Ritsumeikan University IEEE Student Branch
English Presentation Competition 2014

Date: Friday, 31th Oct 2014
Place: Rohm Plaza 5F, Large Conference Room

Schedule

10:00-10:30   Start accepting (Rohm Plaza 5F)
10:30-10:35   Opening Speech by Prof. Izumi
10:35-10:45   Introduce of IEEE Student Branch (SB) and This Competition by Murata, a chair of Ritsumeikan Univ. IEEE Student Branch

Session 1 (10:50-12:00)

10:50-11:00   Network-on-Chip Simulators with QEMU and SystemC
               Yusuke Fukutsuka   M1   Tomiyama Lab.
11:00-11:10   A study of Human detection for tracking persons among multiple cameras
               Yuta Nakase   B4   Yamauchi Lab.
11:10-11:20   Research and development of a precaution system of diseases by biosound
               Yuri Sumi   B4   Fukumizu Lab.
11:20-11:30   Coordinating LED Light with Smartphones to Prevent Surreptitious Photographing
               Kohei Sugiyama   B4   Fujino Lab.
11:30-11:40   A Battery Smart Sensor System for Smart Grid
               Naoki Kawarabayashi   M1   Fukui Lab.
11:40-11:50   A Method of Data Flow Analysis by OS and Compiler
               Shinya Takumi   M2   Mouri Lab.
11:50-12:00   Investigations into the human pinna angles on head-related transfer functions in the median plane
               Hajime Komatsu   M2   Nishiura Lab.

12:00-13:20   **Rest (80mins)**

Session 2 (13:20-14:30)

13:20-13:30   Implementation of SMYLE OpenCL on Dual-core FPGA Board
               Shunsuke Takai   B4   Tomiyama Lab.
13:30-13:40   Improvement of retinex processing for image enhancement
               Hiroki Kato   B4   Fukumizu Lab.
13:40-13:50   Single-Flux-Quantum Digital Circuit Design by Using Clockless Logic Cells with a Jitter Constraint
               Ryohei Matsumoto   M1   Yamashita Lab.
13:50-14:00   Analysis and Experimentation for Effective Cooling of Li-ion Battery
               Yuki Kitagawa   M1   Fukui Lab.
14:00-14:10   Impedance Analysis of Colloidal Gold Nanoparticles in Chromatography Paper for quantitation of Immunochromatographic Assay
               Fumitaka Hori   M1   Uno Lab.
14:10-14:20   A method for inspecting behavior of applications include advertisement libraries for smartphones
               Kanako Watanabe   M2   Mouri Lab.
14:20-14:30   A study of iterative spectral subtraction with optimal iteration times based on noisy- environment identification
               Ryota Miyake   M2   Nishiura Lab.

14:30-14:50   **Rest (20mins)**

Session 3 (14:50-16:00)

Time			
14:50-15:00	Making of the synopsis video which enables investigation of endless video		
	Yusuke Shimizu	B4	Yamauchi Lab.
15:00-15:10	Checkup system of illness precaution using biosound source separation		
	Yusuke Ishida	B4	Fukumizu Lab.
15:10-15:20	Function inlining in high-level synthesis		
	Yohei Onishi	M1	Tomiyama Lab.
15:20-15:30	Two-dimensional Thermal Analysis System for LSI Packages by GPGPU		
	Takashi Omura	M1	Fukui Lab.
15:30-15:40	A Study on Linearization of Nonlinear Distortions in Parametric Array Loudspeakers		
	Yuta Hatano	M1	Kansai University
15:40-15:50	FPGA-based BLOB Detection Using Dual-pipelining		
	Naoto Nojiri	M2	Yamazaki Lab.
15:50-16:00	Video restoration with TV/L2-norm and Visualization of blurry degree		
	Yusuke Nojima	M2	Chen .Lab

