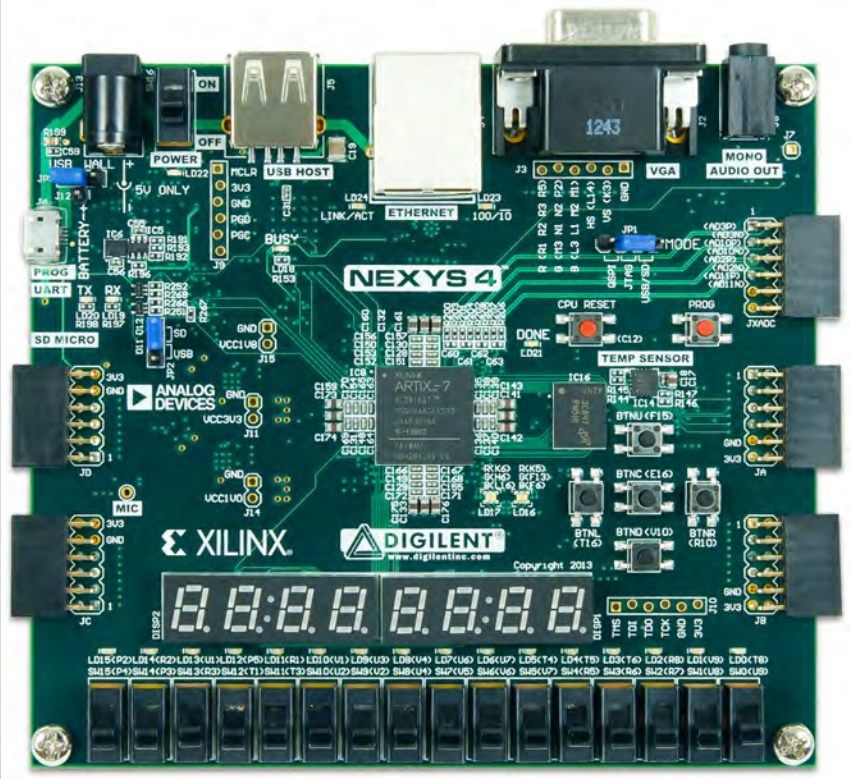
Portable Laser Function Generator

Brandon Vasquez & Ciara Kamahele


NEXYS 4
XILINX
DIGILENT
ANALOG DEVICES
ARTIX-7
POWER
USB HOST
ETHERNET
VGA
MONO AUDIO OUT
CPU RESET
PROG
TEMP SENSOR
SD MICRO
MIC
BTNU (F15)
BTNC (E16)
BTNL (T16)
BTND (U16)
BTNR (R10)
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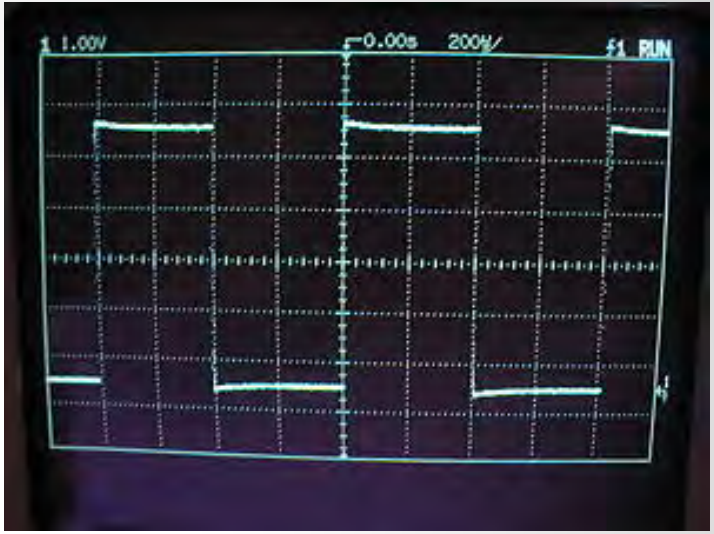
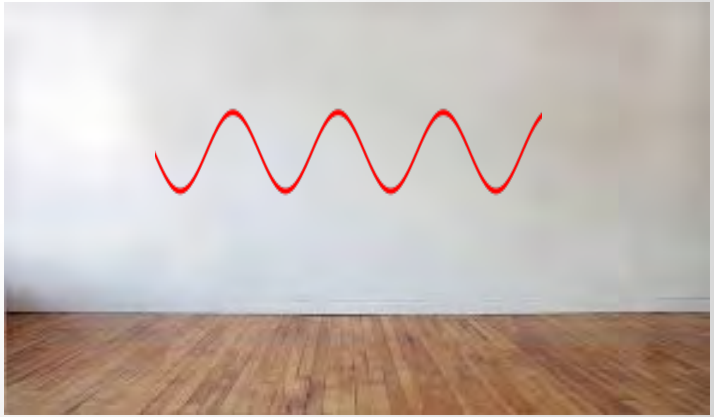

