

# Device under test

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For more information visit: [home.iitb.ac.in/~anuraggupta/dut.html](http://home.iitb.ac.in/~anuraggupta/dut.html)

# Testing Digital Circuits using Embedded Systems

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# Project Description

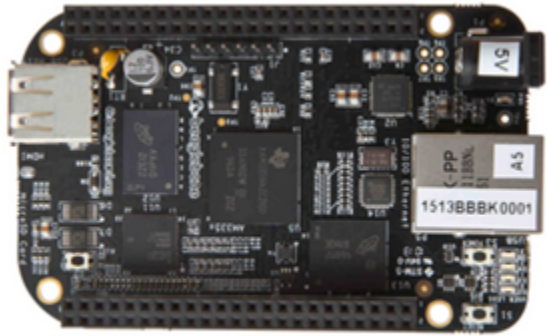
Testing and verification of digital circuits using embedded systems.

- Combinational
  - Brute force.
  - Stuck at fault: s-a-0, s-a-1.
- Sequential
  - Scan Chain.
  - Checking experiment.
  - State-table based test generation.

# Motivation

- To increase focus on circuit design than testing IC's.
- Efficient testing of design.
- Reduce the task of documentation.
- Aging of semi-conductors leads to less reliability on datasheet.

# Components



**Beaglebone Black**

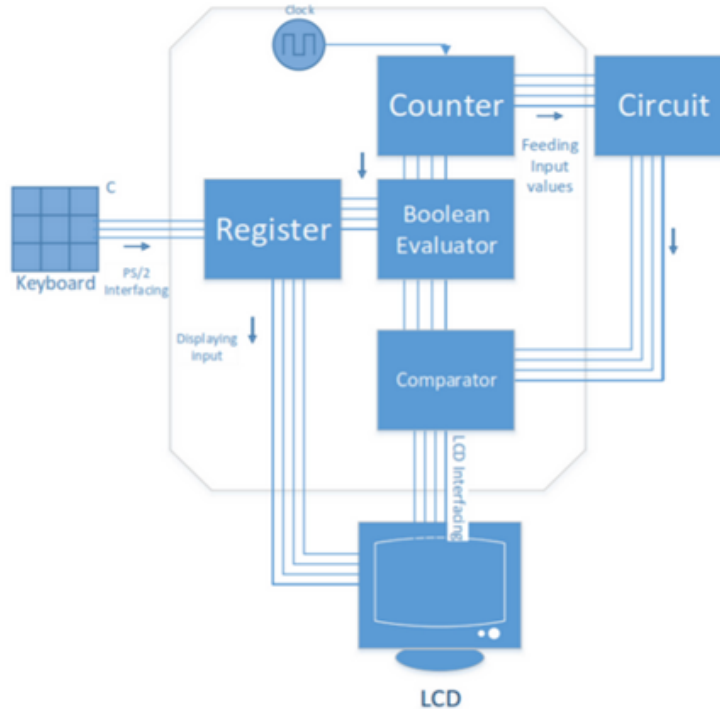


**Keyboard and Mouse**

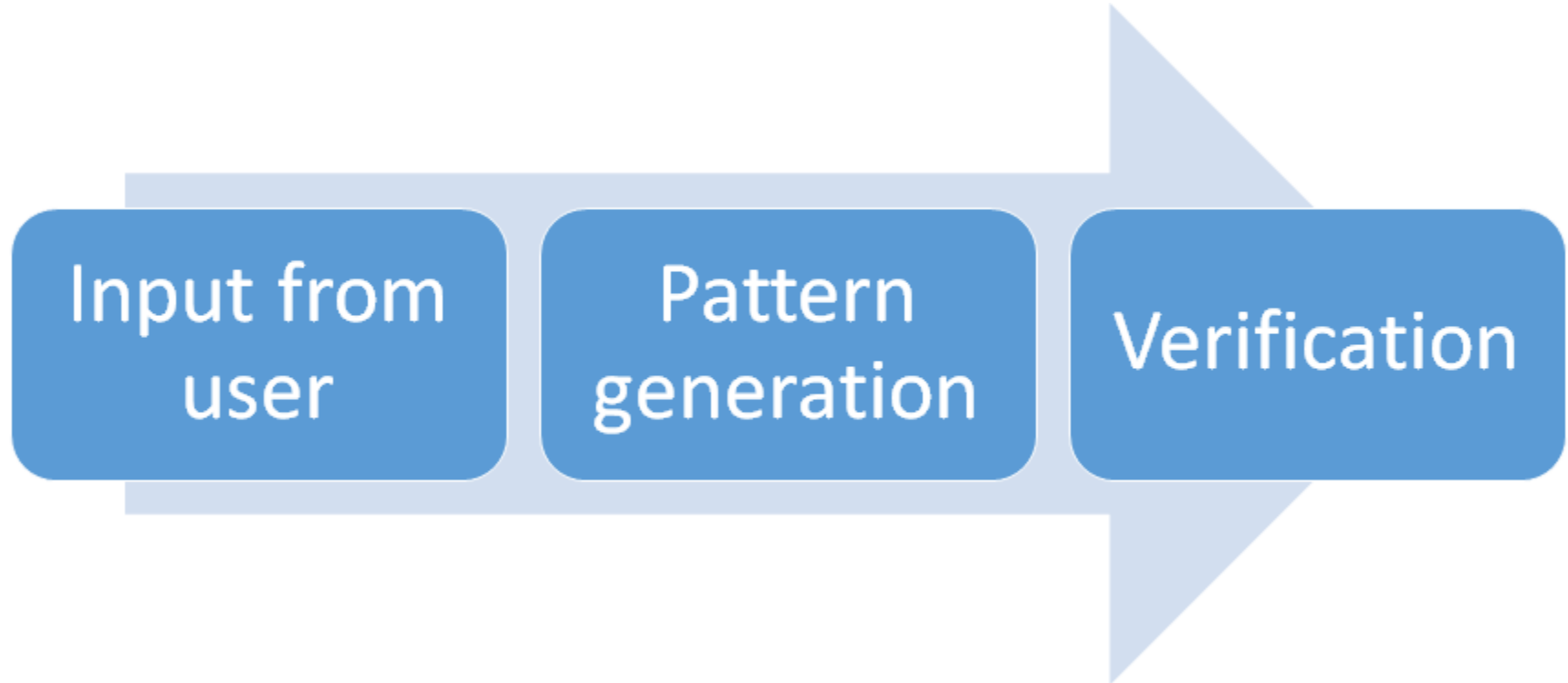


**HDMI display**

# Block diagram



# Overview



# Combinational circuits

- Accept no. of inputs/outputs from the user and formulas corresponding to different outputs.
- Generate all possible input patterns (Different types of counting).