16:00-16:20	**Rest (20mins)**

16:20-16:35	Commentary & Awards Ceremony
17:00-18:00	Friendly Meeting (Food and drink will be provided)
	Place: Conference Room (Rohm Plaza5F)

MAP

Ritsumeikan University Biwako Kusatsu Campus (BKC) MAP

Staffs

IEEE Student Branch at Ritsumeikan University Officer:

Chair: Norifumi Murata
Vice-Chair: Tatsuro Hitomi
Secretary: Yasufumi Araki, Kohei Sugiyama
Treasurer: Yohei Onishi, Syunsuke Takai
Counselor: Pfor. Tomonori Izumi

IEEE Student Branch at Ritsumeikan University Committee Member:

Yuki Kitagawa
Toshiki Kitamura
Yusuke Fukutsuka
Ryu Ishizaki
Takahito Fukuno
Takashi Inui

Home page

URL: http://www.ieee.se.ritsumei.ac.jp/J/main.html

*Sponsored by IEEE Kansai Section Student Activities Committee and
Ritsumeikan University*

Session 1

No.1   Yusuke Fukutsuka   Tomiyama Lab.

[Title]

<p style="text-align:center">Network-on-Chip Simulators with QEMU and SystemC</p>

[Abstract]

Systems-on-Chip (SoC) architectures have been shifting from single-core to multi-core solutions, and they are at present evolving towards many-core ones. Network-on-Chip (NoC) is considered as a promising interconnection scheme for many-core SoCs since it offers better scalability than traditional bus-based interconnection. We have developed a fast simulator of NoC architectures using QEMU and SystemC. QEMU is an open-source CPU emulator which is widely used in many simulation platforms such as Android Emulator. In the proposed simulator, each CPU core is emulated by a QEMU, and the network part including NoC routers is modeled with SystemC. The SystemC simulator and QEMUs are connected by TCP sockets on a host computer. Our simulator is fast because QEMUs run in parallel on a multi-core host computer or even multiple host computers. Also, our simulator is highly retargetable because QEMU provides a variety of CPU models and we use QEMU as is. And, we are developing a fast simulator of NoC architectures using QEMU and Noxim. Noxim is an open-source SystemC base NoC simulator for on-chip interconnection network. Experimental results show that both simulators successfully simulate a 108 core NoC in a practical time.

No.2   Yuta Nakase   Yamauchi Lab

[Title]

<p style="text-align:center">A study of Human detection for tracking persons among multiple cameras</p>

[Abstract]

Recently, technology detecting of humans and objects out of images obtained from a surveillance camera is wide studied. In particular, it plays very important role not only on preventing crimes but also on police investigation in order to maintain public security. However, it is difficult to keep track a person with a single camera. Thus, my study is about a method which enables tracking persons among multiple cameras. In order to realize such tracking system, I am planning to detect a person from an image sequence of a camera, then, discriminate features of him/her such as colors of clothes as well as the way of walking. After that, I construct a machine- learning system of the persons' features which matches a newly appeared person to already learned one.

As a very pre stage of the research, the system has to certainly detect humans. For such reason, I am currently working on the Histograms-Oriented-Gradients (HOG) feature. As future works, I am going to study the Boosting, which makes it possible to detect humans accurately.

Session 1

No.3   Yuri Sumi   Fukumizu Lab.

[Title]

Research and development of a precaution system of diseases by biosound

[Abstract]

Recently, the number of deaths from circulatory system diseases such as cerebral and myocardial infarction has been increasing rapidly. It is because they are hard to find in early stage, since patients have no subjective symptoms. Although the risk increases with getting old, it is a serious problem to young people. Patients of these diseases recover completely, if the diseases are found, diagnosed, and cured in early stage. It is necessary that people have diagnosis regularly; however, it requires a large amount of big medical bill. Also, what was even worse, the number of doctors is not sufficient. Thus, we are working on a research of a precaution system of diseases slove the problems which supports self-healthcare. In overview, the system has a microphone which should be attached on the neck of a patient and then, obtains biosound. If biosound is abnormal, it sends alert the doctor and the patient. Here, the microphone we use, has a flat characteristic to low frequency domain. Everyday life isn't affected, since the size is small. Currently, we can separate an obtained biosound into three components, which are a heartbeat, a blood and a breath sounds, with eliminating noises. We discriminate the disease such as arrhythmia, arteriosclerosis, sleep apnea syndrome, and so forth, in early stage by comparing each sound component with sample sounds statistically obtained from healthy subjects. In order to realize the system, my goal of the study is to derive an algorithm reducing computer resources that enable processing in real time.

