

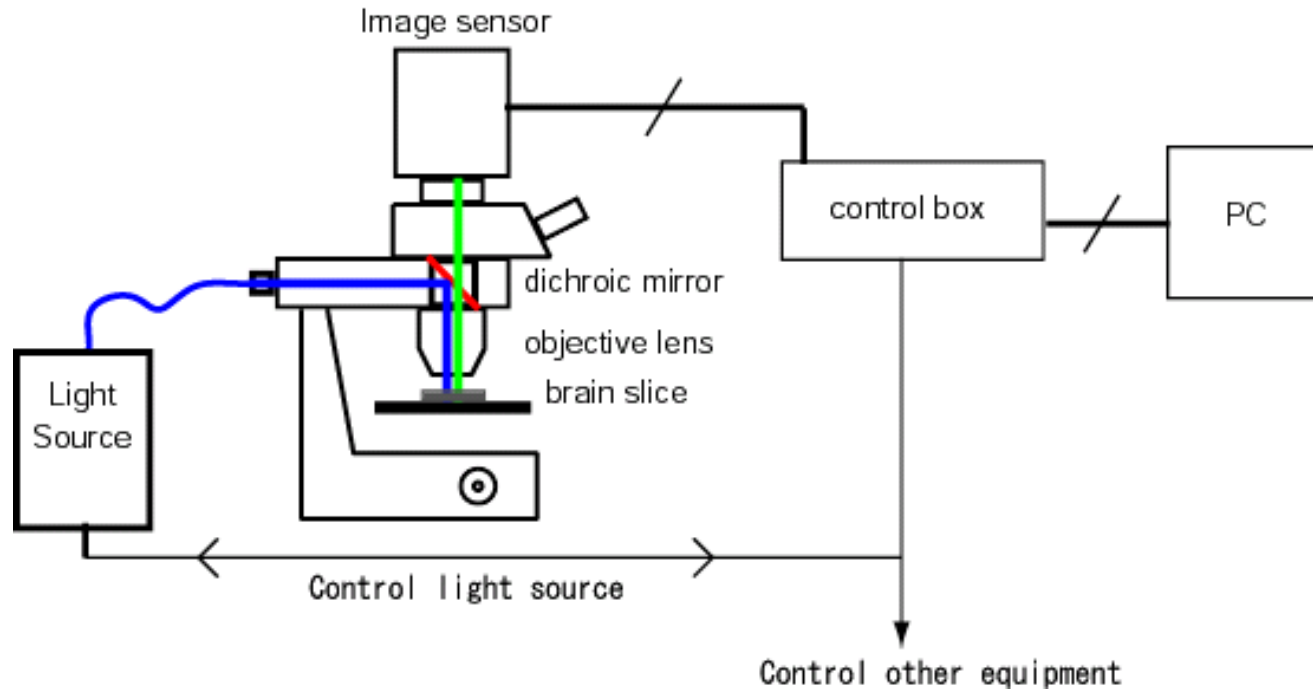
Research and development for an advanced bio-imaging system

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Schematic Diagram of Imaging System

