# Pi-Pico LCARS Project

* Uses the Raspberry Pi Pico RP2040 microcontroller development board.
* Based on an original idea from Mike Horne (@Recantha) with his PicoPiCorder project (<https://github.com/recantha/picopicorder>).
* Provides basic weather and air quality information on an LCARS (Library Computer Access/Retrieval System) style display.
* Uses a 3.5 inch TFT display with SPI interface (using ILI9341 driver).
* Also uses a number of I2C sensor devices; specifically:-
  + BME680 – Air Quality, Temperature, Pressure and Humidity sensor.
  + VEML6075 – UVA/UVB sensor
  + RV3028 – Real time clock
* I have also had this working with other real time clocks
  + PCF8523 – Real time clock (not very accurate)
  + DS3231 – Precision real time clock
* Also includes a number of buttons, switches and LEDs for various functions:-
  + Illuminated reset button, which is enabled/disabled using a toggle switch.
  + Illuminated backlight button to toggle display backlight.
  + LED to indicate when external power is plugged in.
* I’ve also included a Pimoroni Pico LiPo SHIM to allow the unit to be battery powered using a rechargeable Lithium Ion battery.
* Coded using Circuitpython, mainly because this was the only option I could currently find for using the TFT display. If I manage to find some C drivers for this display I will probably recode the entire application in C.
* Most other drivers were also available in Circuitpython, though I did have to construct my own Circuitpython driver for the RV3028 real time clock.
* Main constraint for the code has been memory size, as Pi Pico only has 264k of RAM.
* RAM limit has meant having to restrict the bit depth of bitmap images used (using 4 bit images – giving 16 colours).
* Also had to restrict use of variables/lists wherever possible, so I have sacrificed speed (not really important) for memory usage.
* Display includes:-
  + UV
  + UVA
  + UVB
  + Indoor Air Quality
  + Temperature
  + Current date/time/day of week
  + Atmospheric pressure
  + Humidity
  + Free memory
  + Supply voltage/battery state
* I have also included a ‘historic’ atmospheric pressure graph displaying atmospheric pressure variation over the previous 6 hours to give pressure trend.
* The figure to the left of the pressure trend graph shows the range of maximum/minimum pressure shown on the graph.
* Code is on Github (<https://github.com/DivingIvan/Pi-Pico-LCARS>), though there are still a number of minor changes still to be uploaded due to recent change in the version of Circuitpython.