

itron Embedded TFT Solutions

HMI – Smart and Modular

presented by
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A wholly owned subsidiary of
Noritake Co., Limited. Japan

Customer Considerations

- Customers want to upgrade to colour
- Customer wants to give their product the 'ifactor'
- Customer software development costs expensive
- Need to get to market quickly with defined cost
- Customer internal discussions are slow
- Market reduction in hardware costs
- Ethernet and Wireless communication required
Wifi, GPRS, Bluetooth, Zigbee, 868MHz
- How to match the firmware, hardware and application

itron Embedded TFT Modules

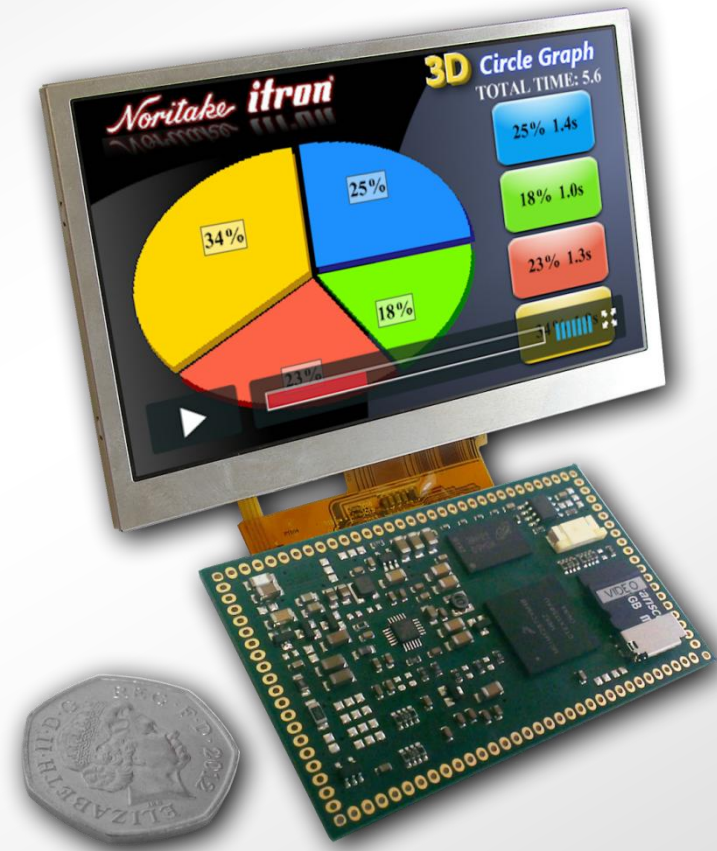
A 4 year programming development to create – iDevOS

- Easy to Use Modular Solution
- Up and running in 10 minutes
- ARM9 Core
- 64MB / 256MB DRAM
- 128MB / 4GB NAND Flash
- RS232, RS485, RS422
- Async, SPI, I2C, USB, Net
- PWM x3, ADCx2, Audio
- 3.5", 4.3", 5.7", 7" TFT
- Resistive & Capacitive Touch
- 50,000 units shipped to 100+ customers



pumaNova - Smaller Faster more Flexible

- The Compact Solution
- Hi-Speed Signals in One Place
- Easy Customization
- Flexible Implementation
- Host or Slave
- Low EMI Emission
- Audio Video Web Net CAN
- 70mm x 40mm
- 8 Layer PCB
- SMD to Mother PCB
- 450MHz 256MB DDR2



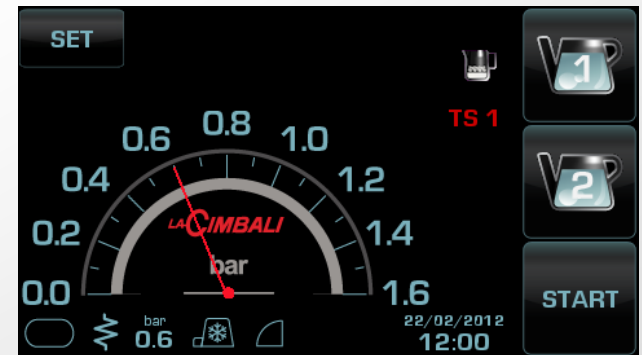
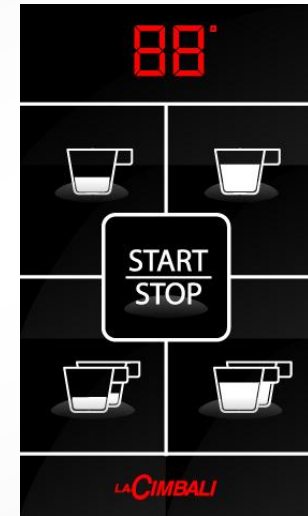
MPCT - Keep the Gloves On