No.4   Kohei Sugiyama   Fujino Lab.

[Title]

Coordinating LED Light with Smartphones to Prevent Surreptitious Photographing

[Abstract]

I have developed a prototype system which coordinates the LED light with smartphone cameras as a way to prevent surreptitious photographing. It is the newly developed system to set up the so-called "privacy protection" zone by coordinating LED light, to pick up the signals from smartphones. Thus, this system makes it impossible to take sneak shots. The lighting of the LED light is adjustable at a level which humans will not notice and is used to send and receive signals from the phone's camera. This technique will be employed with an application already installed in the smartphones. If a person who is in the "privacy protection" zone tries to take a picture, the application will automatically calculate the pixel value. Once it picks up the pattern of the signal, it will discontinue the function of the camera. This system only requires LED lights set up in the public space in conjunction with an exclusive application that has already been installed in smartphones. The system is not restricted to cameras only but it can also be used for power sources and sounds.

Session 1

No.5   Naoki Kawarabayashi   Fukui Lab.

[Title]

A Battery Smart Sensor System for Smart Grid

[Abstract]

A smart grid is distributed type, strong to a disaster and serves as a base of renewable energy introduction expansion. In a smart grid, a battery is a device which makes a base as home use, the object for EV, and an object for system stable. It is going to see the large-sized spread term. However, the change of the characteristic by production tolerance, degradation, and temperature of a battery is large, and it is difficult to fully pull out the performance of each battery. Moreover, if handling is mistaken, unusual generation of heat, ignition, a burst, etc. may be caused. Always detecting grasp and an unusual busy condition immediately is also called for in respect of conservativeness and safety in the state of degradation. This presentation discusses about the smart sensor which is the important technology in a smart grid. We have developed the system to monitor the battery condition by the attached sensor. It accumulates the measured data onto the WEB. The battery sensor is implemented with a microcomputer. We have developed a high accurate and practical SOC (*State-of-Charge*) sensor using the Extended Kalman filter as a function of the battery sensor.

No.6   Shinya Takumi   Mouri Lab.

[Title]

A Method of Data Flow Analysis by OS and Compiler

[Abstract]

Around 90% of information leakage incidents are caused by human error. Once a user got permission to access the data, someone can treat them freely. In other words, the data can be sent to other computers over the network or be saved to removable media. Therefore, data protection technologies, such as authentication and encryption, aren't applicable to the information leakage incidents. In this presentation, we propose DF-Salvia that prevents them. In DF-Salvia, users can set a policy to each file. The policy can describe how the data should be treated, namely, scope of data propagation is defined. DF-Salvia prevents to output data if its policy is violated. To achieve this function, DF-Salvia tracks a data flow between input from a file, and output to network, other file, etc. In addition, DF-Salvia examines a policy associated with the file to decide whether the data can be outputted or not. Mechanism for tracking data flow is implemented in operating system (OS) and compiler. First, the compiler produces data flow information analyzed statically from source code. Furthermore, the compile inserts system calls to collaborate with OS. Then, OS tracks data flow dynamically using the data flow information and the system call as a hint. As a result, we realized to prevent information leakage in Thunar, GUI file manager.

Session 1

No.7   Hajime Komatsu   Nishiura Lab.

