

# Trends in Prototyping Systems



*A Complete Design Platform*

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# Agenda

- Focus of design dept.
- Electronic system & Flow
- Design problems
- Educating design
- Prototype
- USDP
- Features
- Applications
- Conclusion

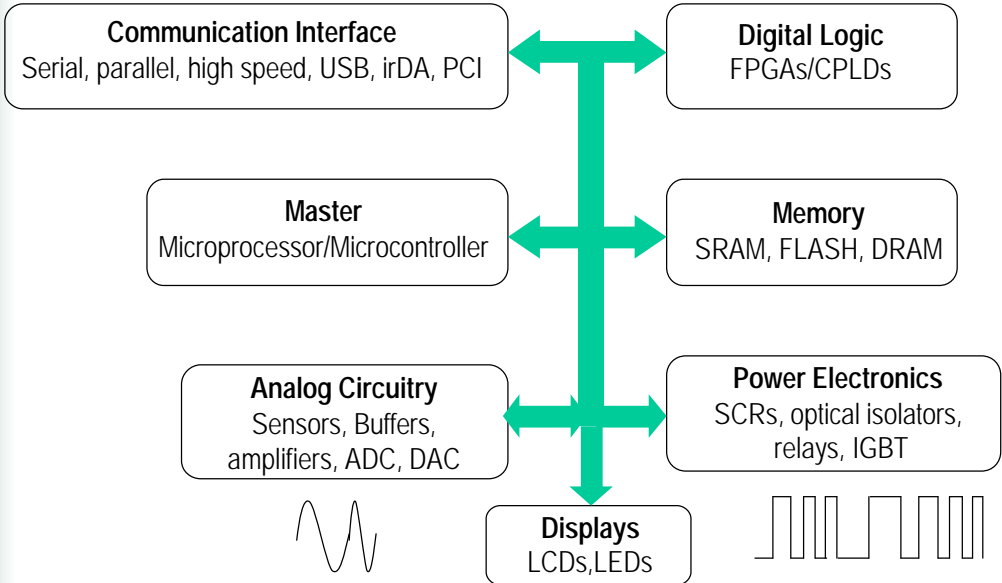
## Focus of Design Dept.

- Faster Solutions
- Higher Integration
- More Features
- Compact form factor
- TTM

# Electronic System

- A system can be defined as “A group of independent but inter related elements comprising a unified whole”.
- Or “A processing platform, where all element work together for a goal, with the given instructions. ”

# Electronic System



# Electronic System

- Microprocessor/Microcontroller (8051, RISC, PIC, ARM)
  - A traditional approach
  - Small form factor available
  - Ease of design
  - A real manager
- Digital Logic (FPGA, CPLD)
  - HUGE complex logic in one device
  - Small form factor
  - Higher frequencies
  - Flexible & reprogrammable

# Electronic System

- Communication Interface (USB, RS232, IrDA, PCI)
  - Depends on data size and speed.
- Memory (FLASH, SRAM, DRAM)
  - For what reasons to store data
  - Look up tables
  - Log files
  - Access time
- Analog Circuitry (ADC, DAC, buffers, SCU, filters)
  - Real world communicator
  - Level translations
  - Sensors

# Electronic System

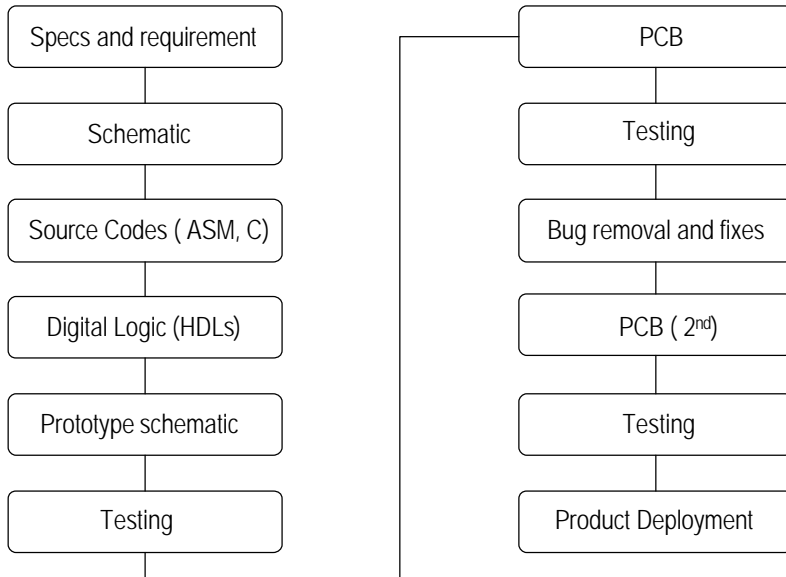
- Power Electronics (IGBT, SCR, relay)
  - High V & I to handle
  - Motor control
  - Electromechanical design