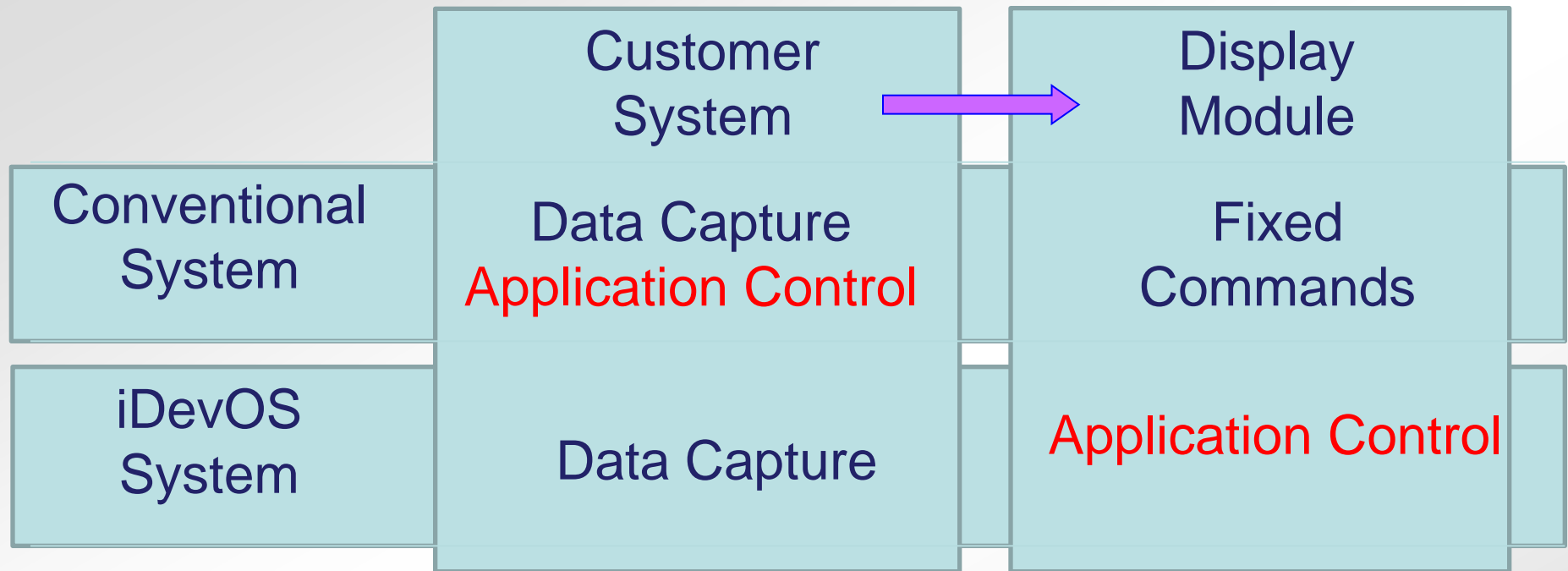
- Use with 4mm plastic
- Use with leather glove
- Water splash capable
- Non bonding required
- Volume Production
- Flexible Design
- No Driver Setup

iDevOS Original Request

Request for a new colour display that puts intelligence in the display module due to limited communication speed



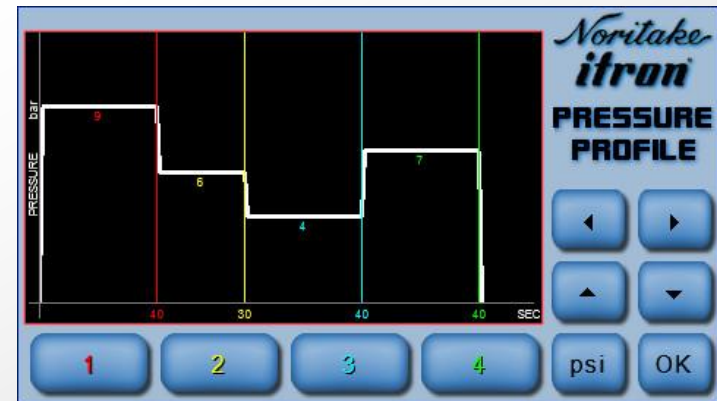
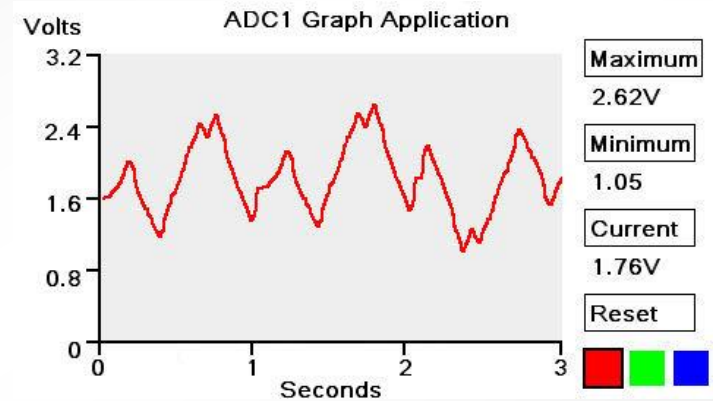
iDevOS - Process Strategy



