

# A TEST-BED FOR THE ASSESSMENT OF POWER MANAGEMENT STRATEGIES IN TIERED STORAGE SYSTEMS

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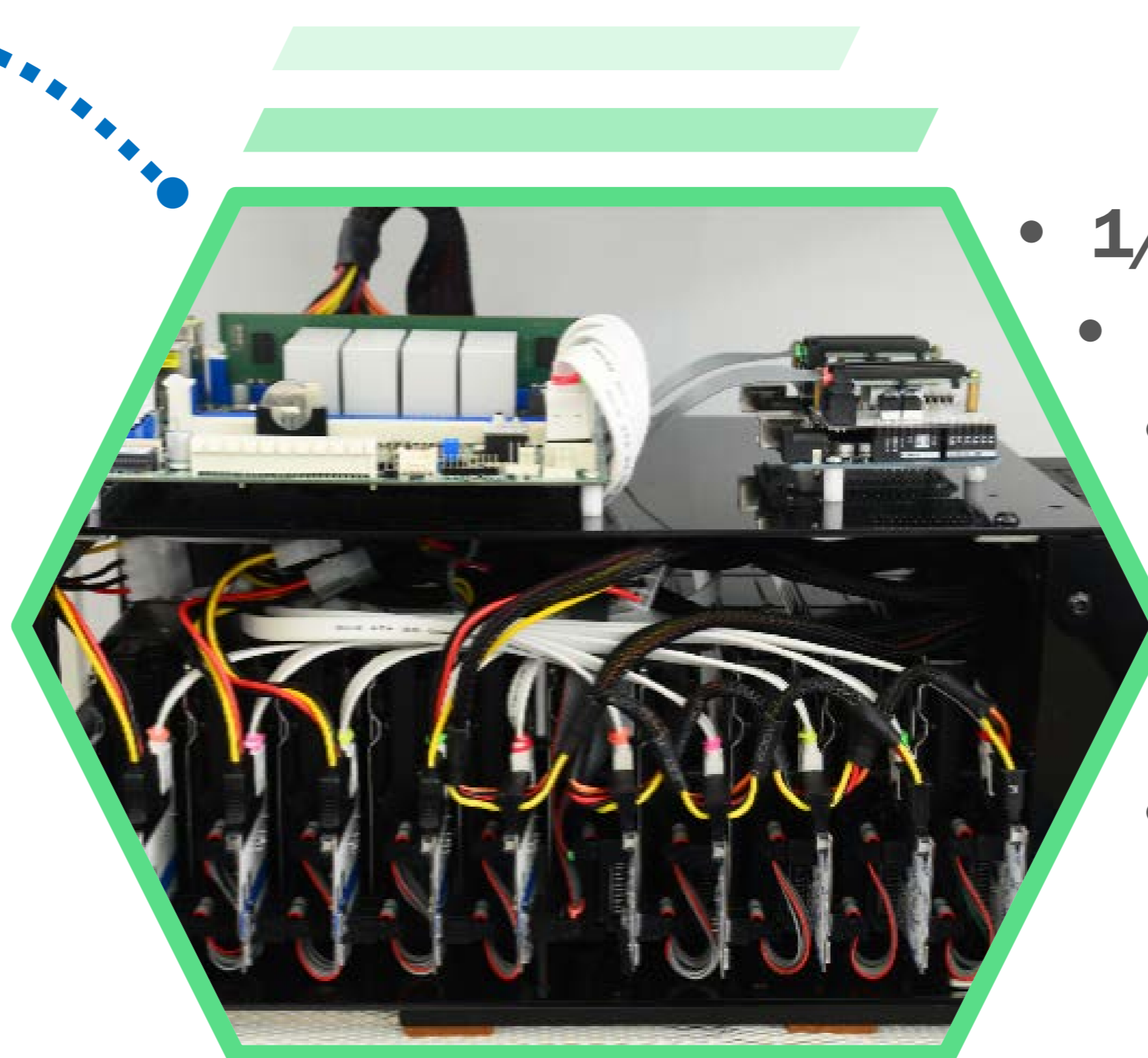
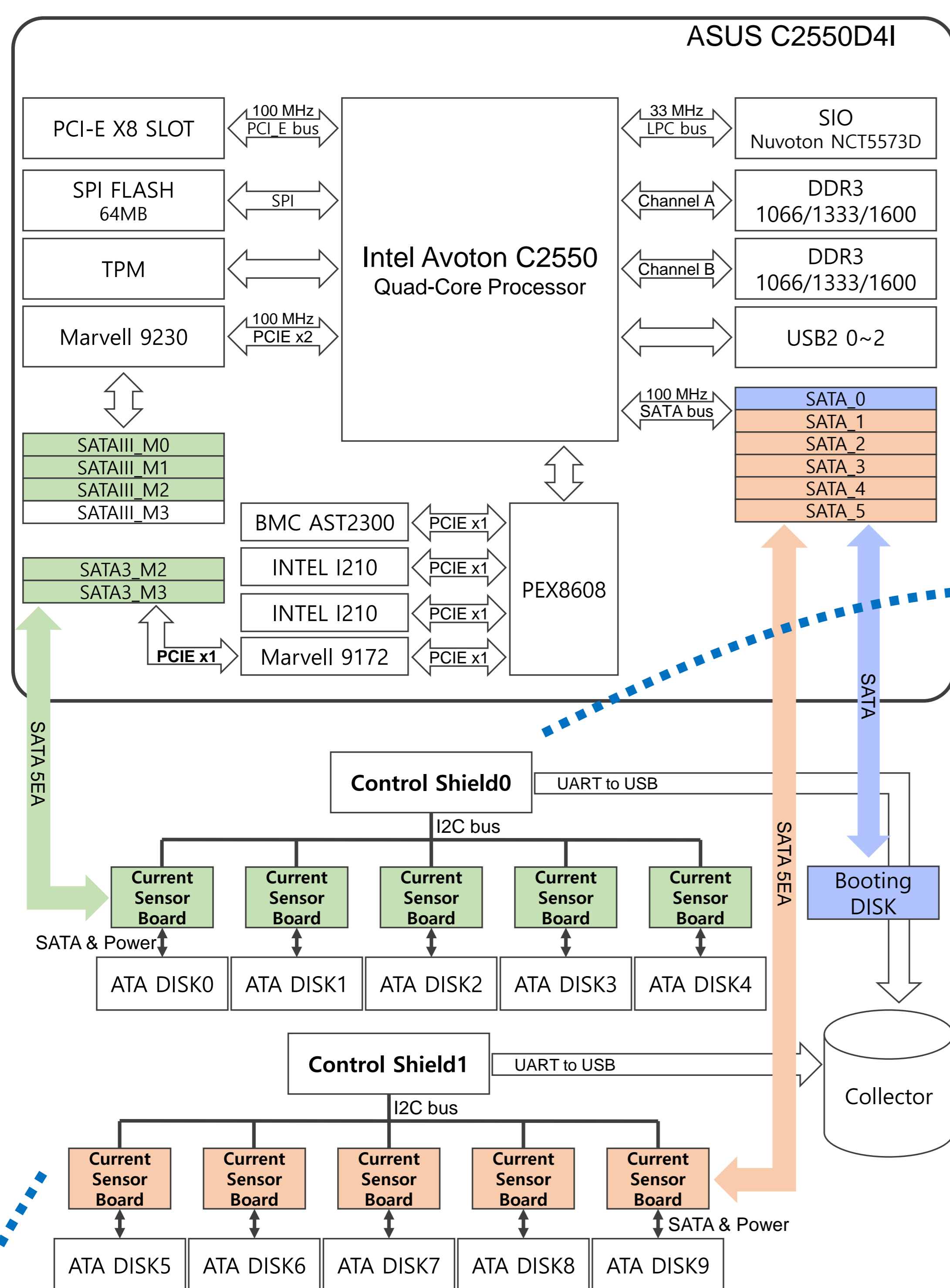
