Segment LCD Stopwatch & Display with MSP430FR4133

Housekeeping MCU Training Series

MSP430

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⚡ Demo

Note: Press RST button in MSP430FR4133EVM to confirm hardware connected.

LCD Display ⌄

STOPWATCH

Minutes:Seconds:Miliseconds//Hours:Minutes:Seconds

| 0 | 0 | : | 0 | 0 | : | 0 | 0 |

START / STOP   CLEAR

LCD DISPLAY

Please enter numbers and capital letters

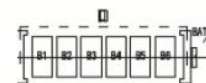| 0 | 0 | 0 | 0 | 0 | 0 |

DISPLAY

ANT   HRT   TMR   REG   BATT

Hardware Needed for this Example Code

Materials

- MSP430FR4133 LaunchPad Development Kit

- Jumper wires (optional)

MSP-EXP430FR4133
MSP430FR4133 LaunchPad™ development kit ;

Order now

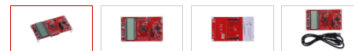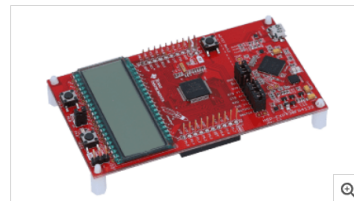| Overview | Order & start development | Technical documentation | Related design resources | Support & training |

