



# Nextion Display Guide

*The purpose of this guide is to provide an overview of the Nextion display used in the ND formula hybrid car and describe the methods for modifying the display and sending data via UART.*

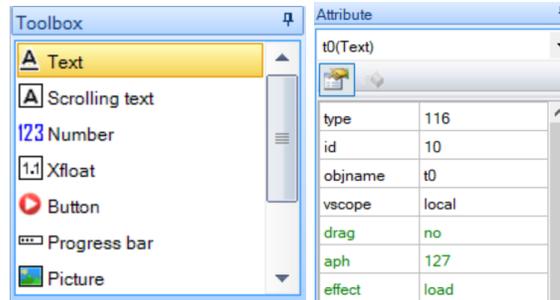
## 1. Nextion Connections

- The connections leading out of the Nextion are the power(red), ground (black), Tx(blue), and Rx(yellow) are labeled at the point of connection.
  - Currently the Tx is unused because the display is not transmitting any information back to the board
- The Nextion has a max of 5V. If anything more is applied, a fuse in the back of the display will burn out. This fuse can be replaced and there are a couple of extras in the lab.
  - Constant unreliable voltage can deteriorate the screen without burning the fuse so it is recommended to check voltages before connecting the display.
  - Currently the board does not have a reliable 5V pin even though the board schematics claims it does.
  - Currently the display was connected to a 12-5V converter.
- The ground of the Nextion must be the same ground as that of the board. If the correct ground is not connected, the display will power but not receive the data correctly.
- The Rx(yellow) cable is currently connected to the pins that were designed for the RF communications. Given that they were the only ones that provided UART communication we connected the Rx of the display to the Tx of the RF pins.
- It is highly recommended that a future team redesign the board with a reliable 5V pin and separate UART pins given that we are borrowing the pins that were for RF.

## 2. Nextion Graphics

### a. Software

- To modify the graphics of the nextion one must download the Nextion Editor software.
- The software has several click and drag tools such as gauges, text boxes, progress bars, and number boxes. Each tool will have an attribute window which will allow you to edit the tool.



- The use of photoshop and picture editing software is highly recommended for gauges and other tools to look more appealing.
  - In the current display, the red and black gauges with the white numbering were photoshopped to fit the display. The nextion provides the needle that moves according to the value you send it.
  - It is recommended to watch a few videos on Youtube to learn how people use the tools and adapt them to their needs.

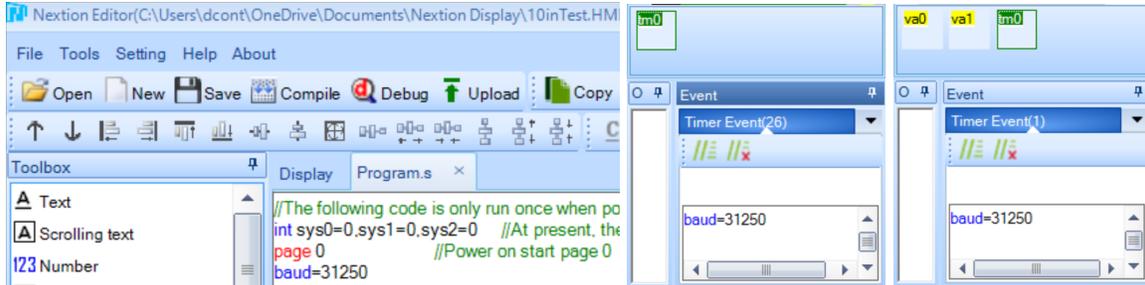
#### b. Upload

- You need a microSD card formatted as FAT32 under Windows with less than 32 GB
- Only 1 TFT project file exists on the microSD card
- Nextion device is powered off before inserting microSD card
- Insert the microSD card containing TFT project file
  - Port is located in top right back corner of display (facing the front of the display)
- Power on Nextion with recommended clean power as per Datasheets
- Nextion device is undisturbed while uploading
- After upload “success” indication power off Nextion
- After Nextion device is powered off then remove microSD card
- Power on Nextion with recommended clean power as per Datasheets