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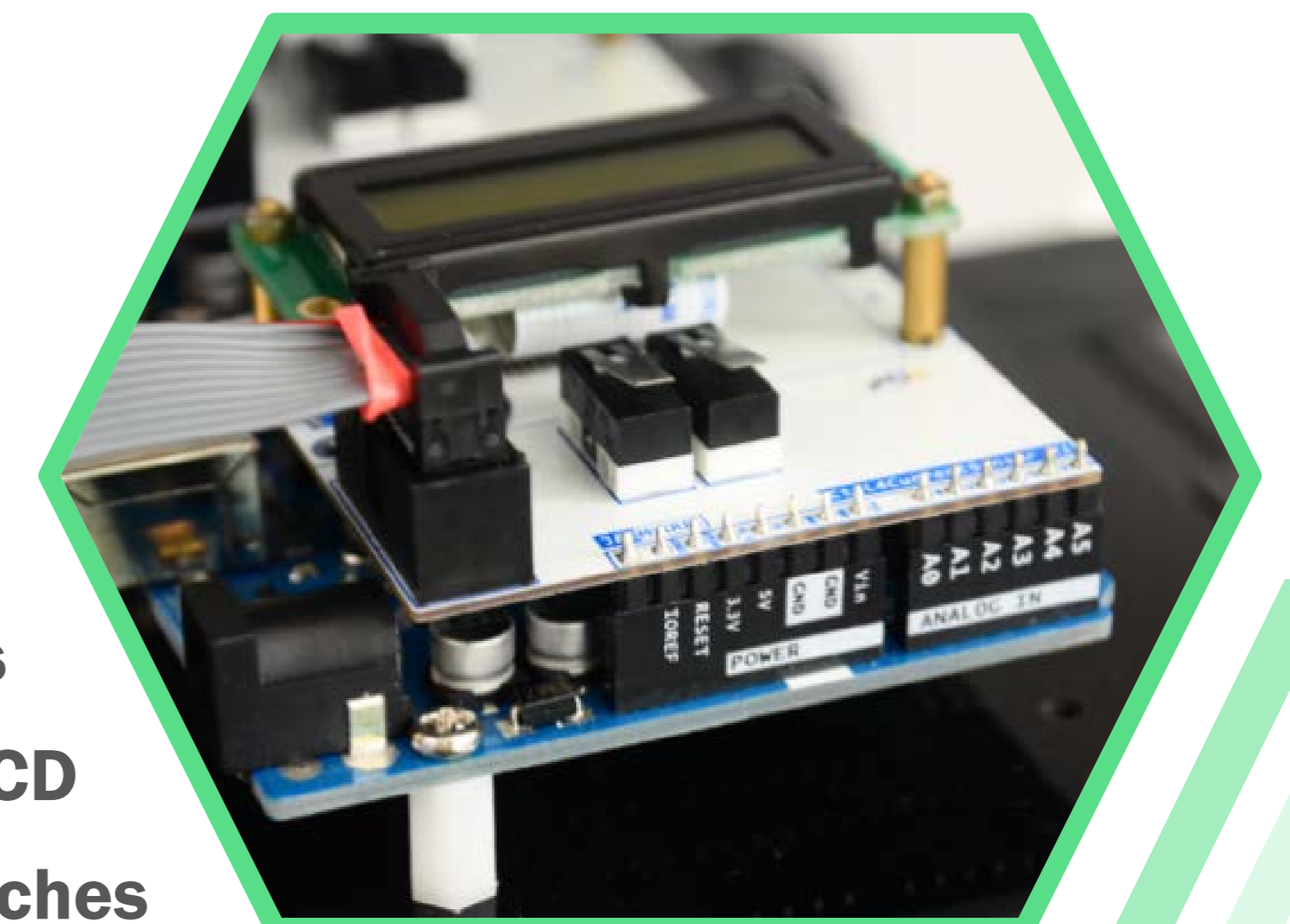
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The huge and increasing power requirements of data centers motivate new strategies for improving the energy-efficiency of storage systems. A 1:3 scale replica of a Cold Storage server, equipped with energy measurement modules to evaluate disk power consumption, provides a test-bed for such strategies. This has been developed efficiently using open-source code and schematic diagrams.