Overview

Description & features   What's included   Supported products
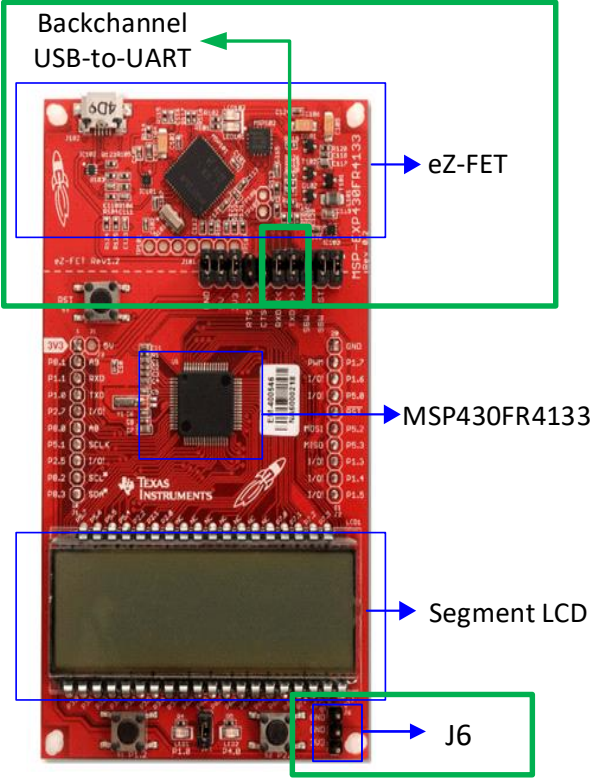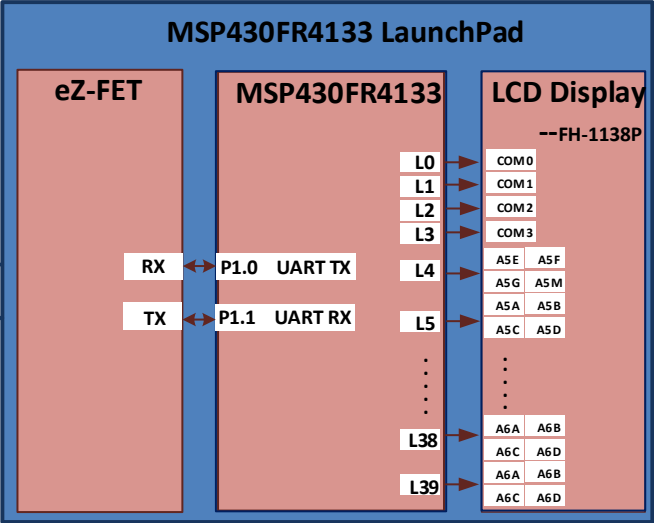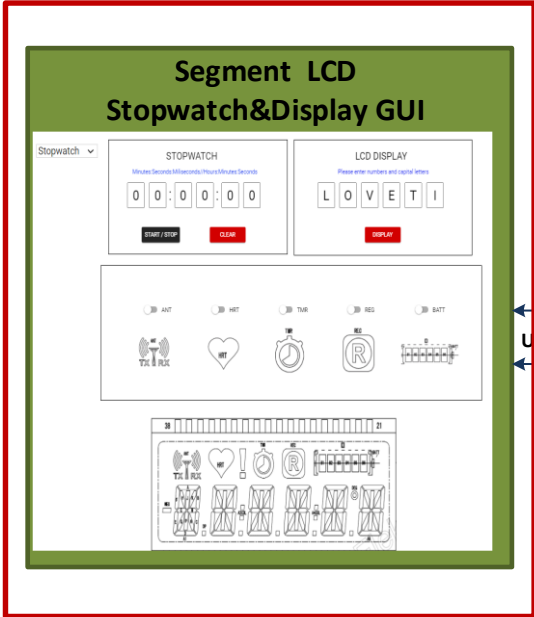
The MSP-EXP430FR4133 LaunchPad development kit is an easy-to-use Evaluation Module (EVM) for the MSP430FR4133 microcontroller. It contains everything needed to start developing on the MSP430 Ultra-low-power (ULP) FRAM-based microcontroller (MCU) platform, including on-board emulation for programming, debugging and energy measurements. The board features on-board buttons and LEDs for quick integration of a simple user interface as well as a Liquid Crystal Display (LCD) which showcases the integrated driver with flexible software-configurable pins. The MSP430FR4133 device features LCD support with an integrated 10-bit ADC as well as embedded FRAM (Ferroelectric Random Access Memory), a non-volatile memory known for its ultra-low power, high endurance and high speed write access.
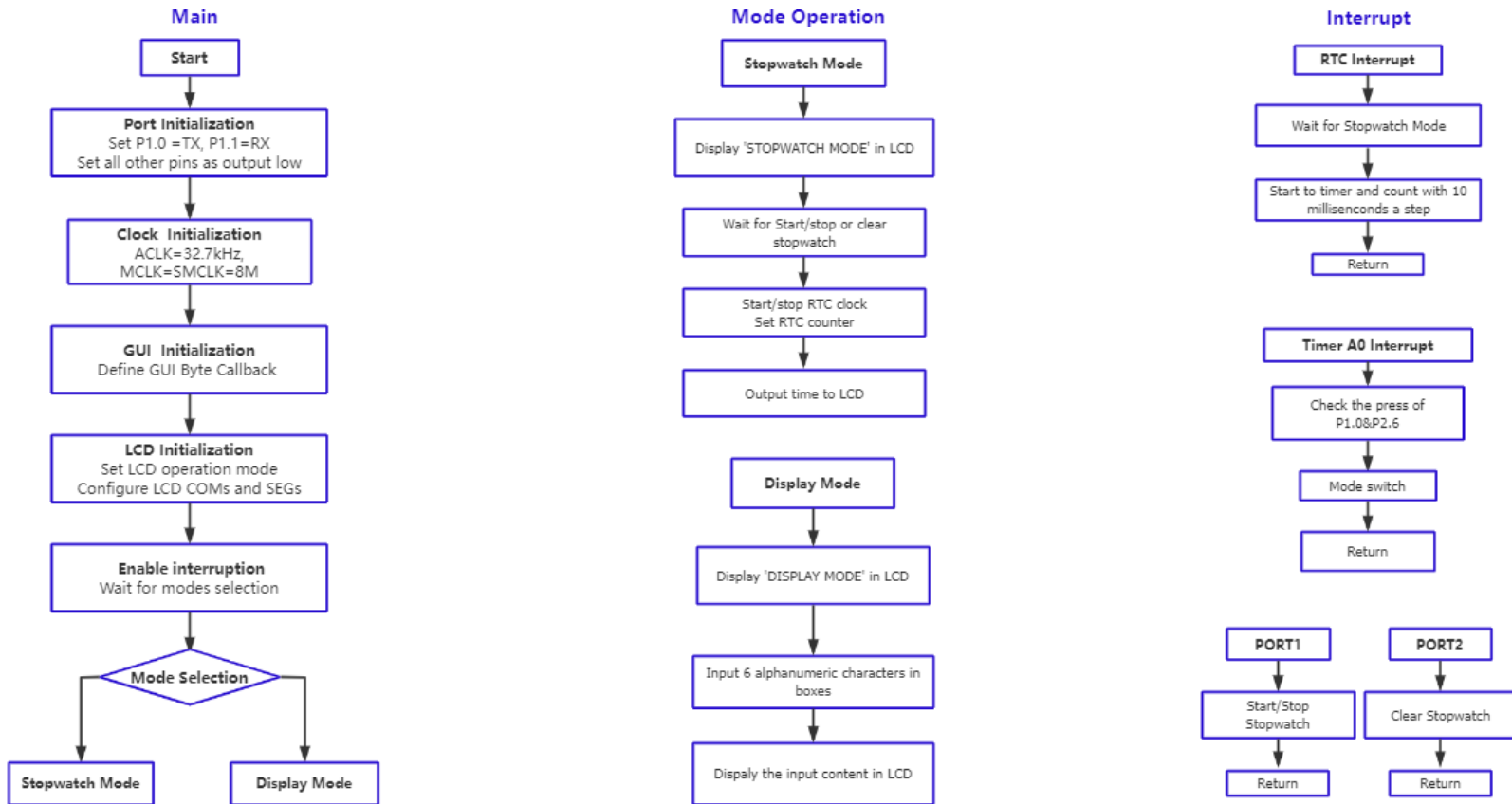
Rapid prototyping is simplified by the 20-pin BoosterPack™ plug-in module headers, which support a wide range of available BoosterPack modules. You can quickly add features like wireless connectivity, graphical displays, environmental sensing, and
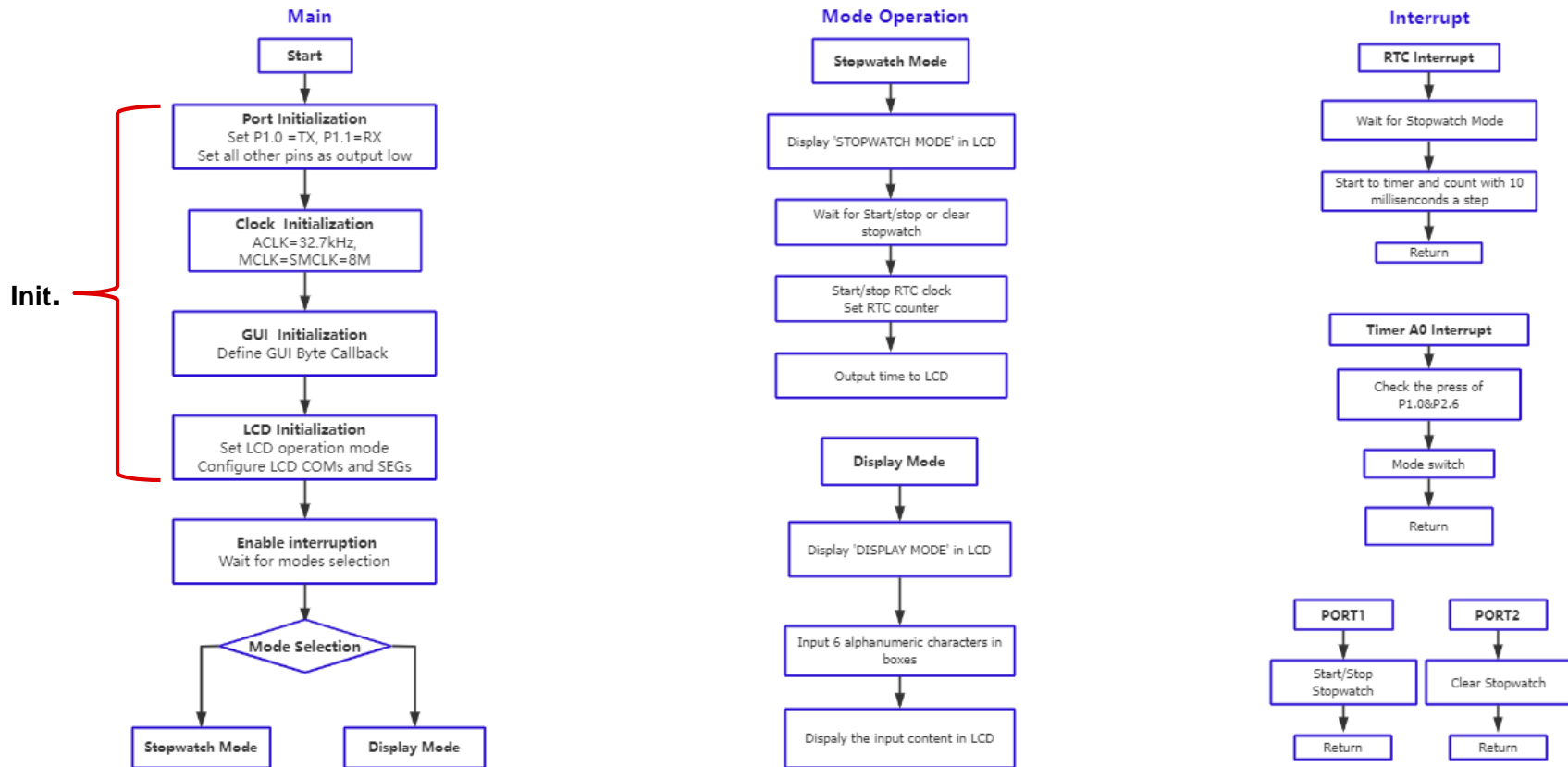
TEXAS INSTRUMENTS

