

JADE Success Story for Smart/Intelligent Vending Machine

Picoway Technology Inc.

A subsidiary company of
Promate Electronic Co. Ltd.

Customer Profile

- US Texas-based Company
- Machines-to-machine (M2M) solution provider
- Named one of the 2008 M2M 100 by [M2M magazine](#)
- Leading vending management solution provider with wide range of innovative products and solutions
 - One of the highly innovative vending machine peripherals provided is **Interactive Cashless Reader (ICR)**

Interactive Cashless Reader

- ICR is a peripheral that allows cashless payments and consumer interaction at vending machines.
- It's a unique combination of an embedded device, payments components, and a touchscreen enabled LCD,
- It allows different forms of cashless payments to be used at vending machines
- It is also a content based messaging platform for vending machines that delivers multimedia messaging to the consumer.

The Challenge

- Existing Interactive Cashless Reader (ICR) system has the following limitation:
 - Performance degradation due to wide range of concurrent operation (esp. multimedia activities that occupies significant memory bandwidth and processing power).
 - Cost of good too high and difficult to reach different market with different price point. The current system include OS cost (WinCE Pro. need to support multimedia) regardless whether the current system need multimedia display.
 - Incapable of driving larger TFT LCD due to processor and display driver constraints.
- Offshore development challenges:
 - Software Delivery
 - Communication and Supportability

The Solution

- A powerful JADE customized module (Freescale i.mx31 processor) designed to support multimedia activities (Flash contents and interaction).
- A carrier board designed to accommodate the customized module for early evaluation and software development.
- Linux BSP that bring up customized module.
- 3.5" TFT LCD (QVGA 320 x 240) support. Additional display support for larger size TFT LCD Panel (7" 800 x 480 and 8.4" SVGA 800 x 600).
- Software (Test programs & sample codes) and API support for display manipulation and GPIO output power
- IBM Rational Unified Process (RUP) based development process. Software is developed and delivered iteratively and incrementally.
- On-line web-based customer support portal for engagement and maintenance.

The Results

- 20%~30% performance increase over current system when playing Flash contents.
- The customized JADE-based module is dedicated for multimedia and may be added as required. The flexible configuration enables solution for different market at different price point.
- Reducing cost as no OS runtime fee is charged for Linux BSP.
- Application developer has full control over display in user space.
- Source code and additional larger size TFT LCD panel drivers are provided for extensibility and flexibility.
- Software and Hardware are released in several iterations/stages.
- Communication and software changes are tracked through on-line customer support portal.

JADE Solution H/W Features

- ARM11 Core (Freescale i.MX31) running @ 400MHz
- 3 UARTS for RS232 I/O (2 peripheral I/O connections to magnetic swipe and RFID, one for debug console)
- 5 GPIO Outputs, 5v/3v Cable, S/W, Jumper selectable
- 5 GPIO Inputs
- 128MB DDR RAM
- 128MB NAND Flash
- 3.5" TFT LCD Panel (QVGA 320 x 240)
- 4Wire Resistive Touchscreen Input
- 3v/5v Input Power (to drive internal rails)
- 3v/5v Output Power to peripherals
- Single Connector interface to peripheral I/O module
- USB OTG "Client"
- USB Host
- Small PCB for Module (53mm x 76mm)



JADE Solution Major S/W Features

- Kernel Features
 - Freescale i.MX31 Processor Support
 - NAND Flash Driver
 - 3.5" TFT QVGA LCD Panel Display Driver
(16/24 BPP, backlight on/off, landscape/portrait mode, 255-level dimming supported)
 - DM9003 Ethernet Driver
 - GPIO Driver
(5 inputs and outputs, 5v/3v output power selection supported)
 - UART Driver
 - I2C Touchscreen Controller Driver
 - USB Host/OTG Controller Driver
- Bootloader (U-Boot 1.2)
- GNU Toolchain
- Other Features
 - LCD Display manipulation and GPIO power API and sample for developer
 - TSLIB (Touchscreen event abstraction layer)
 - POSIX message queue support
 - 78.37% NAND Flash Free
 - 88.88% Memory Free

Comprehensive Support

- User Documentation
 - Release notes & BSP user guide
 - Toolchain user guide
 - Frequently Asked Questions (FAQ)
- On-line Customer Support Portal
 - Forum: general discussion
 - Files: Software, documentation and updates download
 - Tracker: bug, feature request and support tracking
 - Notification mechanism to facilitate communication
 - Web interface facilitates access from different geographical location
- Software Delivery
 - CD ROM included for each milestone release (Prototype, Sample Run, Pilot Run, Mass Production)
 - Releases are also available for download at customer support portal
 - Lower risk with incremental and iterative development and release, as compared to traditional big-bang approach.

