

Establish Good Relationships between Vietnam and Japan

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Contents

- Introduction to Gunma University
- Introduction to Science & Engineering
- Introduction to Kobayashi Lab.
 - Collaboration with Industries
 - Globalization
 - Fun and Human Relationship
- Summary

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Gunma University has 4 Campuses

Maebashi 1: Education, Social and Information Studies

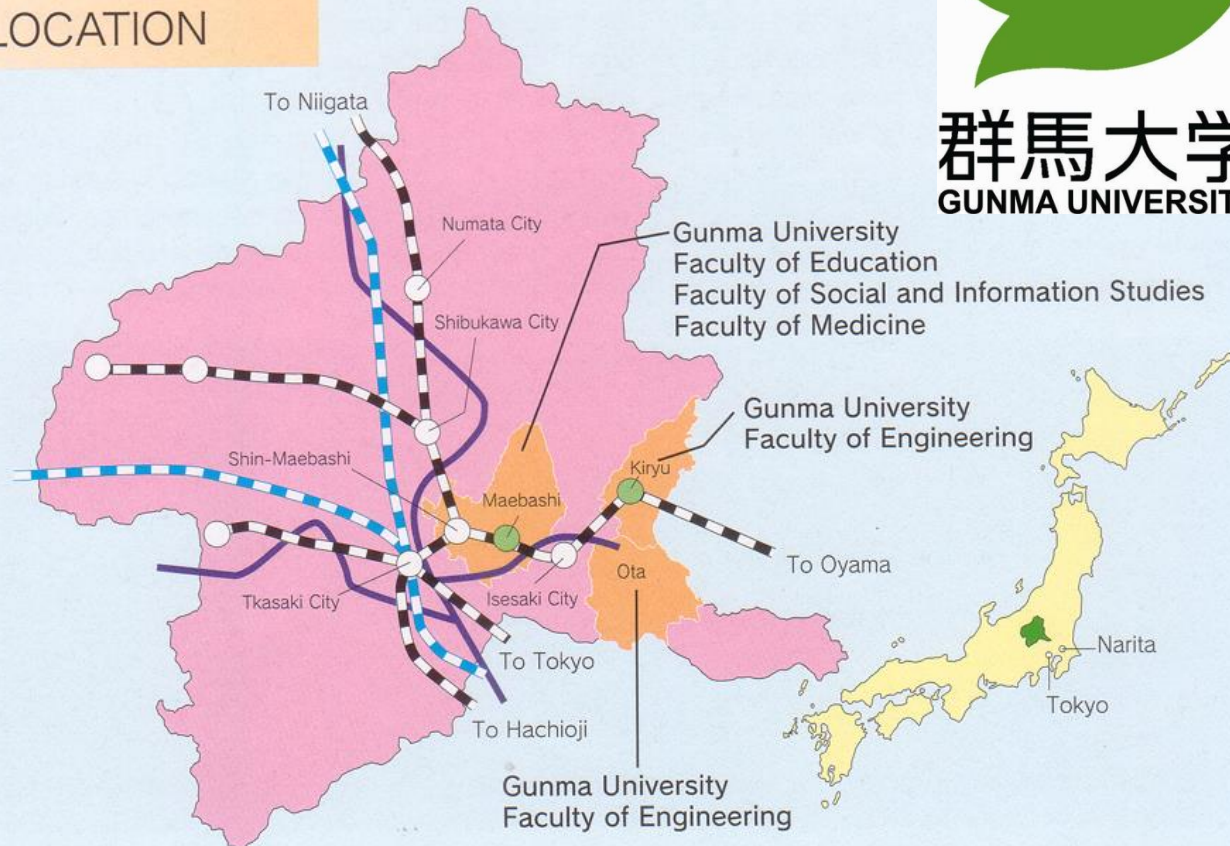
Maebashi 2: Medicine

Kiryu: Science & Engineering

Ota: Science & Engineering



CAMPUS LOCATION



Gunma's Yuru-chara
Gunma chan

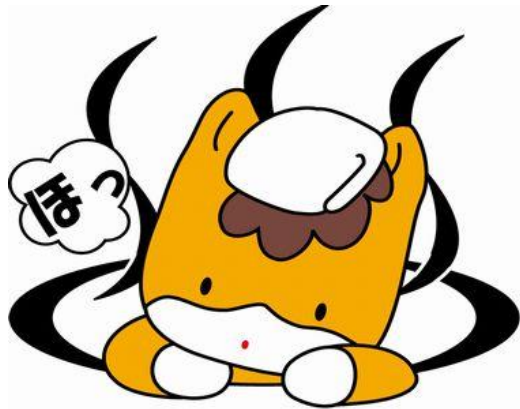


4 Faculties in Gunma University

- Faculty of Education
220 students / year
to be teachers in junior, junior high-schools
- Faculty of Social and Information Studies
100 students /year
to lead information society
- Faculty of Medicine
medical doctor course 108 students /year
nursing science course 160 students/year
- Faculty of Science & Engineering
510 students/year