[Title]

Investigations into the human pinna angles on head-related transfer functions in the median plane

[Abstract]

The binaural reproduction system requires many accurate measurements of head-related transfer functions (HRTFs) to achieve the high-precision sound localization. However, the actual measurement of HRTFs has a heavy burden for subjects. To solve this problem, the personalize methods for HRTFs have been proposed. In personalize methods for HRTFs, the interaural level difference (ILD) and the interaural time difference (ITD) are utilized on the sound localization in the horizontal plane, and the spectral envelope of HRTFs is utilized on the sound localization in the median plane. In this study, we focus on human pinna angles as listener's anthropometric parameters on the sound localization in the median plane. In order to reveal the effect of human pinna angles on HRTFs in the median plane, we investigated the relationship between human pinna angles and the spectrum envelope of HRTFs. More specifically, we replicated human pinna models made of silicone to attach it to the dummy head. Also, we investigated the spectrum envelope of HRTFs in various conditions of the human pinna angles in the median plane. As a result of investigations, we showed the possibility of the personalize method for HRTFs based on human pinna angles.

Session 2

No.8   Shunsuke Takai   Tomiyama Lab.

[Title]

<div align="center">Implementation of SMYLE OpenCL on Dual-core FPGA Board</div>

[Abstract]

Recently, multi-core processors which integrate multiple CPU cores on a single chip have become widespread not only in general-purpose computers but also in embedded systems. In order to fully utilize the performance of the multi-core processors, parallel programming is essential. There exist a number of parallel programming languages such as OpenCL and CUDA, but they are not suitable to embedded systems because of the high overhead on real-time performance. In order to overcome this problem, our laboratory has been developing a lightweight OpenCL environment named SMYLE OpenCL. SMYLE OpenCL reduces the overhead of performance by static creating threads and mapping of computational them. This presentation outlines SMYLE OpenCL and describes how to port SMYLE OpenCL on a new FPGA board equipped with dual embedded processor cores.

No.9   Hiroki Kato   Fukumizu Lab

[Title]

<div align="center">Improvement of retinex processing for image enhancement</div>

[Abstract]

Recently, the image processing technology is widely studied with the progress of the computer technology. It enables us to provide the image/video-related information to the user as well as to support the user operation of the advanced instruments. It is necessary to improve the image quality, because many images degrade by environmental disturbances such as back-lighting, mist, fog and so on. In my research, I am focusing on the "Retinex theory" in many sort of image improve methods. This theory was proposed by E.H.Land in 1971. "Retinex" is a coinage word from "Retina" and "Cortex", and it is based on a model of the human visual system. It says humans can perceive the difference in color by comparing with around colors, thus we can recognize and match colors in various lighting environments. When adapting Retinex theory to image processing, we can get the ideal result from a component of reflectance as a result of dividing input image to a component of illumination and reflectance. However, it is uncapable of real-time operation because it requires a large computer resource. Therefore, my study is reduce the amount of the computation and implementing into a circuit with micro processers so as to make retinex processing easily enabled in a small image/video processing devices.

Session 2

No.10   Ryohei Matsumoto   Yamashita Lab

[Title]

Single-Flux-Quantum Digital Circuit Design by Using Clockless Logic Cells with a Jitter Constraint

[Abstract]

We propose a design method for Single-Flux-Quantum (SFQ) circuits using clockless AND, OR and NIMPLY cells. SFQ circuits are one of the promising candidates for the next generation technology of digital circuits. Generally, SFQ circuits are composed of only clocked logic cells which have clock inputs. The size of clock tree increases with the circuit size. Thus, the existing methods tend to increase the circuit area and the cost of timing adjustment. In contrast, our method uses clockless logic cells. A clockless logic cell does not have a clock input, and thus it works properly only when the timing of input signals are synchronized. It is known that the size of clock tree is reduced by using clockless logic cells, but it is not easy to satisfy the so-called a jitter constraint by doing so. Therefore, we consider using not only clockless logic cells but also clocked logic cells in our method to satisfy constraint of a jitter. Experimental results show that the circuit area by our method is 12% fewer on average than that by the method only using clocked logic cells.