### 3. Nextion Data

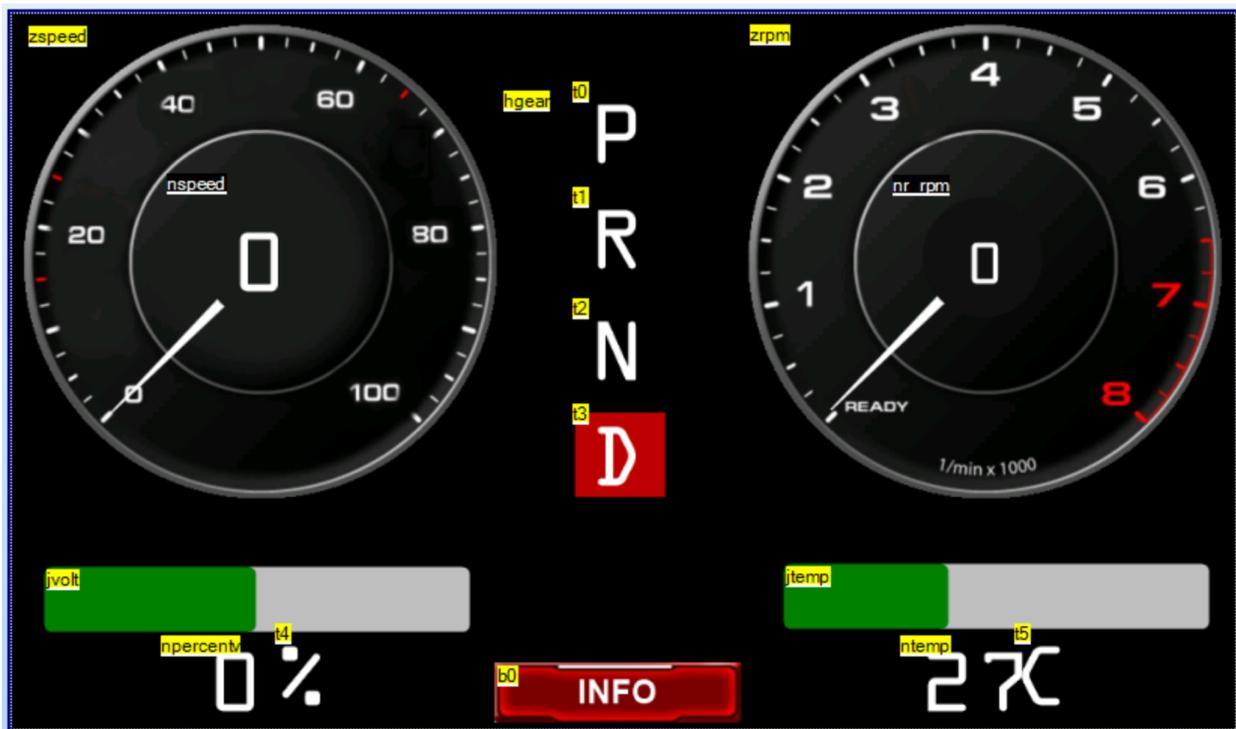
#### a. Format

- Baud Rate:
  - The baud rate on the Nextion display can be set to several preset values.
    - 2400, 4800, 9600, 19200, 31250, 38400, 57600, and 115200, 230400, 250000, 256000, 512000, and 921600
  - Setting baud rate of display was changed in three spots due to not being able to identify exactly where it was needed. One is in the program.s tab and the timers on each page.