Many Hot Springs in Gunma

We, Japanese
love bathing
In hot springs.



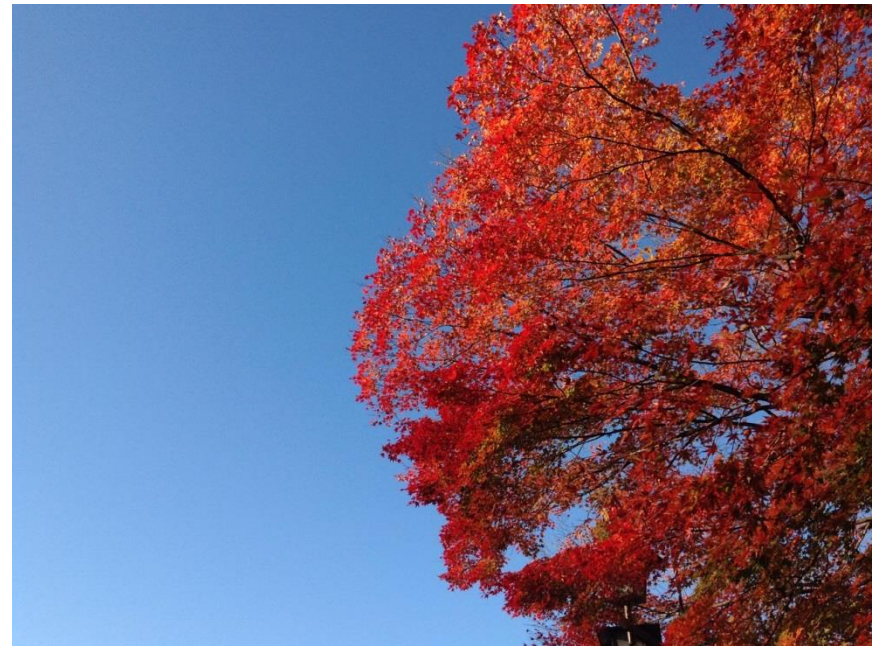
Autumn Season in Gunma

Ikaho shrine

which gurads **Ikaho hot spring** in Gunma.



Ikaho shrine



Red leaves of autumn
in Ikaho hot spring area

Beautiful Nature in Gunma

Insect Zoo



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Science & Engineering: 5 Departments

- Chemistry and Chemical Biology
- Mechanical System Engineering
- Civil and Environmental Engineering
- **Electronics and Informatics**
- General Science & Engineering



Electronic Engineering Research Fields

Kiryu Campus

8 professors

12 associate professors

5 assistant professors

3 major areas

- Electronic Devices
- Measurement, Control and Power Electronics
- Information, Communication and System



Manufacturing Industry in Gunma

Many manufacturing companies in Gunma
Electronics, semiconductor, automotive,
machinery....