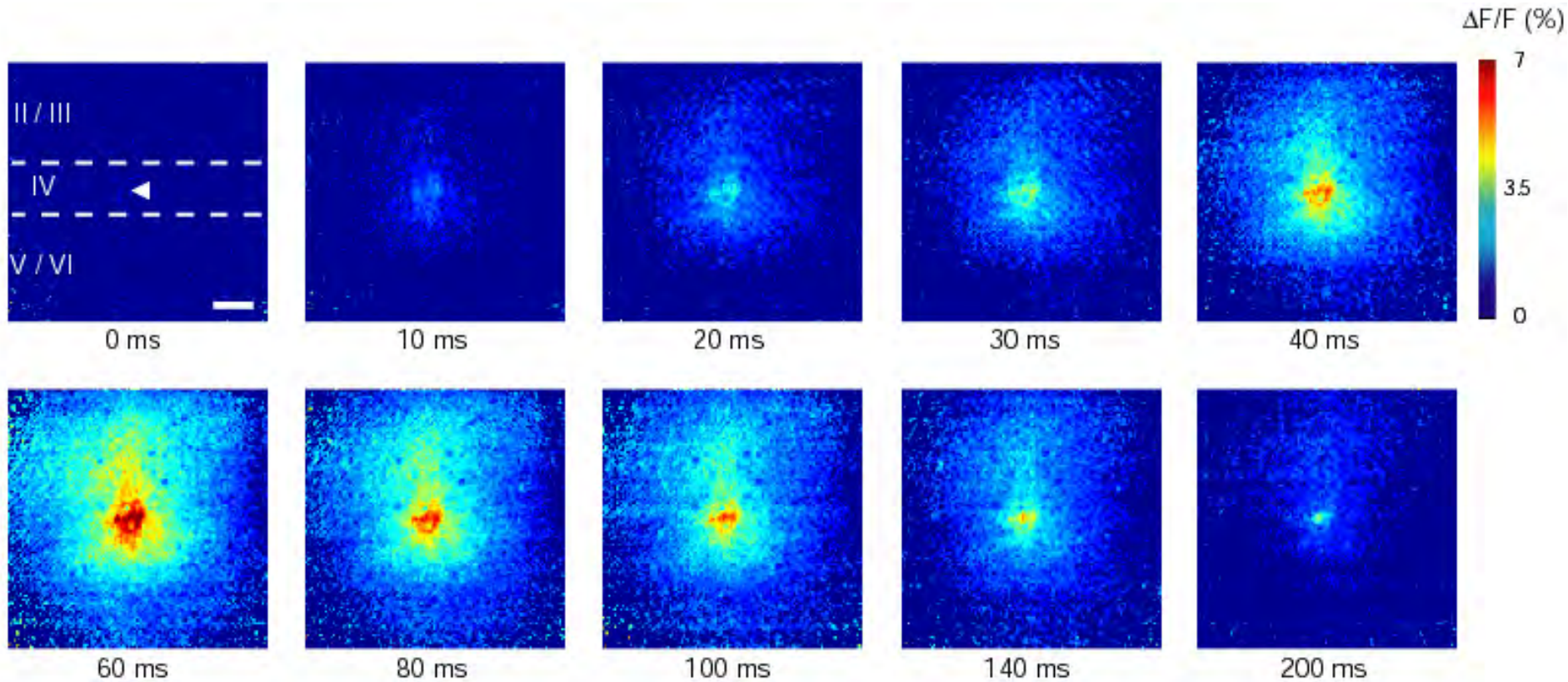


Our research goal is development of the imaging system for advanced bio-imaging.

For this aim, we develop an image sensor, a frontend, and a PC interface, which demands the requires of the bio-imaging.