iDevOS moves the application control to the display
Host system sends raw data over I2C, SPI and Async
Data processed in the TFT and displayed where required

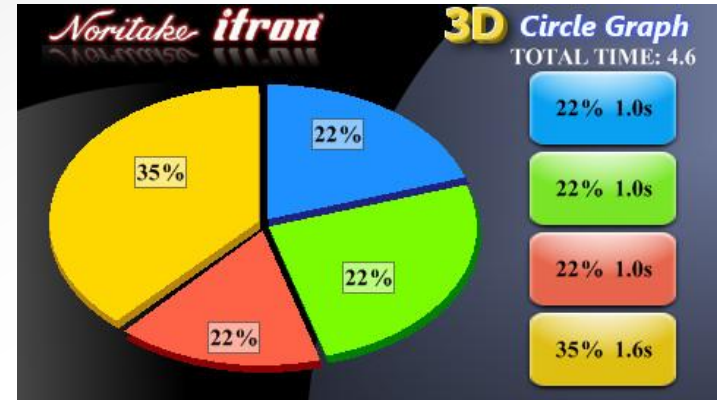
iDevOS Graphs

- Graphical Representation of Data
 - Scatter
 - Line / Trace
 - X Bar / Y Bar
 - Auto-Scrolling

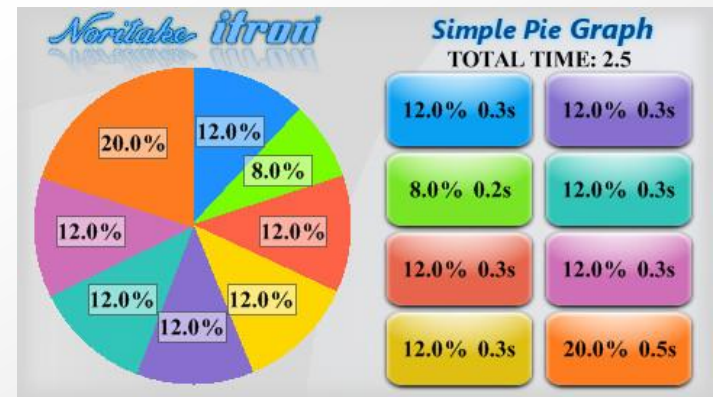


iDevOS Pie Charts

Using Ellipse / Arc
2D / 3D Charts like Excel



Project Application Files
our version of 'Apps'
built in functions ready to use



iDevOS Development

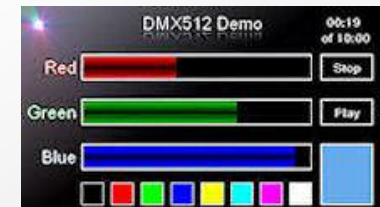
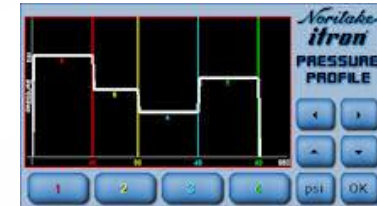
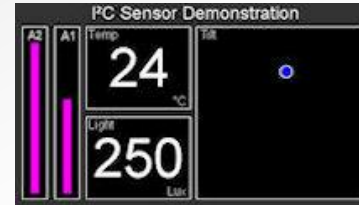


- Create graphics 40%
Web is a great source
- Create the code 60%
Cut and paste examples
- 1 page every 2 hours
Each page in its own file
- iDevTFT DevSuite
emulation and debug

Marrying product and software

iDevOS - Getting Started

- Download a Project
- See how it works
- Make Changes



How Does It Work

High Speed 16,000 object database

Name, type and parameters for each object loaded

Pointers to functions, arrays and structures

Pages, images, fonts and audio pre-loaded to RAM

Rapid database search method employed

Screen updated by sequentially layering – back to front

1ms scheduler checks command stack

Interrupts can set flags with data placed in buffers

15 level priority interrupt scheme forces immediate action

Command integrity monitoring provides real time Debug

iDevOS - Core Commands

PAGE
STYLE
POSN
TEXT
DRAW
IMG
KEY
CALC
LOAD
RUN
FUNC
IF
LOOP

- Interpreted like HTML/Java
- Only 26 to Remember
- 200+ Functions
- Text Based Syntax
- Real Time Debug
- Unicode Programming
- Communication Language
- Operating Language
- Real time Dynamic Pointers