RENESAS

SANYO

オン・セミコンダクター
ON Semiconductor®

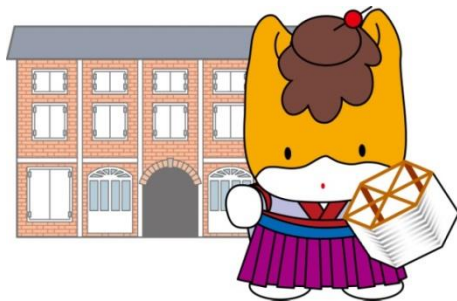


SUBARU

SERVO

JVC

ADVANTEST®

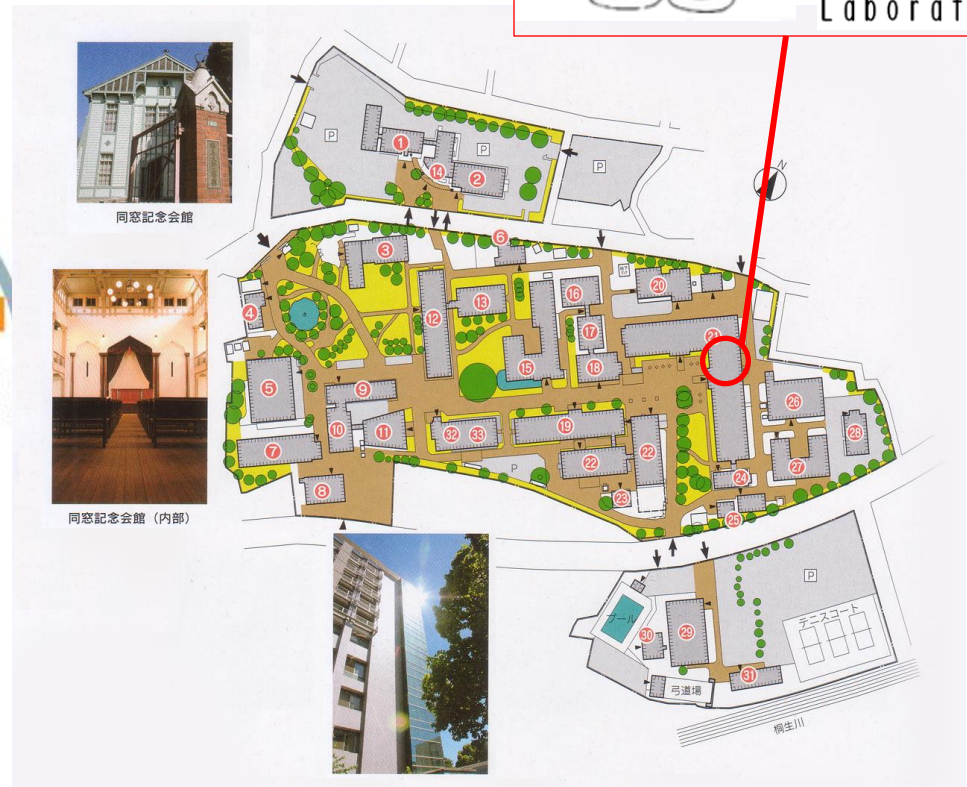


Historical Factory
in Meiji Era



Kiryu Campus for Faculty of Engineering

Founded as an engineering college for silk long time ago.



Kiryu: Capital of Silk in Japan



Silk Industry was Popular

Historical house



Summer Festival in Kiryu



Ancient, Modern Aspects in Kiryu



Kinopy



Full of Greenery in Kiryu



Cherry Blossoms



Kiryu City View
from a Neighbor Mountain

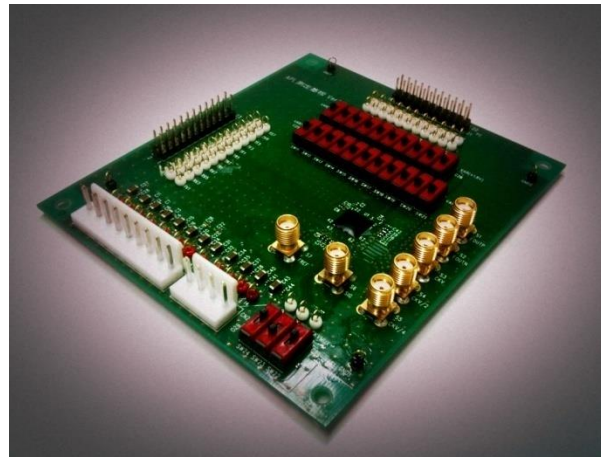
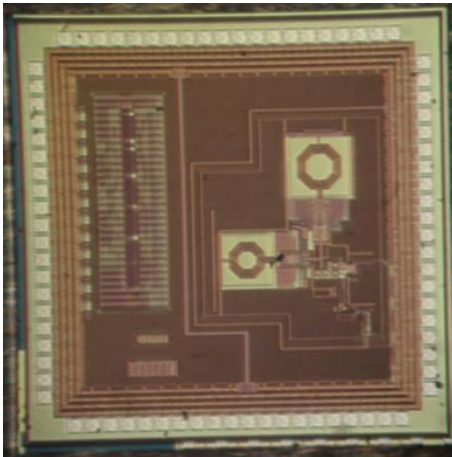
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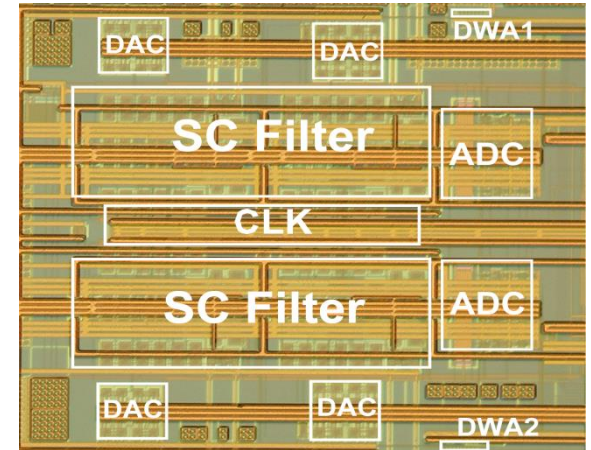
Research & Education Area