1 1.00V
-0.00s
200M/
f1 RUN



Project Overview

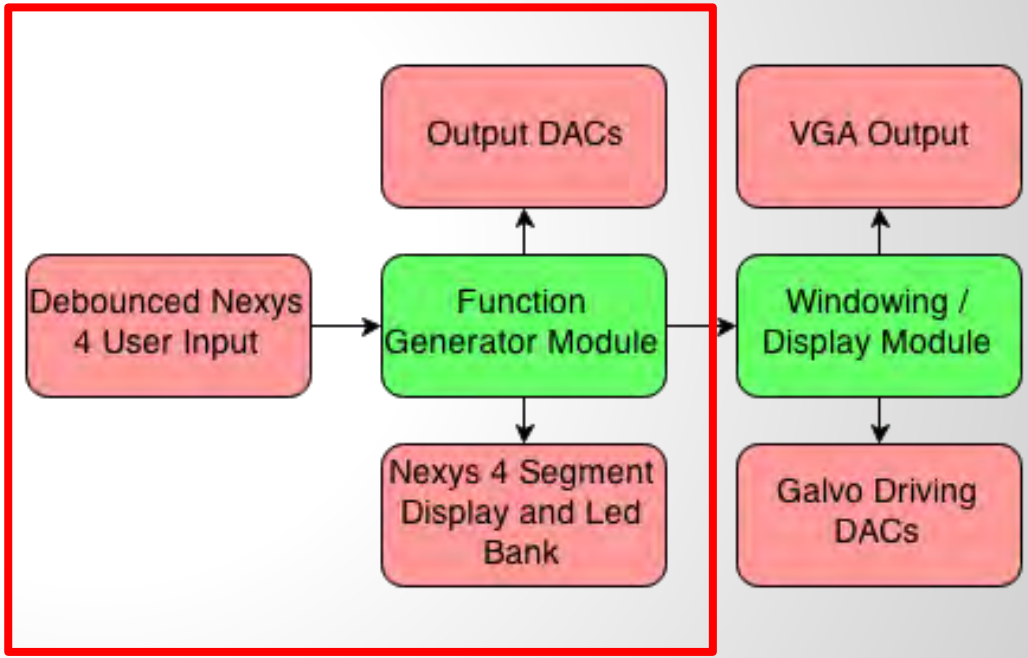
- A functional function generator with multiple viewing modes

- Portable, relatively cheap and easy to assemble

Overall System

Two core modules:

- Waveform generation module responsible for creating a digital representation of a waveform
- Windowing / display module responsible for resizing the waveform to a viewable size and generating the proper display