Selection of devices and interfaces depends

- Application
- Handling
- Environment
- End user needs



# Design Flow



# Design problems

- Designing an circuit or part of application is easy than the integrating all circuits to make a system.
  
- Problem Focus
  - Schematic prototyping
  - Integration of modules at test level
  - Ease of integrating various modules
  - Testing of prototypes
  - Code debugging
  - Flexibility in prototype hardware



*Boss is always for  
TTM*

# Educating design

- College Laboratories
  - Microprocessor, Microcontroller, VLSI, Instrumentation, EDC, electrical, communication, Project.
- Fresher is known to modular designs (with hiccups)
- Need for sophisticated equipments and kits for training
- More focus on system design
- Intensive labs on application design & development
- Deadline attitude
- Research platform
- Industry connection

# Prototype

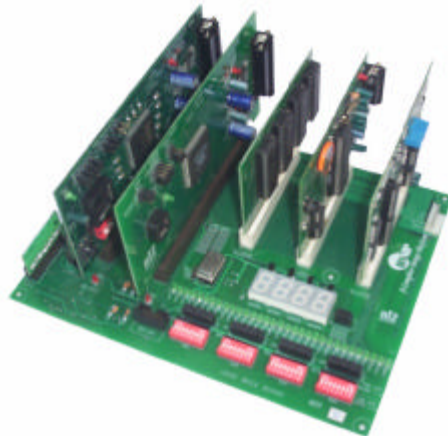
“A system model to test and develop the product before its final implementation.”

- Prototyping is like headache to designers
- Ease of prototyping is necessity
- Flexibility is must
- Individual eval boards or kits available
  
- Need for universal platform integration
- Modular approach
- Up gradation and addition of modules at regular interval.

# USDP

Universal System Development Platform

- A universal platform for various technologies
- An excellent prototyping and system development platform
- Modular approach
- Modules can be integrated according to needs
- Flexible and easy up gradation



# USDP

Universal System Development Platform

Prog. Port

One Platform

FPGA

Keypad Interface

FPGA

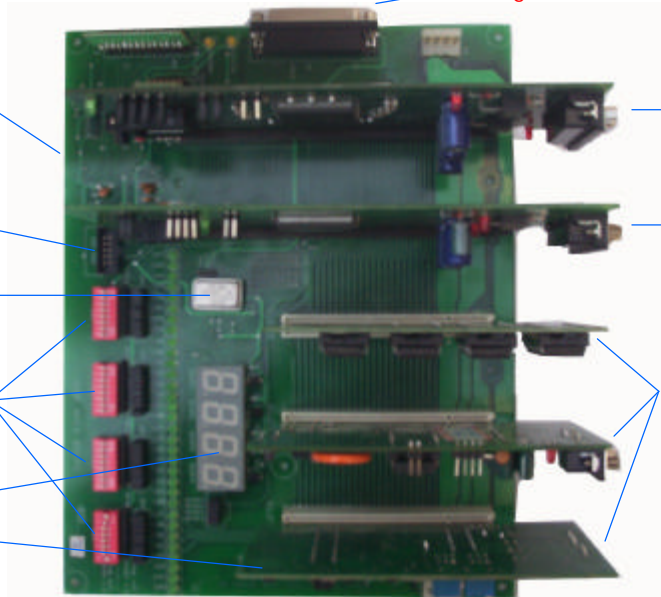
Box Osc.