SETUP
INC
LIB
VAR
FILE
INT
RESET
FPROG
FEND
SYSTEM
DEL
WAIT
EXIT

Spreadsheets – 4 Dimensional Arrays

- Cell, Column, Row, Sheet
- Power behind Graphs
- Structured Storage
- 8bit, 16bit, 32bit data per cell
- Sort and Sum

- `LOAD(array.row.col,variable);`
- `LOAD(array.row,var1,var2,var3...);`

Protocols, Colours, Images and Fonts

- Protocol per Interface
- User Created
- CANBUS
- MODBUS RTU
- DMX512 Lighting
- Extended MIDI Audio
- Checksum
- Byte Stuffing/Swapping
- Six Bit Data Conversion
- 24 bit Colour Control
- 8 bit Alpha Blending
- BMP, JIF, PNG, RawTFT
- Controlled Transparency
- 8 bit Gray Scale Fonts
- Fonts up to 128x128 dot
- Images used as fonts
- Fonts used as Images

iDevOS Rapid Demonstration

TU480.mnu:

```
INC ("SDHC/LIBS.mnu");  
INC ("SDHC/STYLES.mnu");  
INC ("SDHC/VARS.mnu");  
INC ("SDHC/FUNCS.mnu");  
LOAD (TIMER0, 50, 0);
```

```
PAGE (Main, pSt)
```

```
{  
  RUN (setPrice);  
  RUN (setName);  
  KEY (km1, [LOAD (vchoice, 1); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 19, 18);  
  KEY (km2, [LOAD (vchoice, 2); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 99, 18);  
  KEY (km3, [LOAD (vchoice, 3); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 179, 18);  
  KEY (km4, [LOAD (vchoice, 4); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 259, 18);  
  KEY (km5, [LOAD (vchoice, 5); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 19, 138);  
  KEY (km6, [LOAD (vchoice, 6); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 99, 138);  
  KEY (km7, [LOAD (vchoice, 7); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 179, 138);  
  KEY (km8, [LOAD (vchoice, 8); RUN (setChoice); SHOW (Enter);], 78, 116, kStD, 259, 138);  
}
```



iDevOS Projects

Noritake itron Itron SMART TFT MODULE CASE STUDY **keenan**

Initial Screen

Main Page-Total trailer and feed kg

SETUP Menu – Core Functions

Password Page for Parameters

Select DIET or PLAN then START

HEALTH & SAFETY confirmation

LOAD Ingredients Manual / AUTO

LOADING INGREDIENT

After Loading Sales Process

View Product Description

Select Quantity and Buy

Order Confirmation

After Loading Process

CLEAR button

Unload Process

Unload at Yard

A project created from the Keenan PC and Controller Application Manuals by Itron UK Limited using iDEVTF. Total development time 70 hours.
 12/10/2013 Trademark Keenan. IPR Keenan / Itron UK respectively. Copyright 2013 Itron UK Limited. www.itrontft.com Page 1/2

iDevOS In Operation

700k bytes of iDevOS boots up in ~ 2 seconds

Loads user defined splash screen.

Interprets command data from internal memory

Can be uploaded from a host system via a serial port.

From power on to start can be achieved in 4 seconds

Load other screens on demand.

A professional coffee machine system with 40 screen menus, 150 images / icons and several European fonts takes about 13 seconds to load the complete application from 5Mbyte of storage and consumes 40Mbytes of RAM once all the objects are defined

iDevTFT – Development Suite

- Multi User Project Control
- Context Help & Syntax Check
- Interface Simulation
- Multi Mode Emulation & Debug
- Image and Font Import & Editing
- Project Encryption and Distribution
- Firmware Detect and Update
- Free to Download



iDevOS - Pushing Boundaries

- Extended Midi Protocol
- Dual Rotary Encoder Control
- Rapid Waveform Selection
- Fast Launch to Market

*TAKE THAT
Checkout
Gary Barlow's
Tweet*



iDevOS - Benefits

- Get your concept up and running quickly
- Logically minded people can write the code
- itron debug your projects for free
- Gradual learning option with extensive examples
- We can be part of your software team
- iDevOS firmware and updates are free
- iDevTFT development suite is free
- itron take responsibility for it's operation
- Users constantly provide input and feedback
- Easy distribution of updates
- Designed in Europe, supported in Europe

itron Embedded TFT Solutions

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TELEREX

please visit the Telerex booth
for further discussions and product demonstration