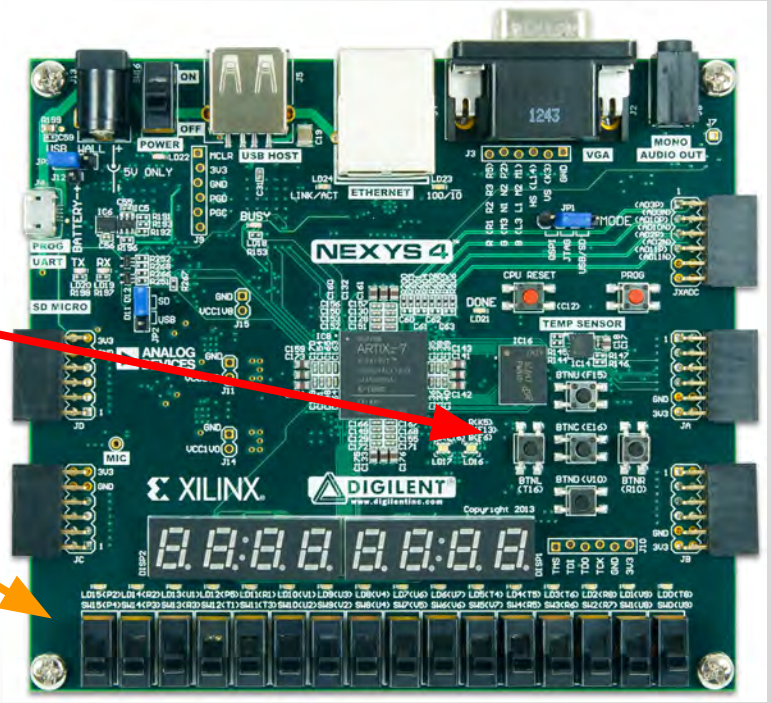


Function Generator Hardware

Input:

Buttons allow for incrementing and decrementing frequency, amplitude phase and duty cycle

Switches allow for a user to select freq, waveform, frequency increment and phase/duty cycle

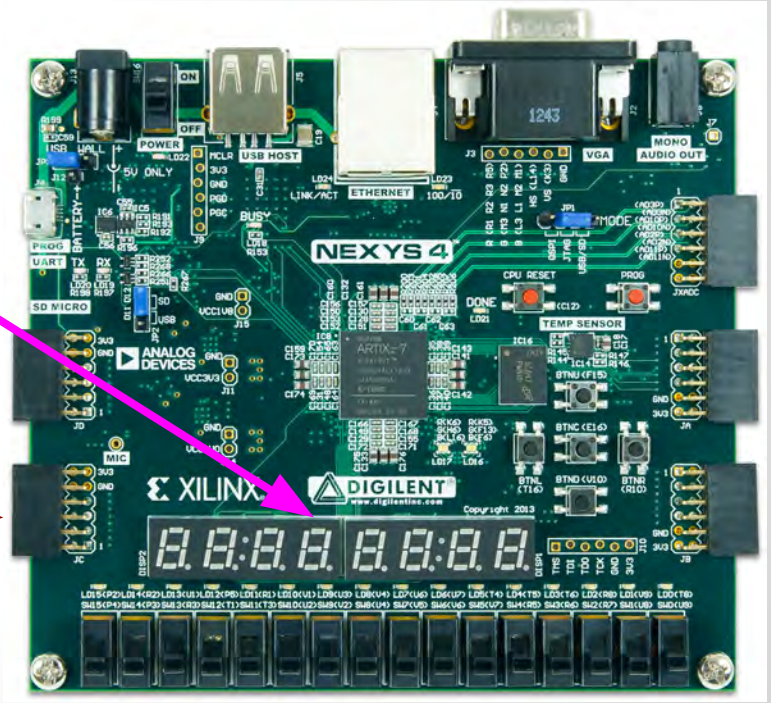


Function Generator Hardware

Output:

