

# Puppeteer

## Embedded Java

### and programmable logic

Embedded  
computer

Programmed  
in Java

FPGA and  
CPLD

Simple  
interfacing

Operating  
systems  
design

Battery  
powered

Field proven

Networked



Puppeteer is an embedded computer, designed for use in higher education to teach both computer and electronics engineering students.

It is ideal as a tool for teaching real-time or embedded systems, allowing simple interfacing to hardware. It is programmed in Java, and introduces Object Oriented programming into your real-time teaching.

It contains both FPGA and CPLD devices, and provides an ideal tool for teaching programmable logic.

#### Programmable logic

The Puppeteer board includes a large FPGA, which can be programmed using high-level design languages. This will allow you to teach an exciting mix of software and hardware programming, blurring the lines between the two. In addition, we can provide an IO board which adds a CPLD device, to allow contrasting approaches to be discussed.

#### Java

Puppeteer can be programmed in Java. A full JVM is provided in the form of WindRiver's PersonalJWorks. Java has a rich support for high-level constructs and is a welcome tool for embedded systems. Java provides an ideal introduction to Object Oriented techniques and is especially useful when considering web-based technology.

#### Interfacing

We provide a number of different IO boards. Our aim is to make interfacing to hardware simple, with plug-in connections, and we provide a number of both digital and analogue inputs and digital outputs. You can drive motors, relays, lamps etc with no further electronics required, inputs are standard TTL.

#### Networking

The combination of Java and an Ethernet port makes for an interesting teaching tool. Java makes the development of software based on TCP/IP networks straight-forward, so it is possible to implement many web-based systems, such as web servers, quickly and easily.

#### Operating systems

The Puppeteer is supplied with the WindRiver VxWorks operating system. However, in many ways, Java can be viewed as the operating system, as most of the features required of an OS are available in Java. We have ported Linux to the board as an optional choice, which would allow programming in other languages, such as C++. NetBSD is also under development.

You can teach about embedded operating systems, the steps to port a different OS to an embedded system, and to allow comparison of the facilities available.

## Specification

CPU	Intel SA1110, 32-bit RISC processor operating at 200MHz
Memory	32MB of EDO DRAM, 8 MB of flash data storage
Memory Expansion	Up to 2GB of additional memory on a plug-in Compact Flash card
Real time clock	Provides time of day for Operating System
Software	VxWorks Operating System, Flash Filing System, Java Virtual Machine (Personal JWorks). Linux is an optional installation. PC-based Java tools are provided on a separate CD
Display	Capable of driving a VGA LCD (TFT) 16-bit colour with resolution up to 640 x 480 pixels (not provided in standard configuration)
Ports	Ethernet port 10Base-T standard 9-way RS232 port 8-way miniDIN port (for debugging control)
Digital IO	8 digital outputs, and 11 digital inputs. The inputs are TTL-compatible. The outputs are open collector Darlington drivers, capable of driving inductive and resistive loads such as: relays, solenoids, AC and DC motors, heaters, incandescent displays, and vacuum fluorescent displays (standard configuration – other configurations are available. See below)
Analogue IO	2 lines, 10 bit resolution, provided via a Toshiba TC35143 AFE
Audio	12 bit audio codec, with standard stereo Walkman-type socket. Two channels of audio are available, independent of each other.
Power supply	+9V to 24V - a suitable power supply is provided
Temperature	0 to 60°C (32° to 140°F)
Weight	0.75 kg (1.6 lb)
Unit size	Length : 260 mm (10.25") Width : 105 mm (4.2") Height : 35 mm (1.26")
Options	Other IO boards are available CPLD board with 24 lines digital IO, 8 digital outputs and 2 analogue inputs. Speech input board

A standard configuration consists of the Puppeteer board, with the 8/11 IO card, fitted into an aluminium housing. A debug serial cable, suitable for connection to the COM port of a PC, an Ethernet cross-over cable and a 12V power supply are included. A CD containing the following software tools is also provided :

- o NetBeans IDE
- o Java Software Development Kit
- o Support software from Ansaе
- o Support documentation from Ansaе
- o CPLD programming tools (winCUPL from Atmel)
- o CPLD programmer details
- o FPGA programming tools (Quartus II from Altera)

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