Analog & Mixed-Signal Integrated Circuit Design

Our research result examples :

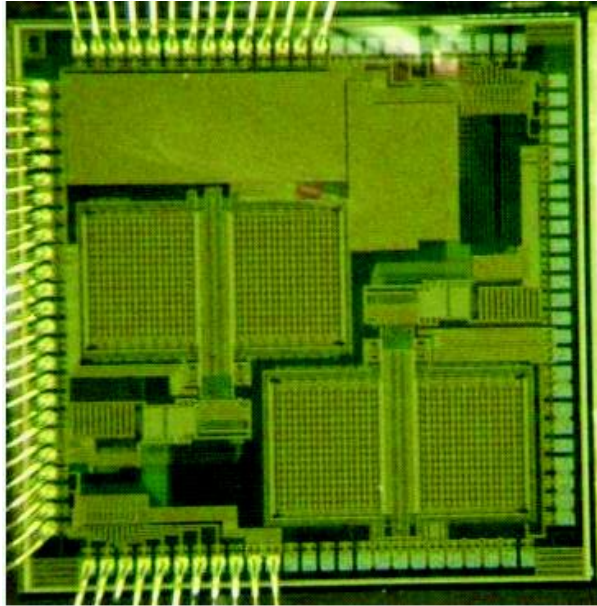


TV tuner application IC & evaluation board
(collaboration with Sanyo Semiconductor)

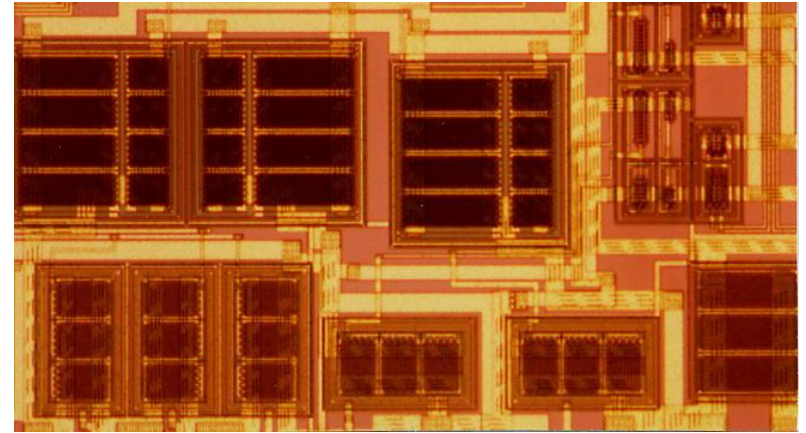


Communication application
analog-to-digital converter
(collaboration with STARC)

Research Result Examples



Low-Power Successive Approximation
Analog-to-Digital Converter IC
(collaboration with STARC)



Charge Pump Circuit
(with Sanyo Electric)

Active Research

Journal Publication: 4-6 papers/year

Trans. of Institute of Electronics, Information and Communication Engineers (IEICE)

International Conference Publication: 5-8 papers/year

IEEE International Test Conference

IEEE Asia Pacific Conference on Circuits & Systems

IEEE Asian Solid-State Circuits Conference

Domestic Conference Publication: ~20 papers/year

Several conferences in Japan

Patent Applications (with industry):

3-7 applications/year

Publish or Perish !

