NIMH DAQ Toolbox
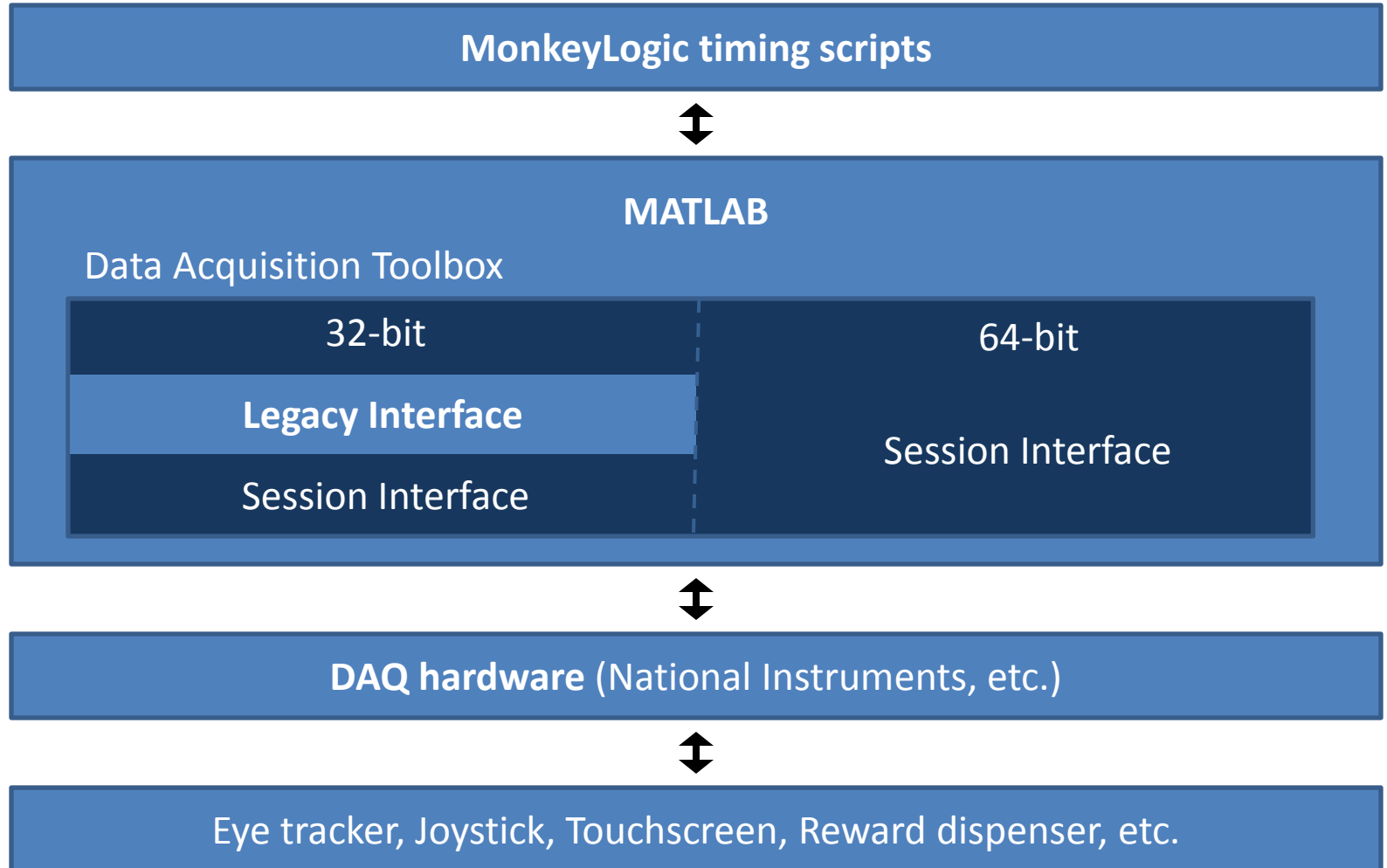
Jaewon Hwang
Staff Scientist
