# N gauge layout automatic operation system software configuration

**Arduino**
**Raspberry Pi Pico 2W**

## Setup()

- Initialize GPIO and analog ports
- Set up PWM (20 kHz, 8-bit resolution)
- Initialize the TFT display driver library
- Start periodic interrupts

## loop()

**Event-driven processing**
- If ***flagCheckTouchPanel*** is true:
  - Determine whether the screen is being touched
  - Convert to local coordinates

**Determine whether a TFT update is required**
- Whether a signal, point, or train speed has changed
  - If changed, set ***flagDrawTFT***
- Whether a TFT button has been pressed
  - If pressed, set ***flagDrawTFT***

**Event-driven processing**
- If ***flagDrawTFT*** is true:
  - Draw items to an offscreen bitmap
  - Transfer the offscreen bitmap to the TFT using SPI

Note: Transferring the entire bitmap takes approximately 80 msec.

## 1ms periodic interrupt [ High priority task ]

**Always running**
- Increments the global counter ***gbIntCounter*** every 1 ms
- Read the serial input (HC166)
  - Sensor status
  - Tact SW status
- Update the status of items on the layout
  - Signal
  - Point
  - Crossing lamp
- Read the fader volume and update the train speed
- (In AUTO mode) Execute the scenario
- Flag control
  - Set ***flagCheckTouchPanel*** every 20ms
  - Set ***flagDrawTFT*** as needed
  - Set ***gbIsHC595Update*** as needed

**Event-driven processing**
- If ***gbIsHC595Update*** is true:
  - Update parameters according to the tact SW state
  - Update parameters according to the fader volume value
  - Output a serial signal to HC595