Members of Laboratory

Full Professor: Haruo KOBAYASHI

Associate Professor: Nobukazu TAKAI

Visiting Associate Professor: Kentaroh KATOH

Engineer: Nobuyoshi ISHIKAWA

Ph.D. Students: 5

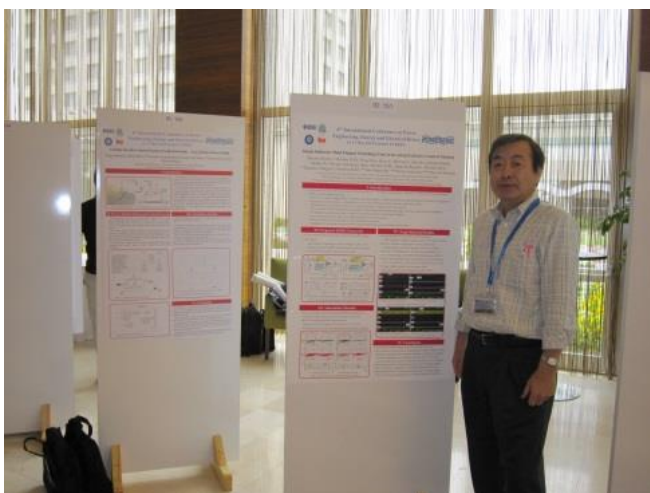
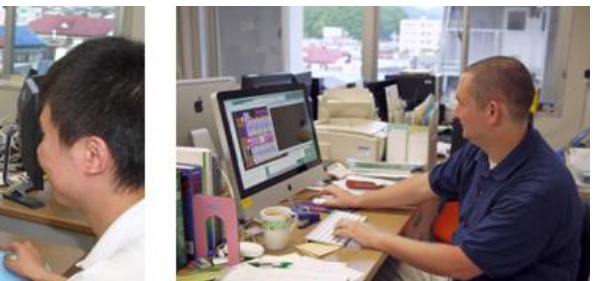
MS students: 28

Bachelor students: 11

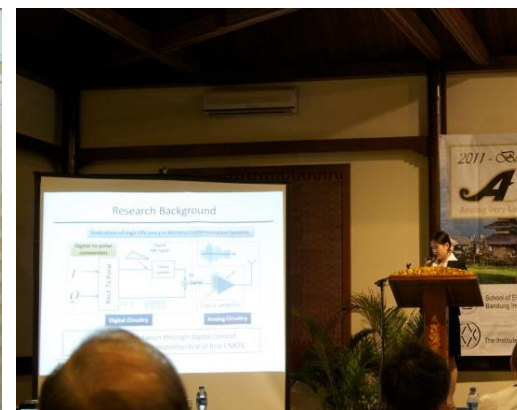
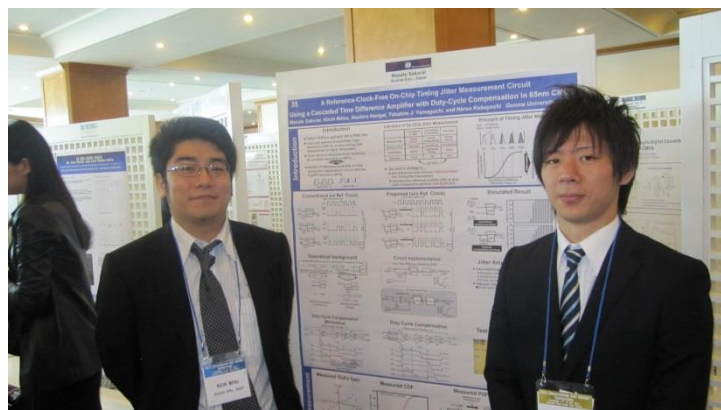
Research students: 3

Many excellent researchers and students are coming.

Lab. Members & Visiting Professors



Lab. Members



International Students in my Lab.

Currently 17 international students from 6 countries
USA, China, Malaysia, Iran, Bangladesh, Peru
 Former from
China, Indonesia, Azerbaijan, Malaysia, Peru