Configurable I/Os

Modules

7 - Seg Disp,

LCD interface



# Features

## ■ Backplane features

- Supports interface with dual daughter PLD cards
- Supports FPGAs from reputed PLD vendors like Xilinx, Altera, etc.
- 3 PCI connector based application specific add-on cards
- 64 bit bus sharing between application add-on cards and PLD daughter cards
- 32 Digital I/Ps and O/Ps
- On board system reset circuit.
- Four seven segment Multiplexed display.
- 4x4 switch matrix keyboard interface header.
- On board crystal oscillator socket (user can select his desired oscillators).
- High performance backplane PCB (upto 80MHz board designs).

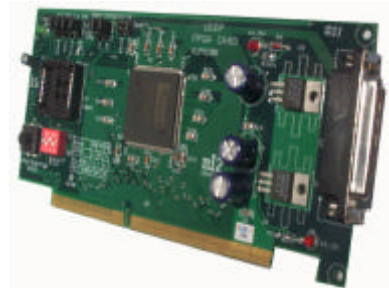
# Features

## ■ Xilinx FPGA Card

- Supports Spartan-II device family of FPGA's.
- User selectable configuration modes
- Onboard PROM support.
- Support for different I/O Standards
- High speed interface with other add-on cards
- A complete I/O bank for user VREF interface, using DB25 connector

## ■ Altera FPGA Card

- Supports ACEX 1K device family of FPGA's.
- User selectable configuration modes.
- Onboard PROM support.
- High-speed interface with other add-on cards.
- Parallel port interface directly from add-on card of FPGA





# Features

## ■ Micro-controller Card

- Philips 89C51 RD2 controller (ISP).
- RS-232 interface.
- On board serial EEPROM.
- On board serial RTC.

## ■ PIC Micro-controller Card

- Microchip 16F877 PIC microcontroller (ISP).
- In built ADC,PWM, timers, etc.
- On board RTC and RS 232 Interface.
- Interrupt port.

## ■ Memory Add-On Card

- 512KB x 4 SRAMs, total 2MB capacity.
- Direct interface with FPGA module.
- 70ns of access time.



All ports accessible through edge connector.

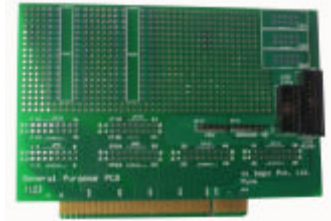
# Features

## ■ ADC/DAC Add-On card

- 4-channel ADC.
- 2-channel DAC.
- Sampling rate upto 400 KSPS.
- 8-bit ADC resolution.
- 12 -bit DAC resolution.
- 0-5V or +/- 2.5V input voltage.

## ■ General Purpose Add-On Card

- General-purpose layouts.
- Helps in prototyping electronic circuits
- To interface custom circuits with modules
- Useful in mixed signals designs.



# Features

## ■ Power Electronics module

- IGBT based O/P drive, with current rating upto 60 Amps.
- Dual high current relays.
- Stepper motor controller circuit.
- 5 optically isolated O/Ps.
- Step down transformer (/100) for line monitoring applications.
- High current capacity connectors (10Amps)

## ■ Other Accessories Provided

- SMPS
- 4x4 membrane keypad with cable.
- 16x2 character LCD with cable.
- User Manual with instructions, reference designs, examples, sources codes, reference datasheets & eval softwares.



# Applications

- System prototyping and testing
- Prototyping of FPGA designs
- Research and development of high-speed FPGA designs.
- Design and development of FPGA based DSP designs and algorithms
- Understanding of various FPGA architectures
- Performing a wide range of experiments, by actually downloading the designs into FPGA
- Understanding the basics of HDL's and digital logic interface
- Robotics and Motion control applications.
- Microcontroller based applications.
- PC controlled design development.
- Many more... ..

# Conclusion

- With the use of USDP designers are free from basic development problems and enjoys following:
  - Easy system design and development.
  - Good learning and design implementation platform.
  - Single platform for multiple technologies.
  - Stacking of multiple FPGAs which makes multiple FPGA designs development possible.
  - Higher performance.
  - Add-on modules for all type of applications.
  - Capable for future advancement and up gradation with new technologies.
  - Large number of user interface.

# Thank You

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