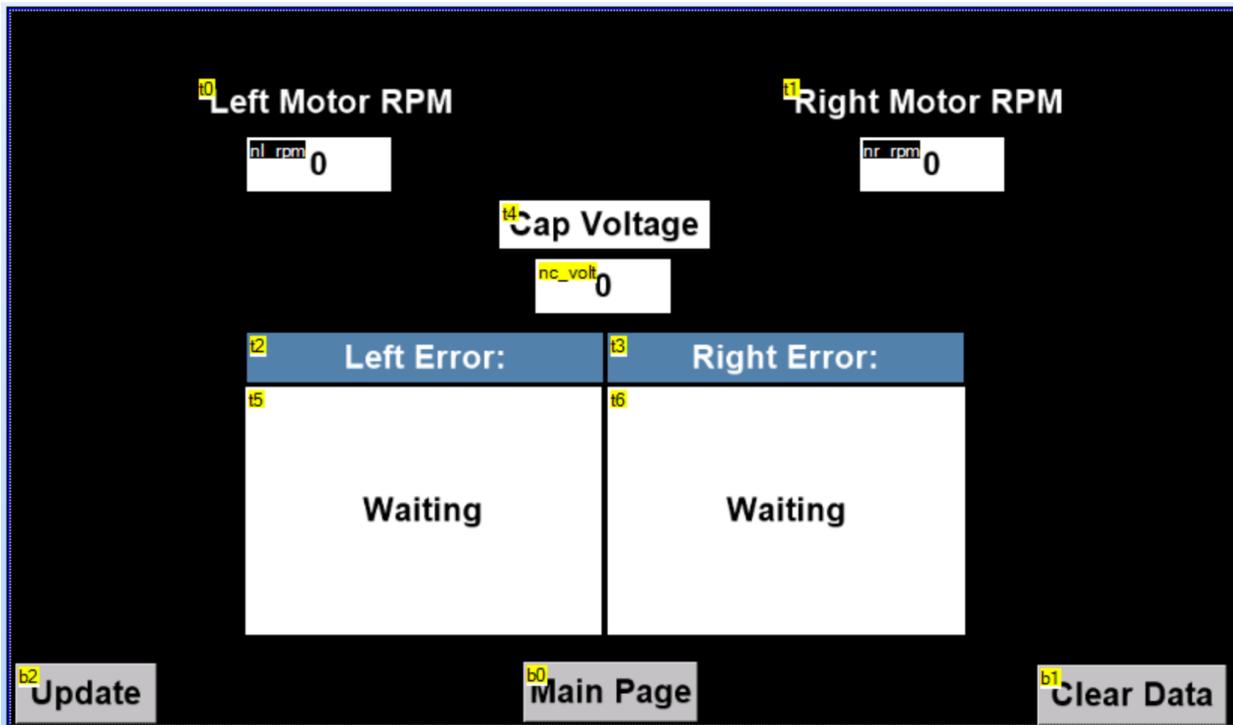
- Writing to tools:
  - (objname).val=(value)
  - Ex.
  - nspeed.val=50 // set the numerical value of the tool “nspeed” to 50

#### b. Current Display



- Speed
  - nspeed: the numerical speed value
  - zspeed: the gauge for the speed
    - Value 1-360, but code remaps the value accordingly
- RPM
  - nr\_rpm: numerical rpm value
  - zrpm: gauge for the RPM
    - Value 1-360, but code remaps the value accordingly
- Gear

- hgear: slider for gear of car
  - hgear.val=0(D),33(N),66(R),100(P)
- Voltage
  - jvolt: sliding bar for capacitor percentage (values 1-100: calculated by code)
  - npercentv: capacitor percentage number
- Temperature
  - jtemp: sliding bar for temp range (values 1-100: calculated by code)
  - ntemp: temperature value



- RPM
    - nr\_rpm: right motor numerical rpm value
    - nl\_rpm: left motor numerical rpm value
  - Voltage
    - nr\_rpm: right motor numerical rpm value
  - Buttons
    - b0: test button to update error feed when data log tool is used
    - b1: clear data log manually
    - b2: return to page0
- c. Testing
- Testing can be done using logic analyzer and connecting to the Rx pins on the board. Make sure to have the baud rate set correctly. If you are not worried about the baud and just want to see the data being sent, use the auto baud feature and make sure to have the signal display the ascii values.

- You should ideally see three terminate functions before and after each command, and every command will be sent one character at a time.

#### 4. Helpful Information

- a. I would recommend looking up videos on how to use the tools to fit your needs given that the tools can be controlled to display data differently.
- b. It may be useful to learn on an arduino since there is plenty of information online regarding arduinos and nextion displays. There are libraries for arduinos, thus making writing data easier.
- c. We attempted using a library to write using UART and found it very difficult and overly complicated.
- d. The functions on the code all write correctly to all the tools but are limited by the amount of instructions we can send to the display due to the chip's processing power and baud rate.
- e. Crucial Links:
  - <https://nextion.tech/instruction-set/>
  - <https://randomnerdtutorials.com/nextion-display-with-arduino-getting-started/>
  - <https://www.youtube.com/watch?v=OhYyBpijR14&t=1201s>