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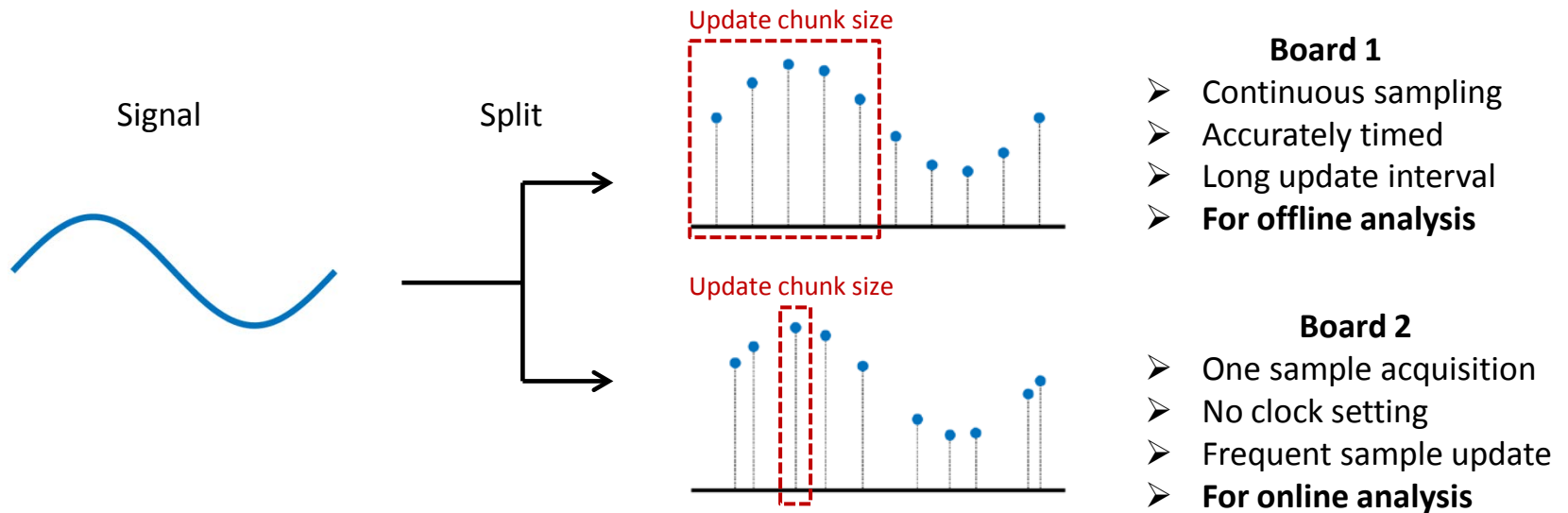National Institute of Mental Health, NIH