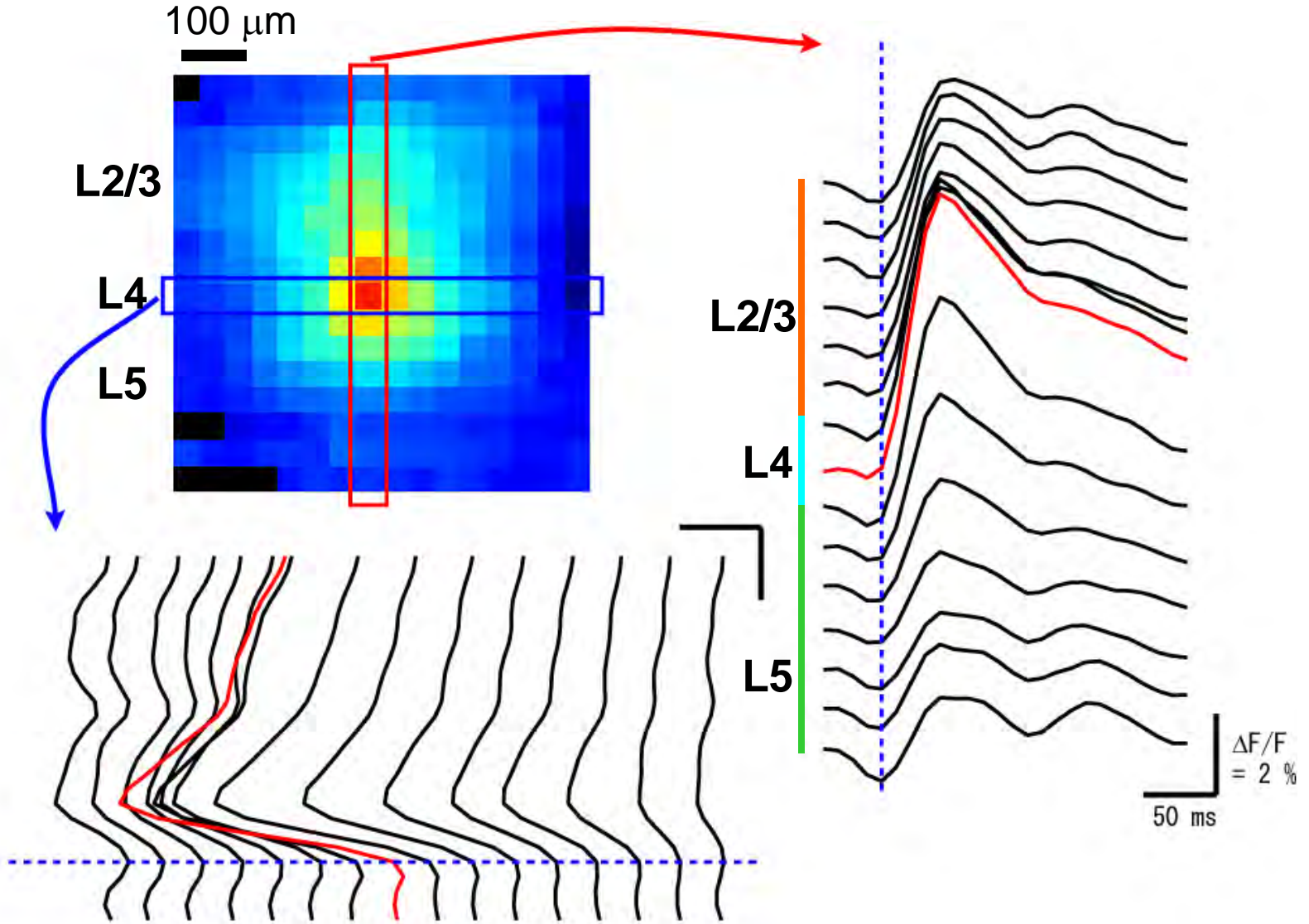
In addition, we conduct further experiment on biological tissue, especially in brain slice, for measurement of neural activity and for revealing the limit of existing imaging system.

Spatio-temporal properties of neuronal activities measured by the existing imaging system



Imaging analysis has advantages on revealing spatio-temporal properties of neuronal activities.

Time courses and amplitude distribution of $[Ca^{2+}]_i$ transients



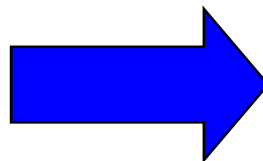
Too slow to reveal the temporal properties of signal propagation !!

Required specifications for high speed imaging

Parameter	Value
Optical Format	< 1 inch
Resolution	256 x 256 ~ 1k x 1k pixels
Color / Monochrome	Monochrome
Shutter type	Rolling shutter
Maximum frame rate	> 1 k fps
Maximum Data rate	~ 1 G Hz
ADC resolution	> 12 bit
# bit for ISP	> 12 bit
Sensitivity	10^{-3} lux (min.)
Dynamic Range	> 80 dB
Operating Temperature	< -20 °C