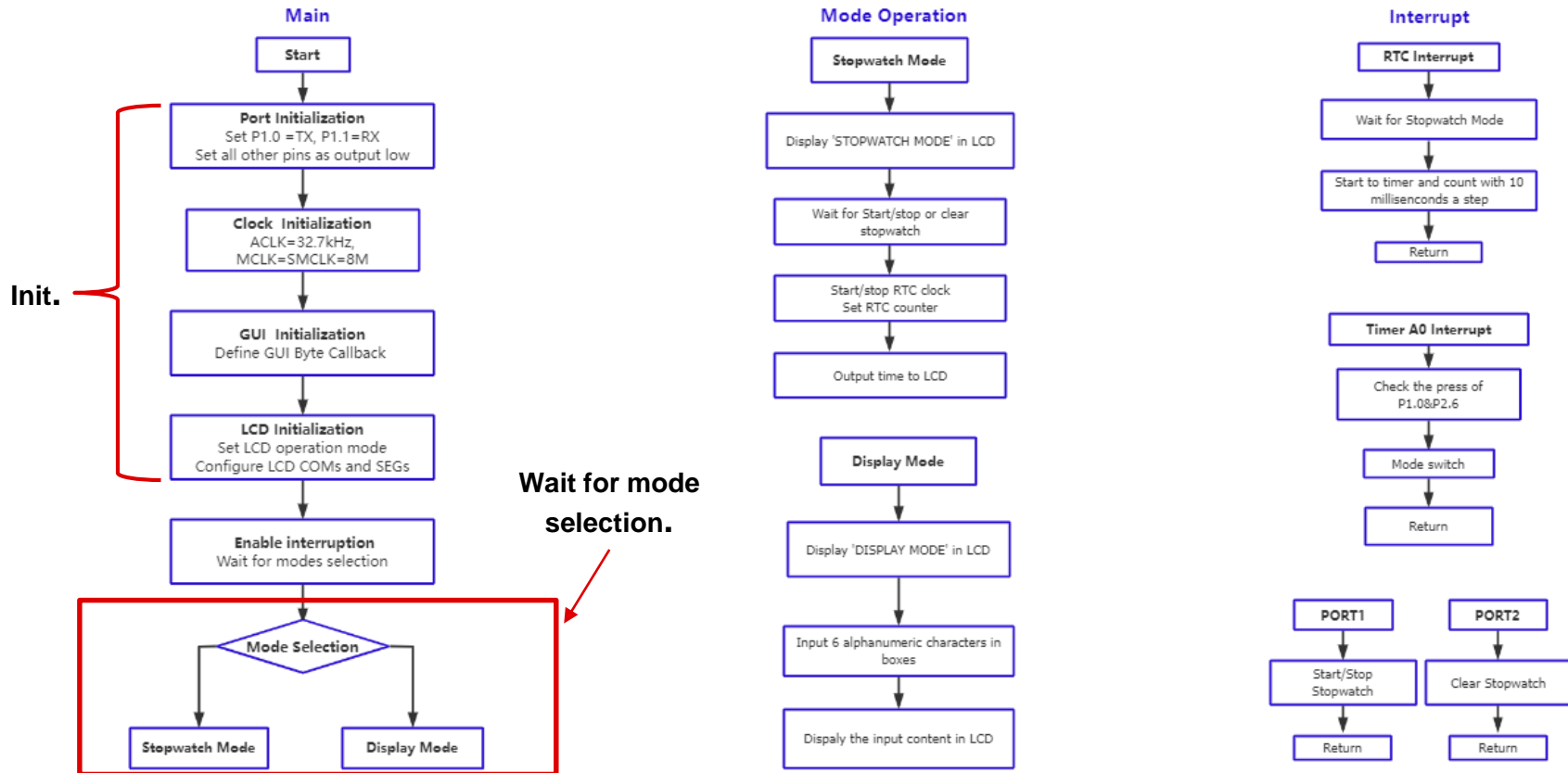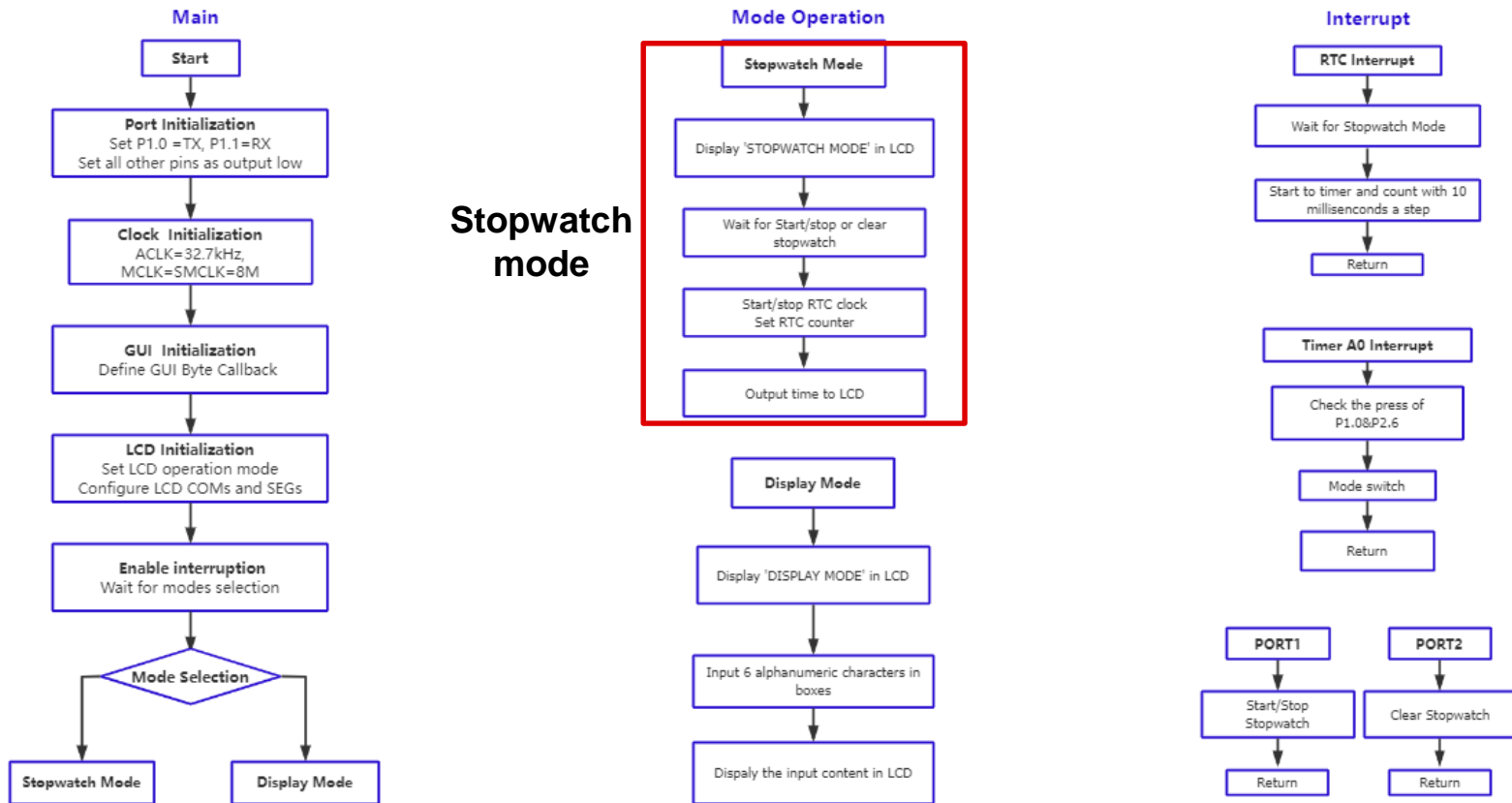