MonkeyLogic & MATLAB

MonkeyLogic timing scripts

$\updownarrow$

MATLAB
Data Acquisition Toolbox

32-bit	64-bit
Legacy Interface	Session Interface
Session Interface	

$\updownarrow$

DAQ hardware (National Instruments, etc.)

$\updownarrow$

Eye tracker, Joystick, Touchscreen, Reward dispenser, etc.

MATLAB Data Acquisition Toolbox (MATLAB DAQ)

- Legacy Interface is available for 32-bit MATLAB only and R2015b is the last release of 32-bit MATLAB for Windows. (http://www.mathworks.com/support/sysreq/roadmap.html)

- Analog samples are updated at 15-msec intervals during continuous sampling, which is not fast enough for near-realtime behavior monitoring (Asaad & Eskandar, 2008a).

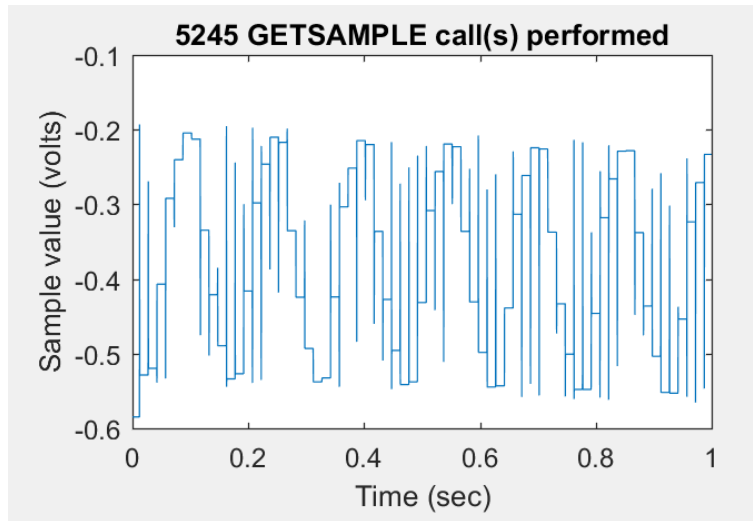- The current solution for the slow sample update is to use two boards together.

Signal → Split

Update chunk size

Board 1
➤ Continuous sampling
➤ Accurately timed
➤ Long update interval
➤ **For offline analysis**

Update chunk size

Board 2
➤ One sample acquisition
➤ No clock setting
➤ Frequent sample update
➤ **For online analysis**

NIMH DAQ Toolbox (NIMH DAQ)

- A complete replacement of MATLAB DAQ for MonkeyLogic

- NIMH DAQ provides MATLAB DAQ's legacy interface in both 32-bit and 64-bit MATLAB.

  ➔ MonkeyLogic can run on 64-bit MATLAB.

- NIMH DAQ updates acquired samples much faster and more frequently.

  ➔ One DAQ board is sufficient for near-realtime behavior monitoring.
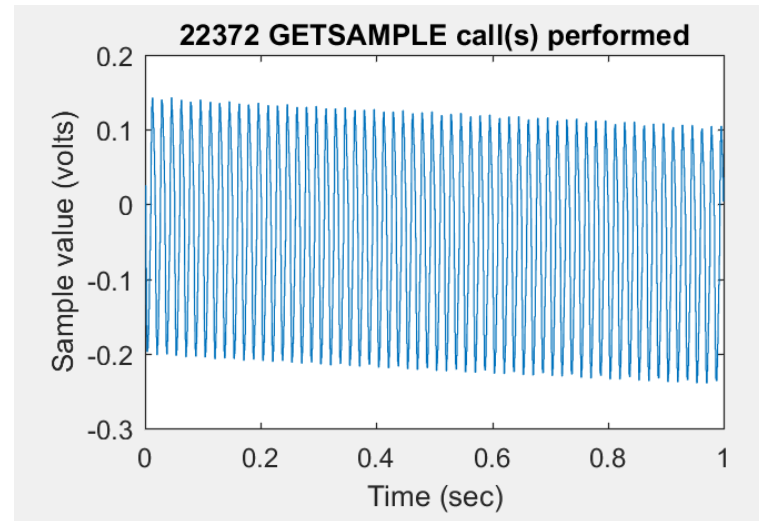
Benchmark

- Test for evaluating getsample() performance during continuous acquisition (sampling rate: 1 kHz)