## TEST-BED DIAGRAM

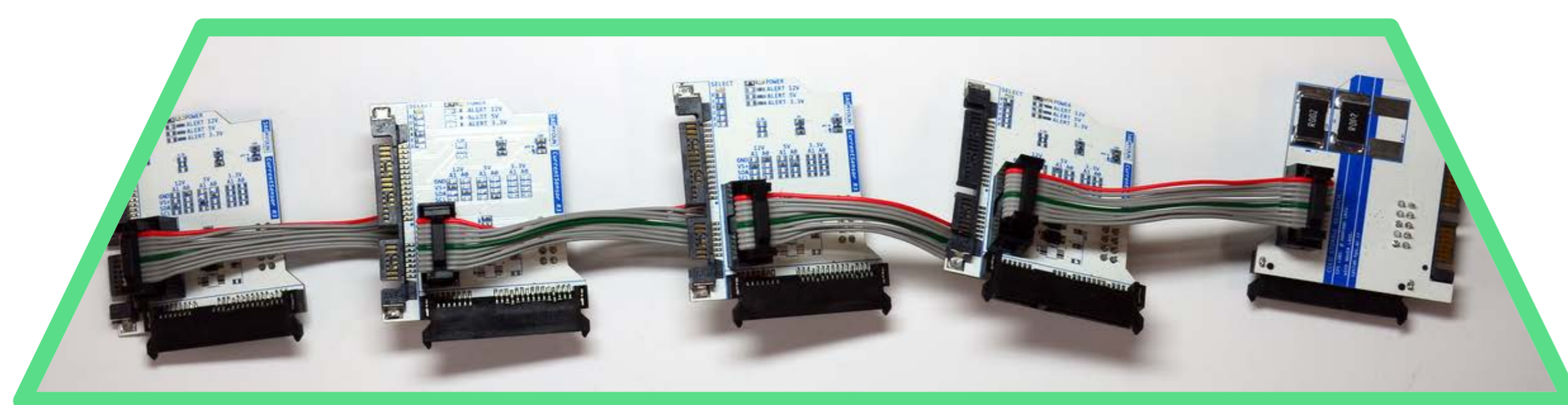


- 1/3 Scale of Cold Storage
- 10 Hard Disks (40 TB)
- 500 W Power Supply
- Stable & Reliable Server Workstation Motherboard
- 2 Control Shields
- 10 Current Sensor Boards