# System Overview and Hardware Connections
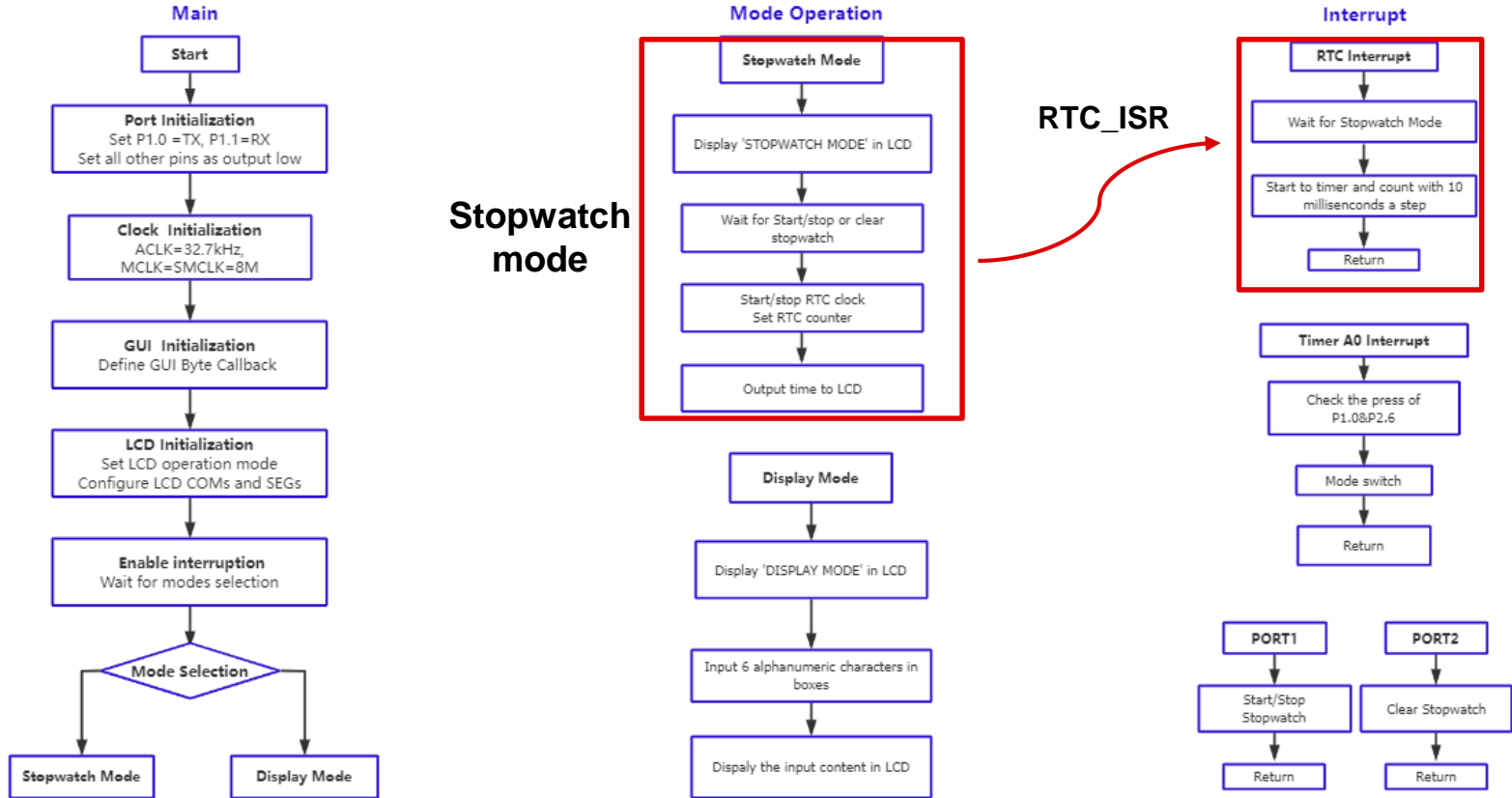
Example Code Flow
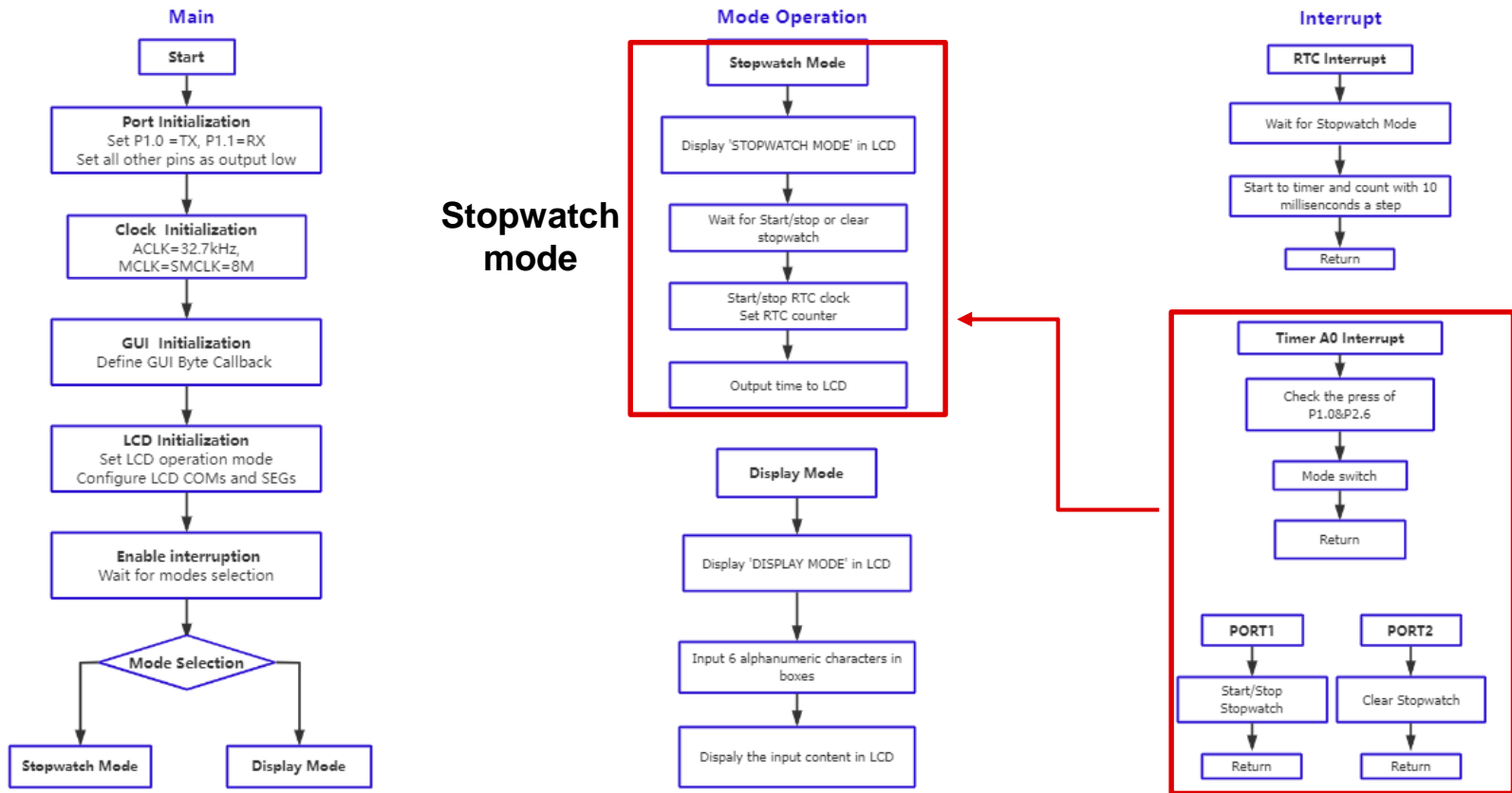
