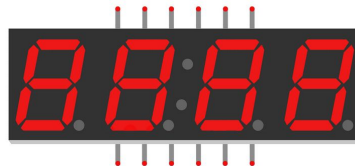


Programmable Digital Display

A user-programmable 4-digit 7-segment display



([image source](#))

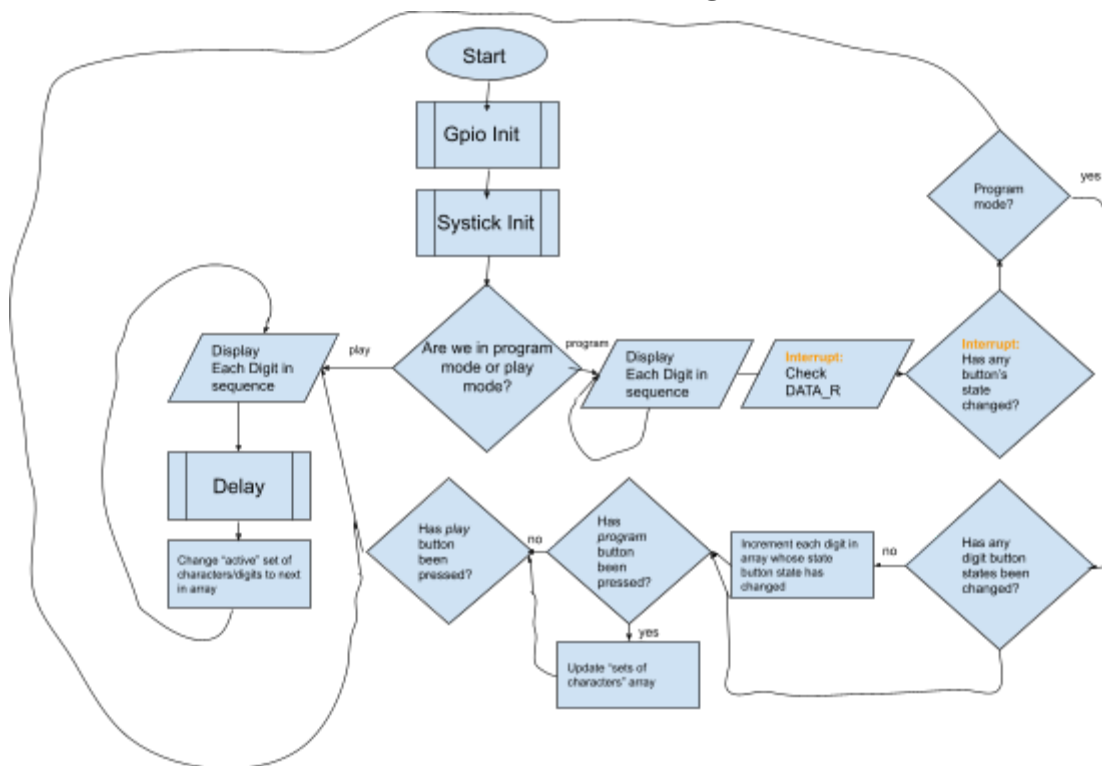


([image source](#))

How it works

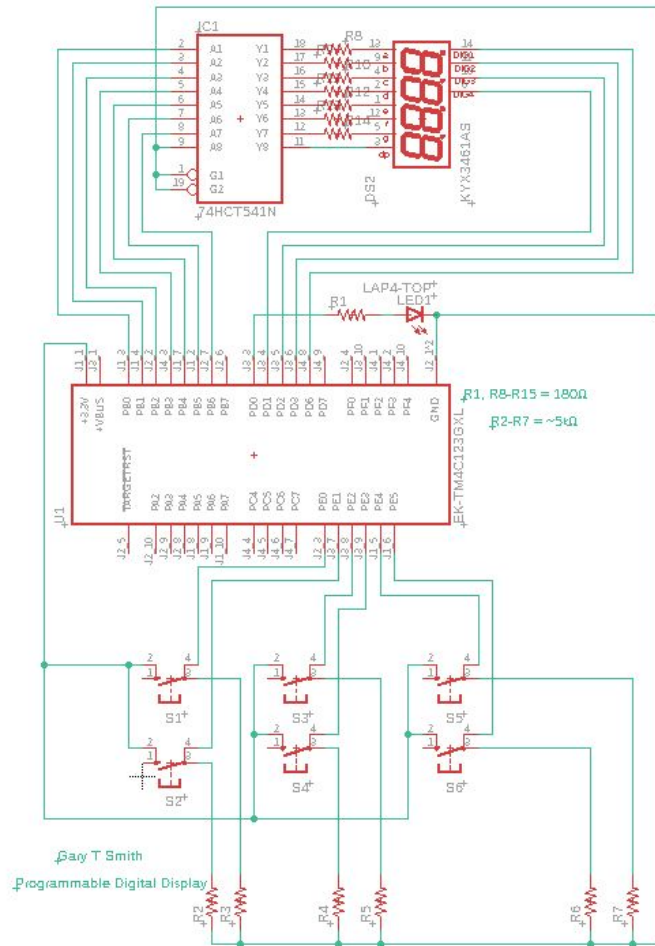
- Each digit (all four) has a corresponding button allowing user to iterate through numbers (1-9) and alphabet (A-F)
- The “Program/Erase” button allows the user to either save the current set of characters, or erase it along with all other stored sets.
 - >To save, the user will press the button once. Display will then be reset and wait for next inputs.
 - >To erase, the user will press the button twice. Display will then be reset and wait for new inputs.
- The “Play/Stop” button either begins playing the programmed character sets, or stops the ones that are currently playing.

Flowchart/Planning



Schematic

([KYX-3561AS display library source](#) - custom converted to KYX-3461AS)
([tm4c123gxl library source](#))



Part List

- 1x [Tiva C Launchpad](#) dev board w/ [TM4C123GH6P](#) mcu
- 1x [KYX-3461AS](#) four-digit 7seg display
- 1x 5mm [Red LED](#)
- 4x Pushbutton

Calculations/Notes

$$V=IR$$

$$R_{\text{seg}} = 3.3V / 0.01A = \sim 330\Omega = 180\Omega \text{ or } 183\Omega \text{ actual (Feed 10mA to each segment LED, max 25mA)}$$

$$R_{\text{button_pulldown}} = \sim 10k\Omega \text{ (General rule-of-thumb)}$$

$$R_{\text{red}} = 3.3V / 0.01A = \sim 330\Omega \text{ (Feed 10mA to red LED, max 20mA)}$$

Connected DP to GND instead of Y8 like schematic. A8 unconnected.

Will utilize multiplexing to display all 4 digits, with 5ms delay between each.

Decided to not implement "erase" functionality in initial build. Use TIVA reset button.

Issues/Changelog

Change LED pin from P7 to 0 due to lock on PD7[3/1/21]

Pins not supplying full 3.3V, must figure out why [3/1/21]

Attempting to mitigate voltage drop from possible *loading effect* by adding buffer opamp to circuit[3/2/21]

Determined issue to be excessive GPIO power draw, ordered buffer IC chip [3/2/21]

Installed buffer chip 74HC541N, problem resolved. Updated schematic! [3/4/21]

Problem with code simulator, switched to a pre-made template [3/6/21]

Changed buttons from port A to port E due to lock[3/6/21]

Updated schematic [3/6/21]