LABORATORIES 研究室から

工学専攻電子情報工学領域 博士後期課程2年
 林海軍 博士課程2年

**より半導体技術の進歩で
 便利な社会を目指して**

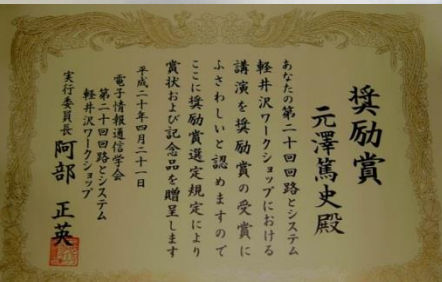
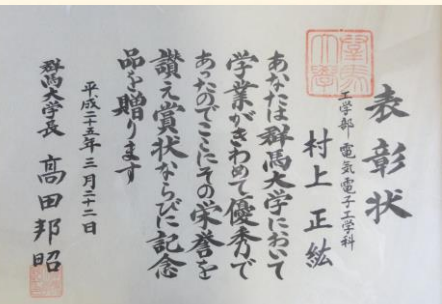
私たちは半導体集積回路技術の進歩の恩恵で高品質の画像・音声を楽しむことができます。より便利な生活を支えるために、集積回路技術の研究開発が日々進んでいます。現在アナログ集積回路が主流となる中で、それを支える技術として自然界とデジタル回路のインターフェースであるアナログ回路が目立っています。産業界からはアナログ回路の技術者が不足していると言われ、食糧を食う聞きます。私は集積回路の重要性を認識しその技術的面白さを感じて、アナログ集積回路設計という研究テーマを選びました。

私は高周波アナログフィルタや高速アナログ・デジタル変換回路の研究をしています。特に産業界との共同研究の一つとして携帯電話の受信回路用高速アナログ・デジタル変換回路の研究をしています。携帯電話受信回路は外から飛んできた電波をアンテナから受け、フィルタ回路によって自己発の電波帯域だけを取り出し、デジタル信号に変換して信号処理します。アンテナで受信する電波信号は数千ヘルツの高周波アナログ信号であるため、直接高精度のデジタル信号に変換することはとても難しいです。今の技術では、この数千ヘルツレベルのアナログ信号をアナログ変調回路によって数十キロヘルツから数十メガヘルツの低周波アナログ信号に変換してからデジタル信号に変換します。しかし、この従来技術では、回路規模や消費電力が大きくなってしまいます。この問題を克服するため、私の研究では新しい方式「アルゴリズム」を考案して高い周波数のアナログ信号でも高精度高精度のアナログ・デジタル変換ができるような小回路規模・低消費電力しかも安価な回路を実現することを目指しています。

この研究を通してアナログ回路設計に加えて、信号処理や通信技術など幅広い知識を習得することができました。研究で得られた成果を、国内・国際学会の発表や論文を通して世の中に発信できたことが一番の収穫であり大きな励みであります。研究室に入ってやりがいを感じるのは、優れた先端技術をもつ多くの企業との共同研究です。産業界の先を究めたニーズに応じて研究し、大学だけでは解決できない様々な問題を企業のトップレベルの研究者と議論しながら進んでいます。報告会や打ち合わせでは企業の研究開発の進め方を理解し、産業界の最先端の技術を学んでいき、自分のレベルが随分と向上していくのを実感しながら研究を進めています。



Japanese Students in my Lab.



LABORATORIES

研究室から

MEMS技術の研究者で広がる世界

MEMSとは、Micro Electro Mechanical Systemの略で、日本語訳の定義としては、①半導体などの微細加工技術を用いて作製される微小機械システム及びそれによって製造された部品や装置そのものを指す用語です。MEMSは、半導体、微小な、低コストなどを可能にする技術などと呼ばれています。MEMSとは、MEMSの研究という言葉を聞き慣れないかもしれません。MEMSは、MEMSの研究という言葉を聞き慣れないかもしれません。MEMSは、MEMSの研究という言葉を聞き慣れないかもしれません。

受験生へのメッセージ

インタビュー……学部生/大学院生/卒業生

医学と工学の融合した分野で、研究開発に携わりたい。研究開発に携わりたい。研究開発に携わりたい。研究開発に携わりたい。研究開発に携わりたい。

Laboratory's Policy

Open, Fair, Independent

- **Open**, **fair** to anyone regardless of his/her nationality, affiliation, ethnics, belief/religion, gender or age.
- All of research / education contents are **open**.
- We are **independent** in all aspects.



A lot of excellent people are coming .

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Merits of Industry Collaboration

- Aggressive collaborations with industries in semiconductor, electronics fields pushes our lab. to higher level.
- Advanced technologies are developed.
- Job/Internship opportunities for students
- Research funds are supported.

I learned importance of industrial collaboration when studying at UCLA.