No.11   Yuki Kitagawa   Fukui Lab.

[Title]

Analysis and Experimentation for Effective Cooling of Li-ion Battery

[Abstract]

Aiming at low carbon and energy-saving society, lithium ion batteries play important roles. The advantage of a lithium ion battery has a high voltage, that energy density is high, that there is no memory effect, and there is little self-discharge. The large-sized lithium ion storage battery is used for the electric vehicle (EV). As a use in small size, it is widely adopted as mobile computing devices, such as a mobile phone, a smart phone, and a personal computer. The lithium ion battery is asked for boost charge. However, when carrying out boost charge, if charging current is only enlarged, heat will occur. The heat is dangerous and leads also to degradation of a lithium ion storage battery. The capacity of a battery decreases. There are two types in the degradation. The one is cycle degradation which takes place by carrying out repetition use. The other is preservation degradation which takes place when saving a battery etc. Cycle degradation is influence heat is large. Therefore, suppressing the rise in heat at the time of charge suppresses degradation. I say that, air cooling is used for the purpose of suppressing the rise in heat at the time of charge.

Session 2

No.12   Fumitaka Hori   Uno Lab.

No.12   Fumitaka Hori   Uno Lab.

[Title]

Impedance Analysis of Colloidal Gold Nanoparticles in Chromatography Paper for quantitation of Immunochromatographic Assay

[Abstract]

A detection method of gold nanoparticles in chromatography paper is developed for a simple, cost-effective and reliable quantitation of immunochromatographic strip test to avoid false negative results. The solutions with various concentration of gold nanoparticles are prepared, and the time courses of solution resistance in chromatography paper with each gold nanoparticles solution are electrochemically measured by chrono-impedimetry using print circuit board electrode. The dependence of solution resistance on the presence or the concentration of gold nanoparticles in the liquid sample is successfully observed. The main factor to increase solution resistance may be the obstruction of ion transport by gold nanoparticles filling some portions of the pores in the cellulose matrix of chromatography paper. In addition, the existence of $1.9*10^9$ particles/mL of gold nanoparticles in little-colored chromatography paper which may be regarded as the absence of gold nanoparticles is also identified by solution resistance measurement. This study constitutes a first step toward the realization of a convenient immunochromatographic strip test.

No.13   Kanako Watanabe   Mouri Lab.

No.13   Kanako Watanabe   Mouri Lab.

[Title]

A method for inspecting behavior of applications include advertisement libraries for smartphones

[Abstract]

Many smartphone applications include advertisement libraries. Most of them gather user's sensitive or private information such as installed applications, device identifier, or location. Accordingly, managers of application markets force rules (e.g., writing privacy policy which notifies gathering information or restricting advertisement libraries to get device identifier) on application developers to prevent gathering excessive information. However because they cannot be sure whether application developers follow the rules, they inspect behavior of applications. Only applications which are not detected collecting the information will be made public. In general, the behavior is made by the advertisement libraries, and is depend on their runtime environment parameters. The goal of this research is to clarify what environment parameters affect the libraries' behavior. Furthermore, I will develop a software for inspecting them.

Session 2

No.14   Ryota Miyake   Nishiura Lab.

[Title]

A study of iterative spectral subtraction with optimal iteration times based on noisy- environment identification

[Abstract]

The telephone communication systems have been widely utilized. However, the observed speech is degraded by the environmental noise in real environments.   Spectral subtraction (SS) has proposed to solve this problem. The SS can reduce the unwanted noise by subtracting the estimated noise in frequency domain. However, the SS has a problem that musical tone is generated. Therefore, we had previously proposed the Loudness contour-weighted spectral subtraction (L-SS) for musical tone reduction based on the auditory sense. Through the evaluation experiments under the condition that no musical tone is generated, we confirmed the noise reduction performance of the L-SS depends on noisy-environment. Therefore, the L-SS should require optimal parameters for each noisy-environment in order to achieve the higher performance.