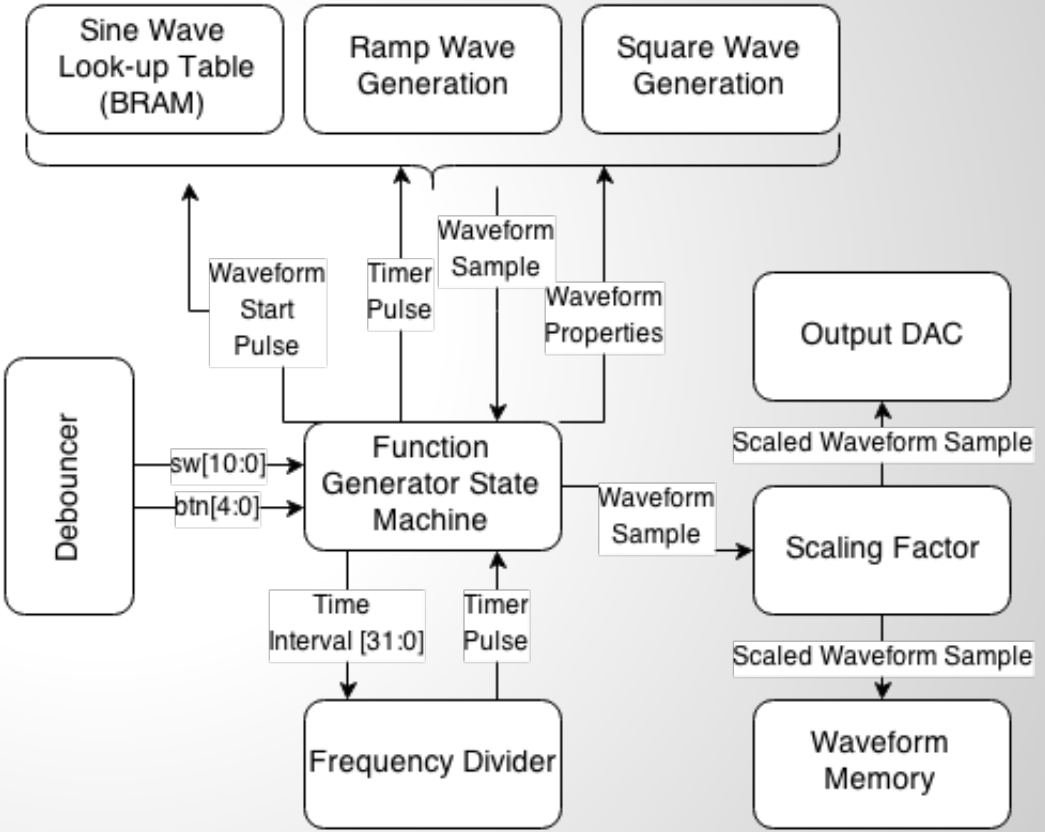
Segment leds will display numerical representation of waveform type, frequency, duty cycle / phase

Output DACs will be connected to one of the user I/O ports

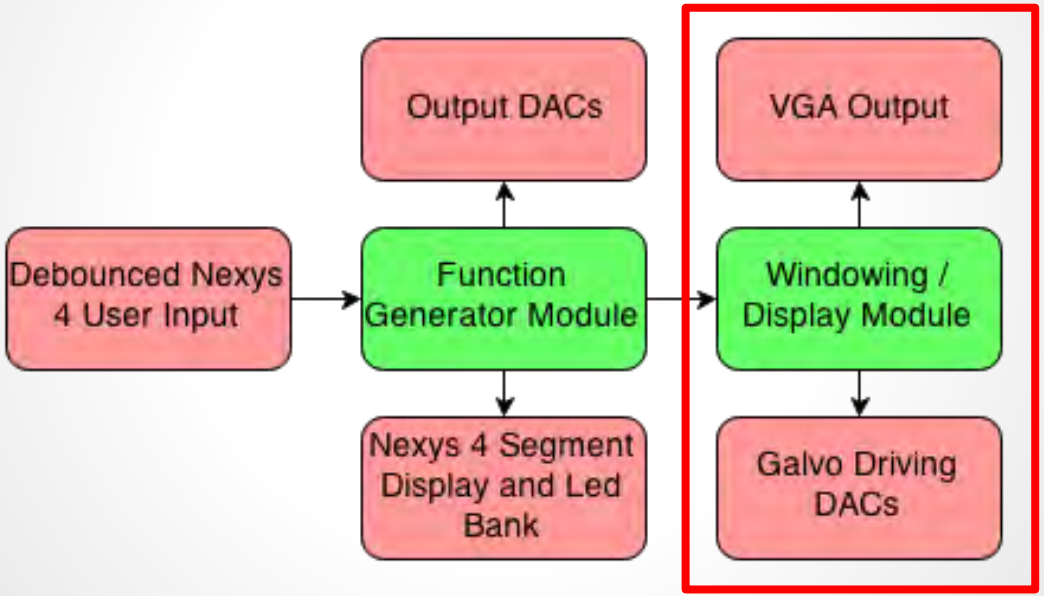


Function Generator Module

- Function Generator State Machine determines waveform and waveform properties with user input
- FSM uses waveform modules to generate waveform
- FSM sends waveform output to scaling factor module which scales amplitude
- Scaled samples are stored in memory and output to DACs