Current Joint Research Projects

Semiconductor Technology

Academic Research Center (STARC)

Mixed-Signal LSI Testing Technology



Sanken Electric Power Supply Circuit

Dialog Semiconductor



Sanyo Semiconductor

Wideband Low Noise Amplifier

オン・セミコンダクター
ON Semiconductor®



Past Joint Research Projects (1)

Agilent Technologies

Electronic Measurement Technologies

Sumitomo Electric

Envelope-Tracking Power Amplifier for Base-Station

Sharp

Direct-RF Sampling ADC



Renesas Electronics

Digital Calibration Algorithm for ADC



Toshiba Microelectronics

High-precision ADC for Power-Meter Applications

Past Joint Research Projects (2)

Asahi Kasei Electronics

Nichicon

Power Supply Circuit

Yamaha

Delta-Sigma AD/DA Converters

Tokyo Sokki Kenkyujo Co.,Ltd.

Strain Measurement Circuit

Adjunct Professors from Industry

Prof. H. Aoki (**Semiconductor Device Modeling**,
former in Hewlett Packard Lab.)

Prof. M. Ochiai (**Power Electronics**, Sanken Electric)

Prof. Y. Kobori (**Power Electronics**, former in Hitachi)

Prof. K. Onda (**Power Electronics**, Hitachi)

Prof. S. Banba (**High Frequency Circuit**, Sanyo)

Prof. K. Ueda (**Semiconductor Process**, Sanyo)

Prof. T. Miki (**Analog IC Design**, Renesas)

Prof. T. Matsuura (**Analog IC Design**, former in Renesas)

Prof. K. Hatayama (LSI Testing Algorithm, former in STARC)

Prof. T. Yamaguchi (LSI Testing Technology, Advantest Lab)



Industry-Oriented Education

- Adjunct professors and invited lectures provide industry-oriented lectures in electronics fields.
- Students can learn advanced and practical technology.



Prof. Y. Sugimoto of Chuo Univ.
former in Toshiba.

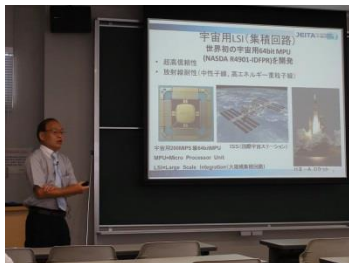


HITACHI
Inspire the Next

群馬大学アナログ集積回路研究会

Technical Meeting of Analog Integrated Circuit at Gunma University

- Founded in 2003.
- Invited many excellent researchers from industry and academia.
- More than 200 seminars for 10 years.
semiconductor device, (analog, RF, power) circuit,
modeling, measurement, testing, system, applications,
EDA, management, education,



Summer Internship Program

2-4 weeks in summer vacation

The following companies

have kindly accepted our students for internship :

Sanyo, Hitachi, Renesas, Sharp, Advantest,

Asahi Kasei Electronics, Toko, Seiko Instru,

ZHine Electronics, Sony, Nichicon

Analog Devices, Toshiba, Yamaha, Verigy,

Texas Instruments, and many.



SHARP

SONY
make.believe

 **ANALOG
DEVICES**

THine ザインエレクトロニクス株式会社
Mixed Signal Processing System on Chip.

FE
e-Front runners

Internship in the USA

Cirque Corp. (ALPS Electric)

at Salt Lake City in the US

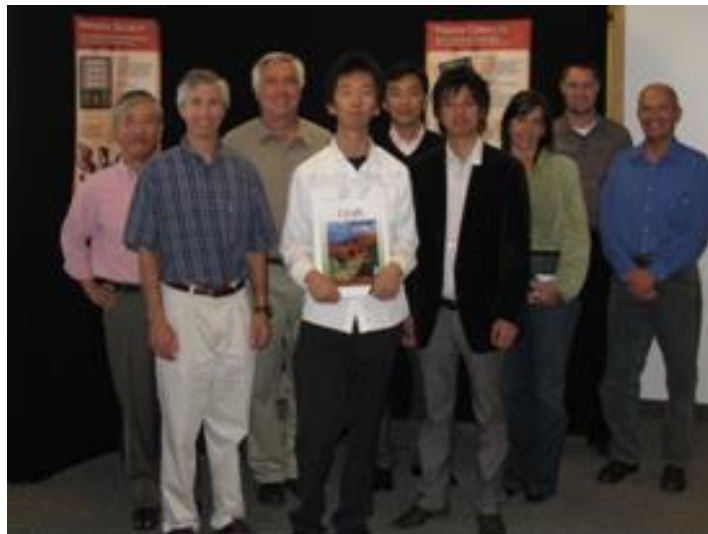
accepted two students for the internship.