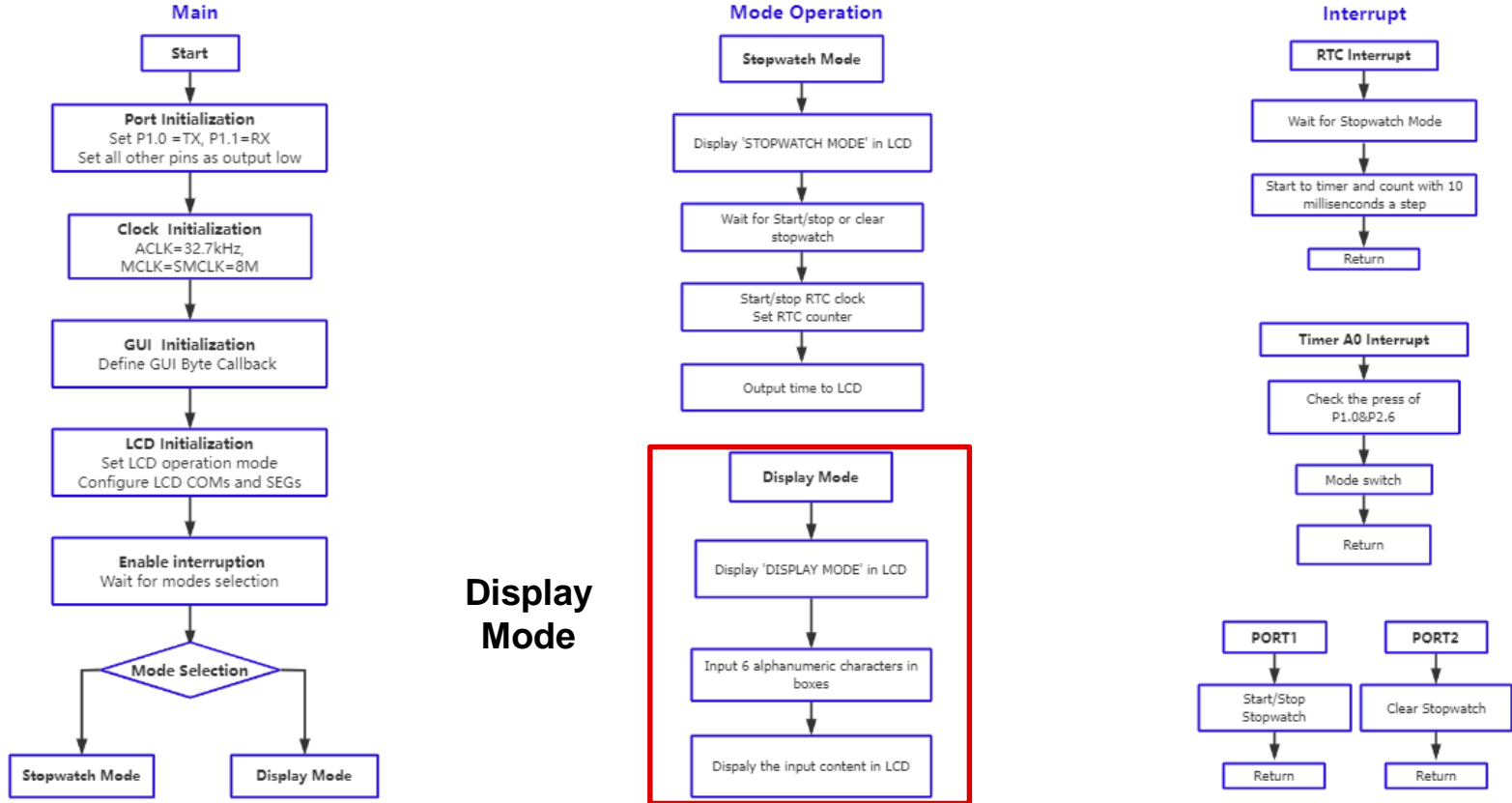# Example Code Flow