  Thus in this study, we propose the parameter optimization method of the L-SS based on noisy-environment identification. The L-SS has three parameters which consist of subtraction coefficient, flooring coefficient and iteration times. In the proposed method, iteration times are optimized because amount of musical tone correlates with iteration times. Therefore, we calculate optimal iteration times of the L-SS in each noisy-environment through objective experiments. Additionally, we identify noisy-environments based on the runs test to determine optimal iteration times for each noisy-environment. Finally, we confirmed the effectiveness of the proposed method through evaluation experiments.

Session 3

No.15   Yusuke Shimizu   Yamauchi Lab.

[Title]

Making of the synopsis video which enables investigation of endless video

[Abstract]

Sometimes videos recorded with surveillance or security cameras help in investigating and solving crimes. In recent years, such cameras are widely used not only on street and in store but also in home. Thus, cameras are necessary to monitor and prevent crimes. On the other hand, monitoring all recorded videos of every surveillance cameras is impossible. Almost videos are not even seen, until a crime committed near the camera. They have an enormous amount in length. It is difficult for us to checking such long video, and of course, there are some possibilities of overlooking. If we have a software system synopsize video sequence, we can investigate crimes quickly and certainly. It becomes a key technology for an intelligent surveillance camera which empowers to investigate cases as well as to maintain public security. Currently I am working on extracting all moving objects out of a video. I plan to build synopsis software through some steps. For the first step, I start with deriving an algorithm to synopsis video by showing all extracted objects. Then, I want to show only objects the synopsis video, which is having features that are given by a user from my good of the study.

No.16   Yusuke Ishida   Fukumizu Lab.

[Title]

Checkup system of illness precaution using biosound source separation

[Abstract]

Recently, the number of people who dies in a circulatory disease increases. However, it is difficult to diagnose circulatory diseases in early stage. In addition, the number of patients per doctor increases in progress of the aging society. Thus, it is necessary to realize a device that patients diagnose themselves in everyday life. The device uses biosound applying the auscultation technology. With auscultation, we can make a lot of diagnoses of diseases. In particular, we can collect a lot of information from biosound around neck. My goal is to propose a device which costs lower price, enable patients to self-diagnose and is not a burden on them.

In the preceding study, biosound separation was realized in MATLAB's code. Biosound consists of heartbeat sound, breath sound, blood flow sound and noises. In the method, we observe biosound from test subjects, transform into the frequency domain using fast fourier transform and separate sound source by Non-negative Matrix Factorization. Subsequently, source separation signal transforms to each sound using inverse fast fourier transform. Currently, I translate a sound source separating program in MATLAB developed in the preceding study to C-language. Hereafter, I will reduce computer resources required in the algorithm, to accelerate processing speed. Also, I will design the device which can carry easily. Finally, my research goal contributes in realizing diagnose system to find illness early with separated biosound.

Session 3

No.17   Yohei Onishi   Tomiyama Lab.

[Title]

Function inlining in high-level synthesis

[Abstract]

In recent years, high-level synthesis, which automatically generates register transfer level (RTL) circuits from behavioral descriptions, has become popular along with the increasing complexity of LSIs. Function inlining, which replaces function calls with their bodies, is one of the optimization techniques in high-level synthesis. In general, function inlining reduces circuit area and execuyion cyckes, but degrades clock frequency. This work aims at development of a systematic methology to decide which functions to be inkined. As a first step of this research, we synthesized RT-level circuits from the CHStone benchmark programs using a commercial high-level synthesis tool named Vivado HLS. We observed that in some cases function inlining improves clock frequency and worsens circuit area, which is opposite to the traditional knowledge in this field.

No.18   Takashi Omura   Fukui lab.

