N gauge layout automatic operation system software structure

Setup()

- Initialize GPIO and analog ports
- Configure PWM (20kHz, 8 bit resolution)
- Initialize TFT display driver library
- Start periodic interrupt

loop()

Event-driven processing
- When *flagCheckTouchPanel* is true:
  - Determine if the screen is touched
  - Convert to local coordinates

Determine if TFT needs to be updated
- Whether signals/points/train-speed has changed
- If changed, set *flagDrawTFT*

Handle buttons on the TFT is pressed
- Determine if the buttons on TFT pressed
- If pressed, set *flagDrawTFT*

Event-driven processing
- When *flagDrawTFT* is true:
  - Draw items to off-screen bitmap
  - Transfer off-screen bitmap to TFT using SPI

  Note: Transferring the entire bitmap takes approximately 80 msec.

Arduino
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1ms periodic interrupt [High priority task]

Always run
- Increment 1ms global counter *gbIntCounter*
- Read serial input (HC166)
  - Sensor status
  - Tact SWs status
- Update status of items on the layout
  - Signals
  - Points
  - Crossing lamp
- Read fader volume and update train speed
- (When AUTO mode) Execute scenario
- Flag control
  - Set *flagCheckTouchPanel* every 20ms
  - Set *flagDrawTFT* if needed
  - Set *gbIsHC595Update* if needed

Event-driven processing
- When *gbIsHC595Update* is true:
  - Update params by tact SW status
  - Update params by fader volume value
  - Output serial signal to HC595