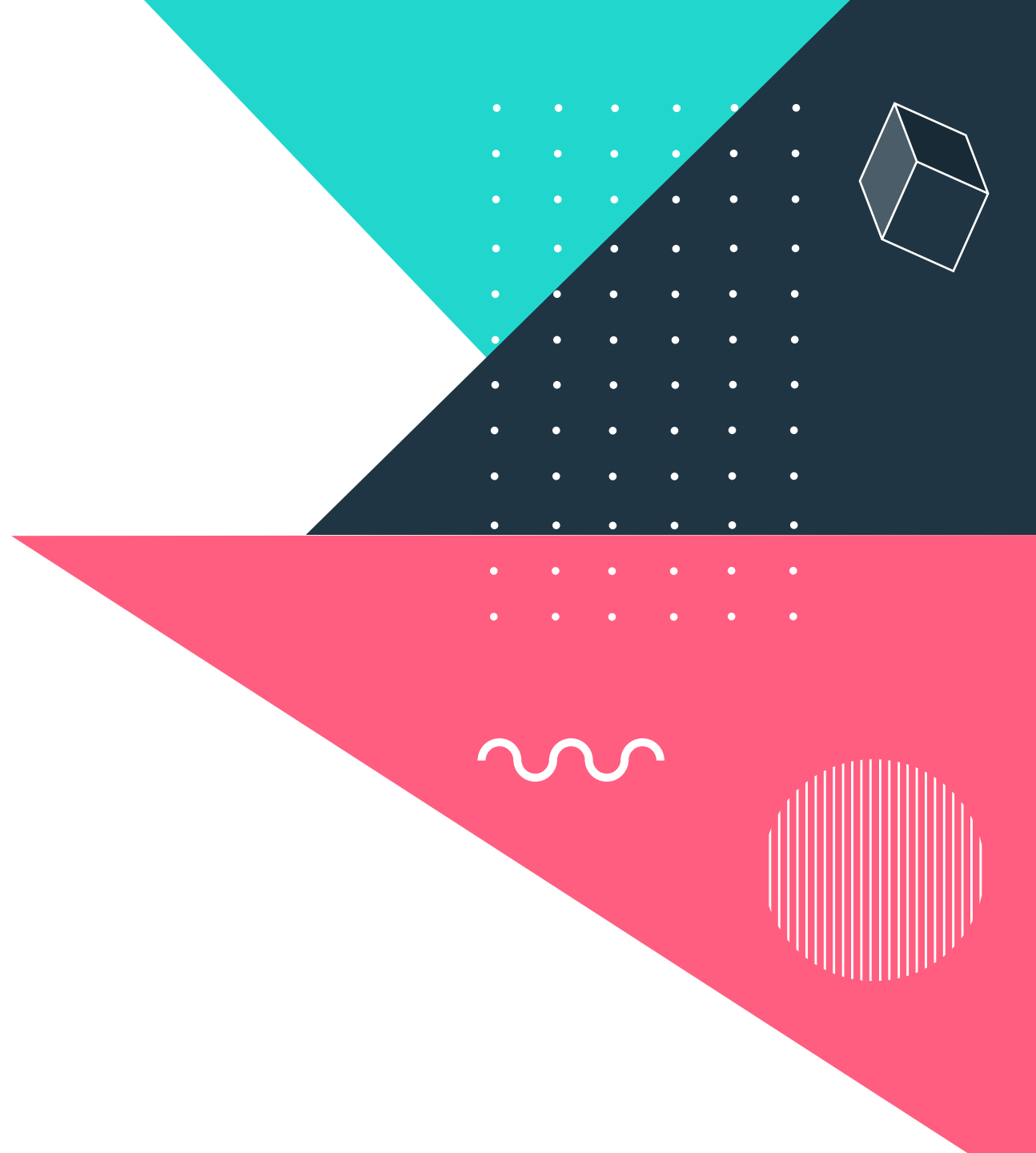
Flip-flops and waves- it's like the beach but better!





Motivation

CONSTANT interaction with
oscilloscopes. How do they work? Build
our own to find out!

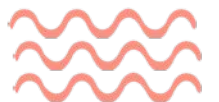
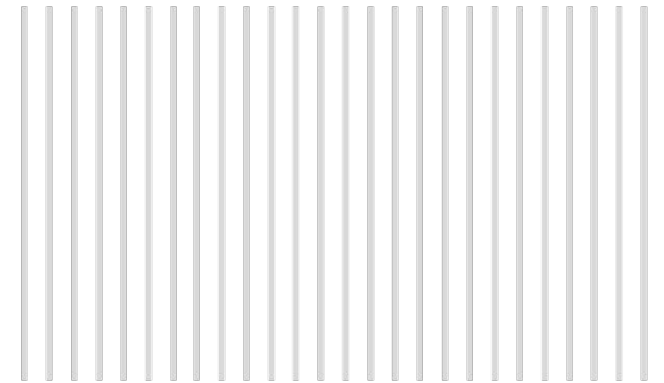