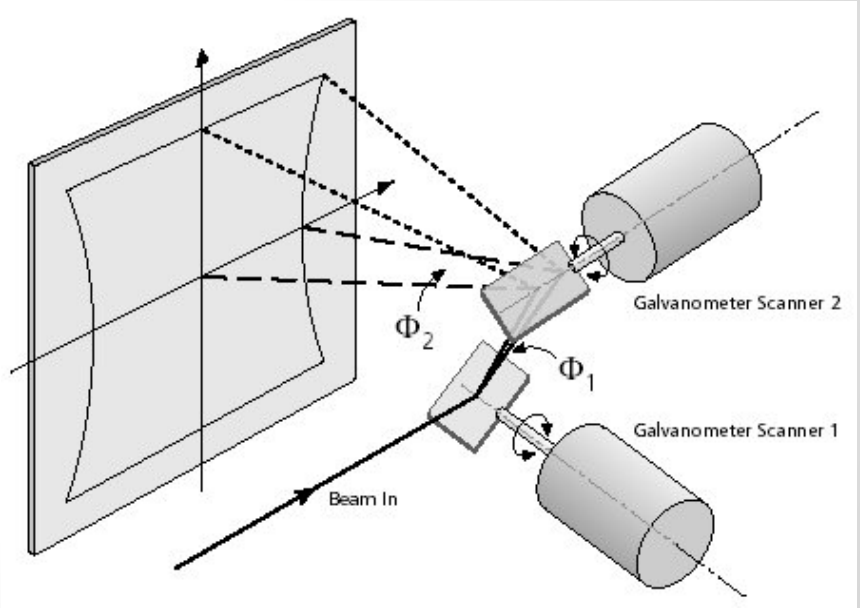


Displaying Hardware and Module



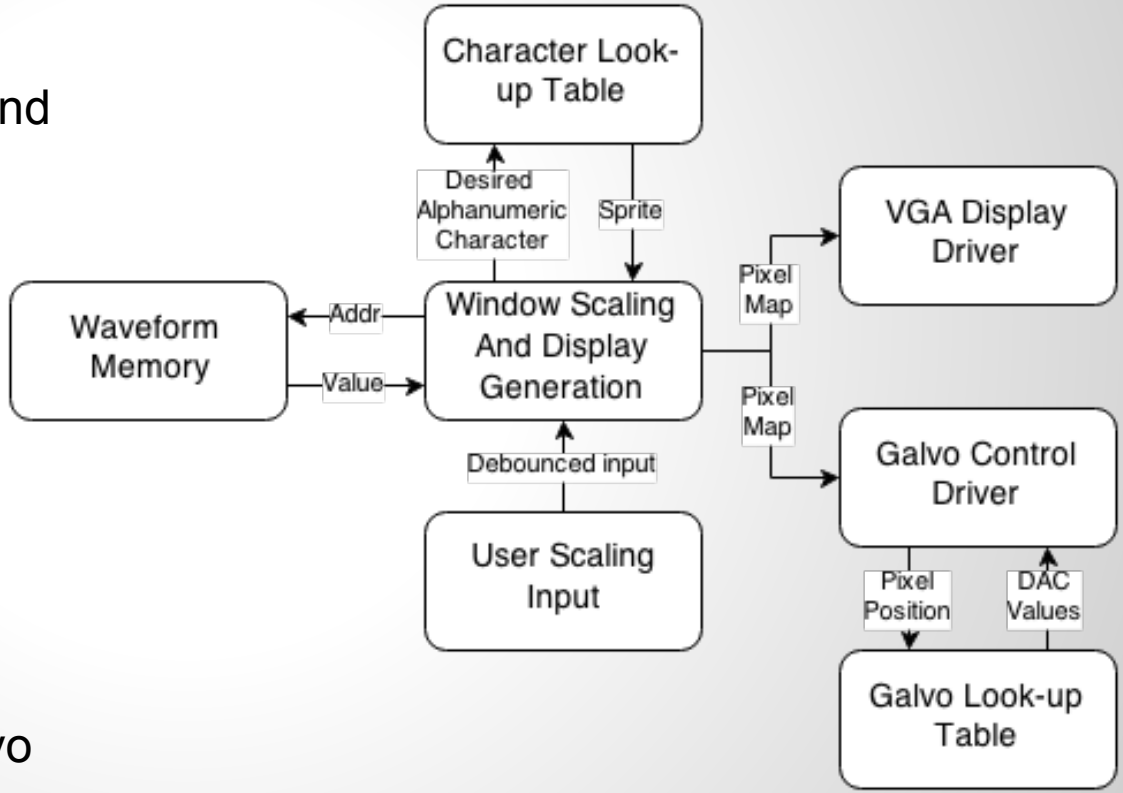
Display Hardware

- VGA Display Interface
- Output DAC for Galvanometers
- Galvanometers

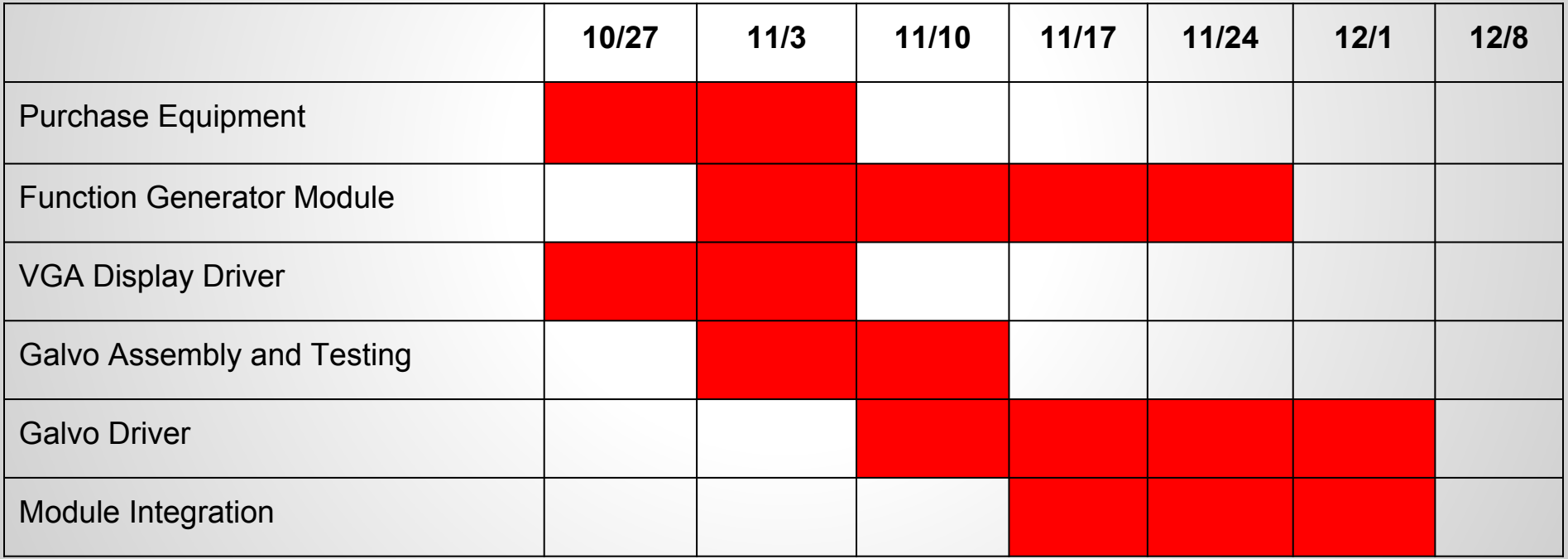


Window and Display Module

- Waveform loaded from waveform memory (BRAM) and scaled using user input
- Added with information regarding waveform with characters from lookup table
- Pixel Map generated and accessible to VGA display driver and galvo control
- Pixel map translated into galvo voltages



Timeline


10/27
11/3
11/10
11/17
11/24
12/1
12/8
Purchase Equipment
Function Generator Module
VGA Display Driver
Galvo Assembly and Testing
Galvo Driver
Module Integration