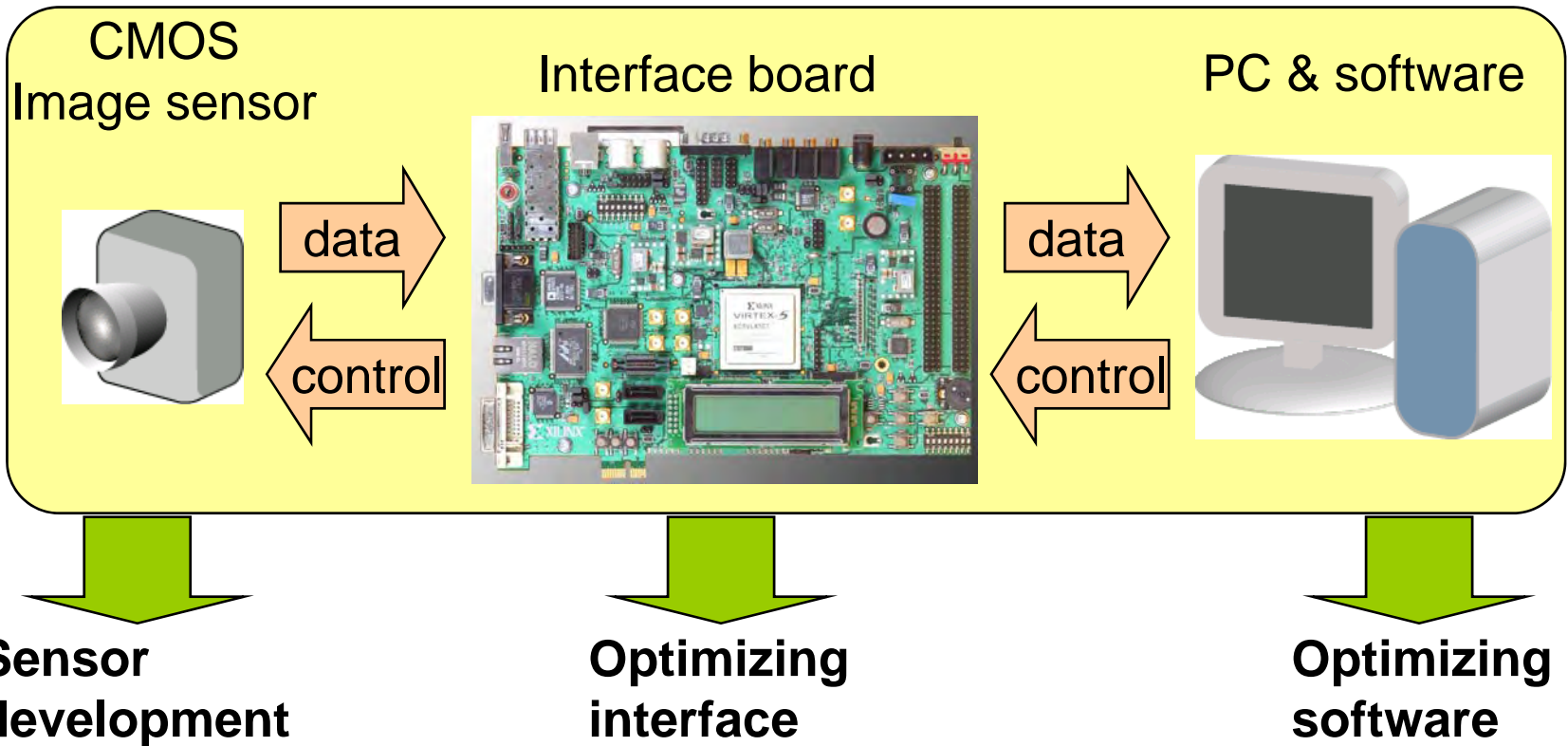
For bio-imaging ...

high speed,
high data rate,
high sensitivity, and
low noise devices are needed.