Example Code Flow

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Example Code Flow

Example Code Flow

Example Code Flow

Main

```
Start
  ↓
Port Initialization
Set P1.0 =TX, P1.1=RX
Set all other pins as output low
  ↓
Clock Initialization
ACLK=32.7kHz,
MCLK=SMCLK=8M
  ↓
GUI Initialization
Define GUI Byte Callback
  ↓
LCD Initialization
Set LCD operation mode
Configure LCD COMs and SEGs
  ↓
Enable interruption
Wait for modes selection
  ↓
Mode Selection
  ↓            ↓
Stopwatch Mode    Display Mode
```

Mode Operation

```
Stopwatch Mode
  ↓
Display 'STOPWATCH MODE' in LCD
  ↓
Wait for Start/stop or clear stopwatch
  ↓
Start/stop RTC clock
Set RTC counter
  ↓
Output time to LCD
```

Display Mode

```
Display Mode
  ↓
Display 'DISPLAY MODE' in LCD
  ↓
Input 6 alphanumeric characters in boxes
  ↓
Dispaly the input content in LCD
```

Interrupt

```
RTC Interrupt
  ↓
Wait for Stopwatch Mode
  ↓
Start to timer and count with 10 millisenconds a step
  ↓
Return
```

```
Timer A0 Interrupt
  ↓
Check the press of P1.0&P2.6
  ↓
Mode switch
  ↓
Return
```

```
PORT1                    PORT2
  ↓                        ↓
Start/Stop Stopwatch    Clear Stopwatch
  ↓                        ↓
Return                   Return
```

12

Thanks for watching!

MSP430FR4133: https://www.ti.com/product/MSP430FR4133

MSP430FR4133 LaunchPad: https://www.ti.com/tool/MSP-EXP430FR4133

Segment LCD Stopwatch App Brief: https://www.ti.com/lit/pdf/SLAAE53

Segment LCD Stopwatch Code Example: https://dev.ti.com/tirex

GUI Composer: https://dev.ti.com/gc/