- Compare expected and observed output.
- Display output.



# Circuit description

- No. of inputs: 8
- No. of outputs: 4
- Output 1:  $a+b$
- Output 4:  $g+h$
- ...
- Pin configuration

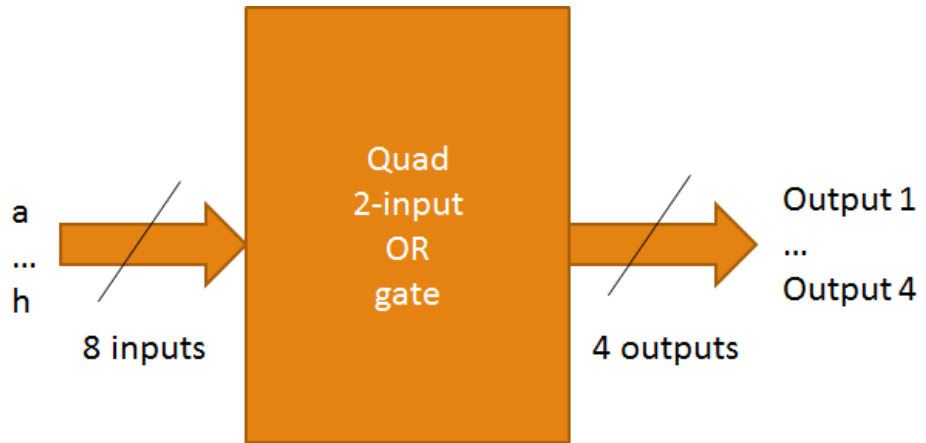


Fig 1. 7432

# Graphical User Interface

Refer to demonstration

# Sequential circuits

- Accept description of Mealy machine.
- Verification of each state and all its possible transition using graph theory.
- Generate result.

# Circuit description

- Description for the graph shown in figure 1 is as follows:

0:'ab', 1:'bc', 2:'ca', 3:'  
cd', 4:'db', 5:'da'

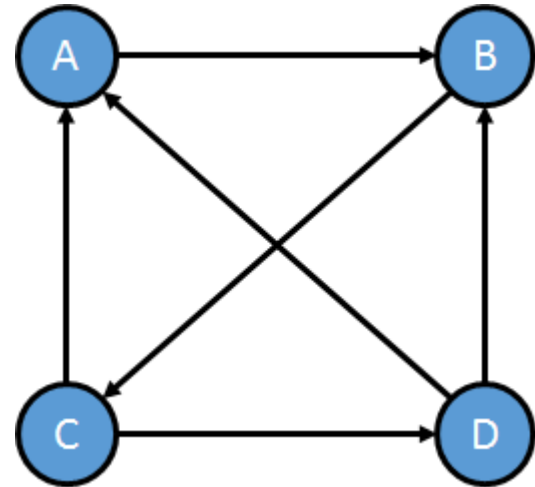


Fig 2. State Transition Graph

# Graphical User Interface

Refer to demonstration

# Future work

- Product design.
- Validating formulation of sequential circuit testing algorithm based on combination of random path traversal and shortest path algorithm.
- Optimized algorithm for directed graphs.
- Developing indigenous Data Acquisition hardware for measuring transient behaviour.
- Creating online Javascript based software.
- Implementation on FPGA.

Information



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