[Title]

Two-dimensional Thermal Analysis System for LSI Packages by GPGPU

[Abstract]

Shrinking design rules of the semiconductor devices, various problems are actualized. For example, physical disruption of circuits, signal degradation, and increased in power consumption. In addition, mobile devices like a smartphone has been popularized in recent, and they have difficulty to thermal design. Therefore, there is a high importance of the thermal analysis, and a simulation by a software may provide an effective solution. However, it is a very time-consuming task. Therefore, speeding up the simulation has drawn a great attention in recent years. For a high speed simulation of LSI packages, we propose a two-dimensional thermal analysis system. The system expresses three-dimensional heat conduction by two-dimensional grid-type thermal circuit, and we adapt a high speed power grid circuit simulation method to the system. The method has a matrix calculation algorithm in parallel and the data structure suitable for the grid-type circuit. Then, it can execute the analysis of the circuit efficiently with GPGPU. With the method, we realize the thermal analysis system on a GPU, and achieve about 143 times speed up than a CPU program. From machine specs, the upper bound of the acceleration is assumed about 163 times, in the environment. They indicate that the algorithm has well parallelized and effective for thermal analysis.

Session 3

No.19   Yuta Hatano   Kansai University

[Title]

A Study on Linearization of Nonlinear Distortions in Parametric Array Loudspeakers

[Abstract]

The parametric array loudspeaker (PAL) is well known for its ability to radiate a narrow sound beam from a relatively small ultrasonic emitter. However, nonlinear distortions are commonly observed in the reproduced sound of a PAL as a result of its nonlinear acoustic sound principle. Moreover, Volterra filters have been successfully applied in the linearization systems developed for the ordinary loudspeakers. In this paper, a linearization system accounting for the 1st-order and 2nd-order Volterra kernels is examined for the PAL experimentally. Before this study, there is a hypothesis assuming that the nonlinear distortions of the PAL vary with the listening distance. Experiment results show that the Volterra kernels identified at an arbitrary distance can work well at different listening distances without significant loss of performance. Therefore, when a linearization system is designed for a listening zone, the center of that zone can be chosen as the identification location of the Volterra kernels.

No.20   Naoto Nojiri   Yamazaki Lab.

[Title]

FPGA-based BLOB Detection Using Dual-pipelining

[Abstract]

BLOB detection technology is widely used in various fields, such as guidance of autonomous vehicles, car camera, traffic sign recognition, and surveillance system. This paper shows a real time BLOB detection using dual-pipelining which equips two pipelining image processing on FPGA. The image processing consists of reading image data from BRAM, Gaussian filtering, binarization, labeling and BLOB analysis. Look-up Table stores and revises the connected components information for estimating the equivalence of BLOBs. The experiment results show that the dual-pipelining system can detect BLOBs in 0.1ms on FPGA which is 3.92 times faster than related work, and 1.83 times faster than the single-pipelining system.

Session 3

No.21   Yusuke Nojima   Chen Lab.

[Title]

Video restoration with TV/L2-norm and Visualization of blurry degree

[Abstract]

There is a high demand for generating high-quality video and images, which are used for the wide range of applications, such as biometric authentication, medical imaging, and so on. In this paper, we present a video restoration method for generating a high-quality video from a deteriorated or blurred video. Recent researches independently investigate how to estimate the proper kernel from single blurred image and other researchers developed the unique algorithm, which includes time variation of data for restoring a blurred video. Therefore, in this paper we proposed a high-quality video or image restoration method, which combined with these two researches' methods for enhancing restoration performance. Our strategy can be divided into two steps. The first step is kernel estimation from each image frame of blurred video with using Total Variation(TV)/L2-norm as a regularization term. Then, the second step is to recover a high-quality video with algorithm, which considering time variation of adjacent frames. Experimental results show that the recovered high-resolution video and images with our proposed approach can achieve comparable performance than the conventional methods. In addition, our method can visualize how the blurry degree changes in the video.