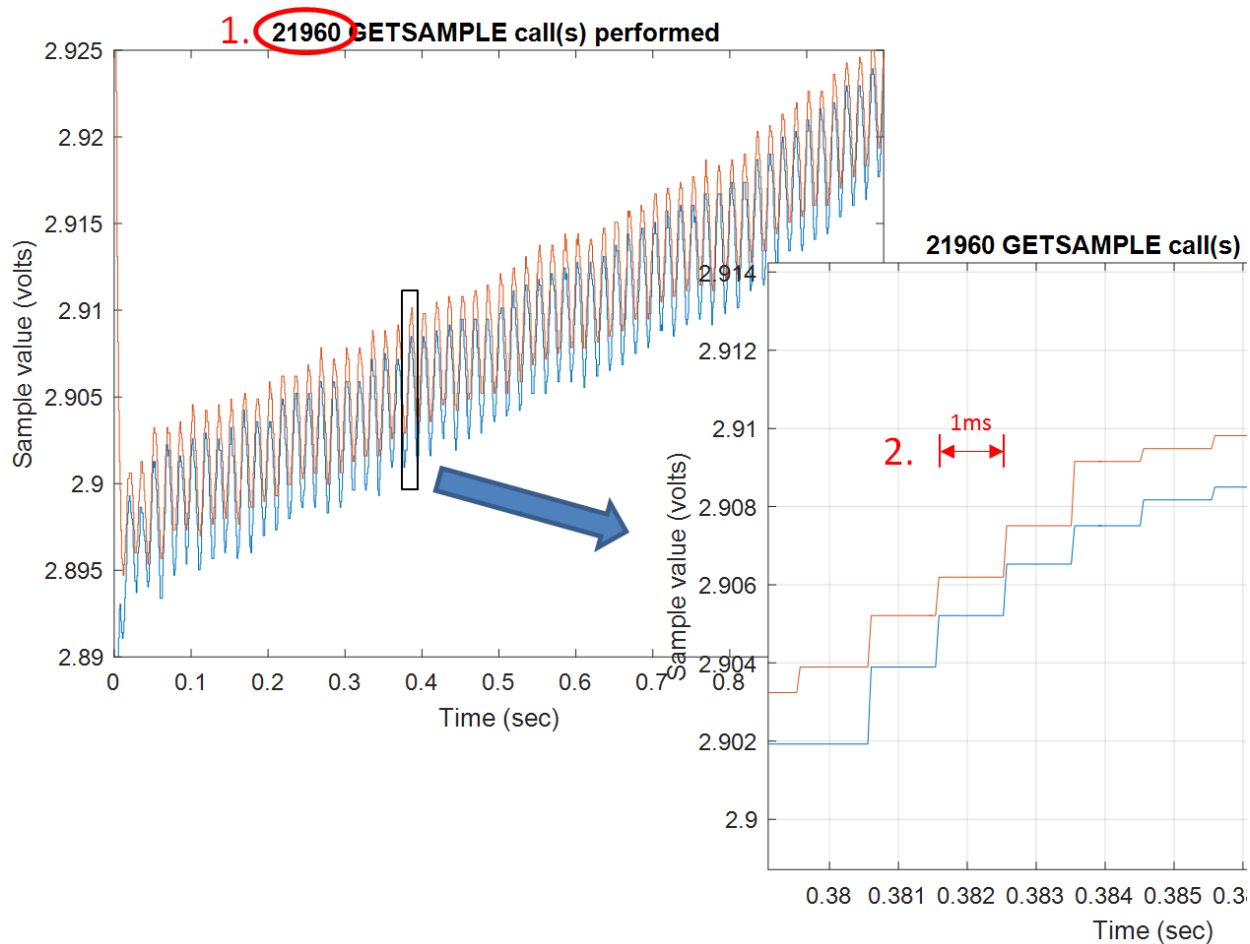- The task was run on the same computer with the same board.

MATLAB DAQ

NIMH DAQ

GETSAMPLE during continuous acquisition in NIMH DAQ

- Not only is GETSAMPLE performed faster but also samples are updated every milliseconds.

Performance in MonkeyLogic

- The same task on the same computer and the same MonkeyLogic setting

- Simply replacing MATLAB DAQ with NIMH DAQ increases the MonkeyLogic cycle rate significantly.

MATLAB DAQ **NIMH DAQ**

Cycle-Rate: **1966 Hz**

Cycle-Rate: **2814 Hz**

Reference

Asaad WF, Eskandar EN (2008) Achieving behavioral control with millisecond resolution in a high-level programming environment. *J Neurosci Methods* 173:235-240.