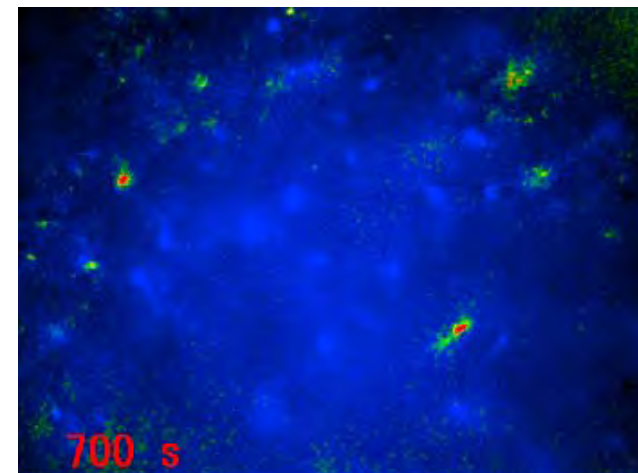
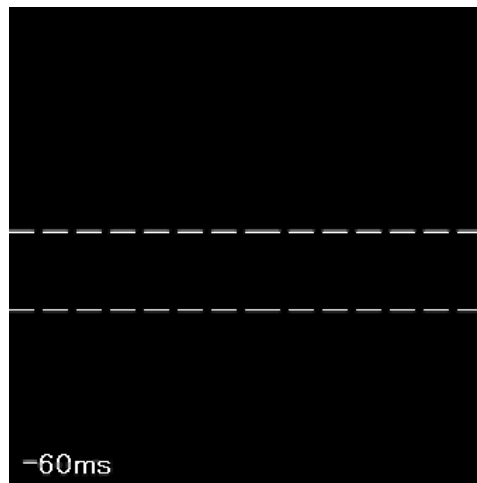
These required specifications
are also challenging issues
for device researchers !!

Our strategy



In addition ...

We conduct the bio-imaging experiment to reveal the information processing in nervous system using the imaging system.



EDIS 2008 satellite symposium
GCOE global seminar
Advances in Neuroengineering



23 January, 2008

Conference Room 2, Osaka University Convention Center, Suita, Osaka, Japan

Sponsored by Osaka University global COE program "Electronic Devices Innovation" (CEDI)

Co-sponsored by: The Center for Advanced Medical Engineering and Informatics, Osaka University
The Institute of Electrical Engineers of Japan

This EDIS 2008 satellite symposium will focus on the neuroengineering including neurophysiology and neuromorphic device, and provide an opportunity for scientists and engineers working in the field of neuroengineering to make discussion with frontiers of neuroengineering and neuroscience.

Program

- 8:55-9:00 Opening remark (T. Yagi, Osaka University)
- 9:00-9:40 **T. Suzuki** (University of Tokyo)
"Development of flexible neural probes and their applications to neuroprostheses"
- 9:40-10:20 **R. Harrison** (University of Utah)
"The Utah integrated neural interface: wireless gateway to the brain"
- 10:30-11:00 **M. Osanai** (Osaka University)
"Calcium imaging for investigating the spatio-temporal properties of the neural activity"
- 11:00-11:40 **W.-J. Song** (Kumamoto University)
"Coding and decoding of pure tones in guinea pig primary auditory cortex"
- 11:40-12:20 **L. Cohen** (Yale University)
"What the nose tells the brain about odors and the first order response"
- 13:30-14:10 **T. Tokuda** (NAIST)
"CMOS technology-based *in vivo* biomedical photonic devices"
- 14:10-14:40 **K. Shimonomura** (Osaka University)
"Neuromorphic robotic vision system emulating disparity computation in visual cortex"
- 14:40-15:20 **J.-K. Shin** (Kyungpook National University)
"Bio-inspired CMOS vision chips for edge detection"
- 15:40-16:20 **B. Shi** (Hong Kong University of Science and Technology)
"Neuromorphic hardware models of visual cortical neuron populations"
- 16:20-17:00 **I. Ohzawa** (Osaka University)
"Finding what high-order visual neurons are telling without prejudice"
- 17:00-17:05 Closing remark (M. Osanai, Osaka University)

Venue

Osaka University Convention Center, Conference Room (Kaigi Shitsu) 2 located in SUTTA campus of Osaka University.

<http://osaka-u.ac.jp/eng/accessmap.html> (access map)

<http://www.osaka-u.ac.jp/eng/target/student/campus/suita.html> (campus map)

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