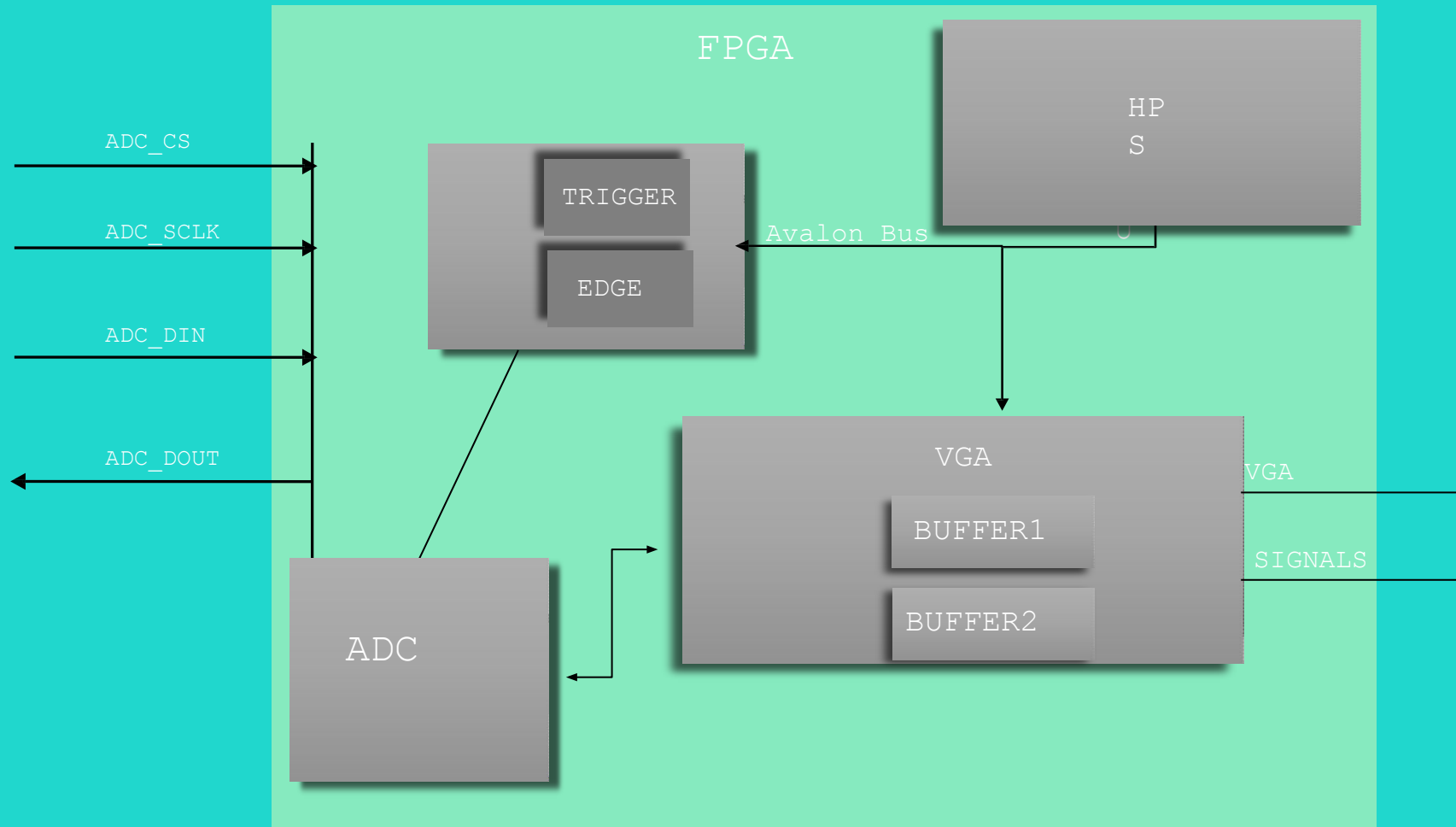
Overview

Utilize the FPGA's ADC to sample and display waveforms

Allow for user input to declare the trigger value and select a rising or falling edge for the trigger



ARCHITECTURE



HARDWARE

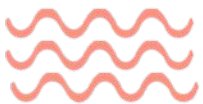


VGA: hardcoded values, software input, buffers to display waveform.



DISPLAYS: HEX display the voltage on the first 4 seven segments and trigger value on the last 2.

ADC: the backbone of our project! Configured ADC to sample data and send it to the VGA





Conclusion

New appreciation for oscilloscopes!

Learning how to program an ADC was extremely challenging but we learned a wealth of new skills including:

Research of product
Tools to debug
The importance of timing!

THANKS

Invaluable support from the TAs and Professor Edwards

New to Verilog programming this semester, at the end of lab1 we would not have imagined we would come to enjoy the process of planning, designing and implementing a solution on an FPGA. Now, we don't want to give the FPGA back!

References



Grateful for the internet!

ADC Datasheet: LTC2308

<https://www.analog.com/media/en/technical-documentation/data-sheets/2308fc.pdf>

Digital Scope Implemented on Altera DE1-SoC:

<https://people.ece.cornell.edu/land/courses/eceprojectsland/STUDENTPROJ/2015to2016/hj424/>

SOFTWARE



Interface layout



Buttons and mouse usage



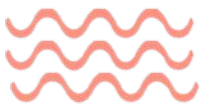
MEMORY ACCESS AND TIMING



TIMING DIAGRAMS FOR ADC



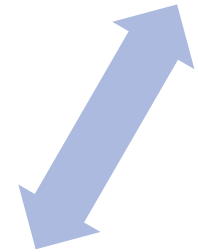
TIMING DIAGRAMS FOR
COMMUNICATION PROTOCOL



PROJECT PLAN

ADC

Ishraq & Klarizsa



VGA

Tvisha



UI

Zhongtai & Jino



DEBUGGING

VGA

- Mouse
- Software Input
- Accessing Buffers
- Merging Code

ADC

- Communication
- Hex Display
- Test Bench
- "Magic" Timing Diagram Paper

Features

Manipulate trigger value

Rising or falling edge selection

Mouse selection

OUR PROJECT
RESULTS
ARE WAVY

EXAMPLE OF SAMPLING