Everything was kindly supported by them.

From Oct. 6 to Oct. 31 in 2008.

CIRQUE

美しい電子部品を究めます
ALPS

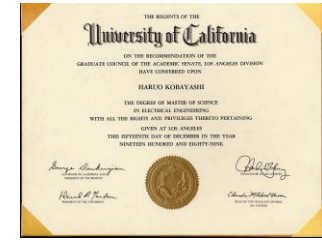


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My Experiences of Study in the USA

- University of California, Los Angeles (UCLA)
Electrical Engineering Department
Integrated Circuits and Systems Laboratory
Master course 1987-1989



Invitation of UCLA Professor Asad Abidi to Gunma U. in 2007.

- 1-year work experiences in Silicon-Valley in the US.

International Conference (1)

IEICE International Conference

on Integrated Circuits, Design, and Verification

Mo Chi Minh City, Vietnam (Nov. 15-16, 2013)

Presentations: 11 papers, **Attendees:** 20 members

IEEE Asian Test Symposium

Yilan, Taiwan (Nov.18-21, 2013)

Presentations: 2 papers, **Attendees:** 4 members

Five international students will present papers.

International Conference (2)



We have presented **6 papers** and **23 members** attended to IEEE Asia Pacific Conference on Circuits & Systems Kuala Lumpur, Malaysia, Nov. 2010.

International Conference (3)



IEEE Conferences in Taiwan in 2012



IEEJ Conference in Spain



IEEE Conference in Korea in 2011.



IEEE Conference in Macau in 2008.



Student Short Stay in the USA

- Visit to Prof. Fred Lee Lab, Virginia Tech in 2008.
- 5 graduate students stayed at UCLA in Sept. 2011.



Job Employment after Graduation

International graduates of my lab are working for

Sanyo Electric

Renesas Electronics

Texas Instruments, Japan

Analog Devices Inc. Japan

Fujitsu Laboratories

New Japan Radio Co., Ltd.

Tokyo City University

Alps Electric, and many.



Renesas Electronics



TI, Japan

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Local Society Support

- Kind Local community occasionally takes care of international students.
- Rotary-Yoneyama scholarship recipients from my lab:
Mr. Haijun Lin, Ms. Gao Hong
Mr. Santhos Ario Wibowo



ハタミ ラミン
khatami Ramin



Lab & Marriage Party



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All of you are welcome to Gunma U.

- Kiryu is an attractive city.
- We have been accepting many international students.
- You can learn advanced and practical technologies in electronics and LSI fields.
- There are plenty of chances for conference presentations and paper publications.
- You can have many good friends.



Globalization is important.

Appendix

For students who wish to study
in Faculty of Science and Technology at Gunma University
Our department has accepted students from Vietnam.

Requirements for success:

- (1) Good academic background
- (2) Language skill (Japanese and English)
- (3) Finance for living cost and tuition fee in Gunma University

Master course (2 years)

Entrance exam. in Aug, Dec.

You have to come to Gunma University to take either of them.

You have to take TOEFL or TOEIC as a part of the entrance exam.

Ph.D. Course (3 years)

Entrance exam. in Aug. Dec. March. E-mail interview is acceptable.

You do not have to come to Gunma University to take one of them.

Enrollment: April or October

Research topic

RF

- A Power-Efficient Noise Canceling Technique Using Signal-Suppression Feed-forward for Wideband LNAs

ADC/DAC

- Noise-Shaping Cyclic ADC Architecture
- SFDR Improvement Algorithms for Current-Steering DACs

Delta-Sigma

- Phase Noise Measurement and Testing with Delta-Sigma TDC
- Study of Complex Multi-Bandpass $\Delta\Sigma$ Modulator for I-Q Signal Generation
- Delta-Sigma Digital-to-Time Converter and its Application to SSCG

Modeling

- Typical n-MOSFET Modeling using A Skewing Method

Research topic

Power Supply Circuit

- Design of a Simple Feed-Forward Controller for DC-DC Buck Converter
- Single Inductor Multi Output DC-DC Converter Design with Hysteresis Control
- A Single Supply Bootstrapped Boost Regulator for Energy Harvesting Applications

Software

- Automatic Synthesis of Comparator Circuit Using Genetic Algorithm

Self-Calibration

- An Analysis of Stochastic Self-Calibration of TDC Using Two Ring Oscillators
- Digital Compensation for Timing Mismatches in Interleaved ADCs 53