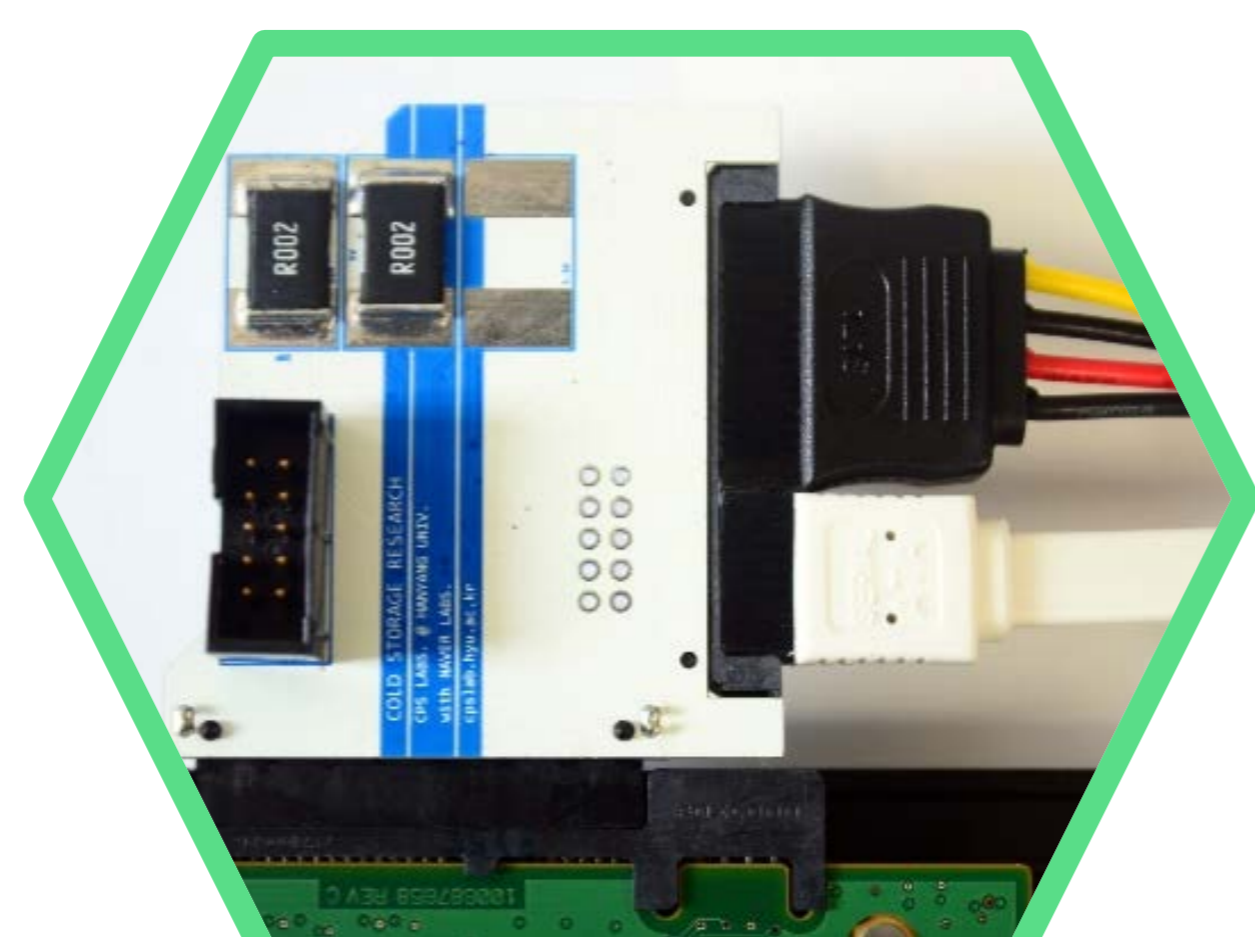
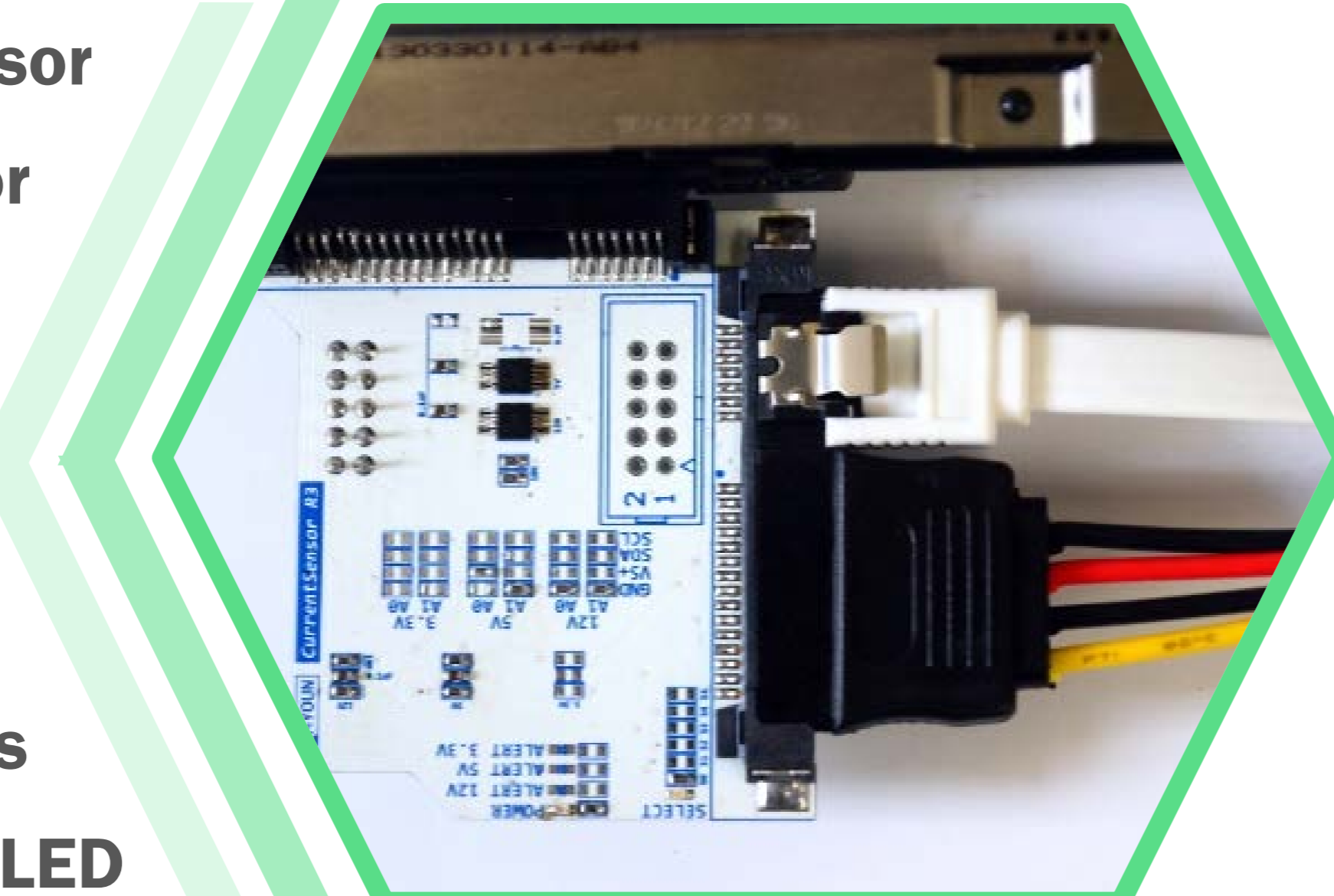
- Arduino UNO R3 Shield
- UART to USB 2.0
- I2C Bus
- 16x2 C-LCD
- 2 Control Switches

## SMALL-SCALE COLD STORAGE



- TI INA226 Sensor
- Current/Power Monitor

- 3 Voltage Inputs (3 V, 5 V, 12 V)
- High Accuracy: 0.1 % Gain Error (Max), 10  $\mu$ V Offset (Max)
- 16 Programmable Addresses
  - I2C Interfaces
  - Selection Flag LED



Energy-efficiency



Cold image storages



Distributed file systems



Open-source



Energy dashboard



Context aware

## CONCLUSIONS

- Test-bed: A 1:3 scale replica of a Cold Storage server of Open Compute Project
- Prepared the three test-bed (120 TB)
- Energy-efficient image storage servers with Ceph
- Workload: Global messenger service LINE by LINE Corp.
- Visit <https://github.com/jaemyoun/CurrentSensor>