

Next-generation Lab with Light of Shizuoka Univ.

Innovation caused by SU Next-generation Lab with Light(cont'd)

Collaborative research perspective in SU Next-generation Lab

- Innovative research to change industrial structure
- Research that will contribute to society
- Specification of research subject is realized within budget by the due date

Research Leader: Nominated by Company's Top Person
Students selected from Candidates

Company Researchers → Research Subjects → SU Next-Generation Lab (established in iPERC)

Challenge in the unexplored boundary area beyond labs!!

Young Leading Researchers: Assistant Professor, International Students, Graduate Students, Post Doctoral Fellow

Research Institute of Electronics: X-ray CT Lab, Imaging Devices Lab, Color Fidelity Lab, Remote Reproduction Lab, NIRS Lab, Terahertz Device Lab

Wavelength and Spectrum of Light: X-ray CT, Color Fidelity, NIRS, THz devices

Basic Research of University

2. 8K High definition imaging of Super Hi-Vision

Features ①. CMOS Global Electronic Shutter
The global electronic shutter is called "all pixels simultaneous exposure" and using this function images without motion distortion can be acquired.

Features ②. Column Parallel AD Conversion Circuit
This CMOS sensor is equipped with a column parallel AD Converter effective for high speed reading. Based on the core technology's cyclic AD conversion method, it realizes performance such as super high speed, low noise, low power consumption required for next generation imaging sensor.

Features ③. Ultra Low Noise technology
Ultra low noise property that suppresses random noise to the limit. The system saturation problem which was regarded as a problem of the image sensor technology is solved by devising the analog circuit of the latter stage

World New !!

- Compatible with full specs of 8K Super Hi-Vision 33M pixels
- Smooth moving scene and large screen display at 120 fps operation
- 14-bit output that brings out sufficient image processing performance

Lifestyle can be realized

Remote Reproduction

Remote Family Love

Lively State Monitor

Visualization of Biological Information

3. Digital Photon Counting X-ray CT

Medical Site → Industrial Use
: Difference of target, Price
R&D only → Development site
: Function, Speed, Installation location

Photon counting CT scanner delivered by ANSeeN Co., Ltd.
Fundamental study photon counting type CT Scanner

Scintillator (conventional, popular) vs CdTe Device (new, high function)

Concept of compact CT scanner

Basic test of battery-powered compact X-ray source and compact X-ray imager

Comparison of Detectors

Image Comparison with conventional detectors

1. Remote Communication System with Eye to Eye

EYE CONTACT VIDEO PHONE SYSTEM

We are developing a videophone system that connects people's minds as if they were directly talking with each other with eye to eye in remote communication.

In order to make it possible to give a sense of direct dialogue, we aim to realize natural communication enough to feel as if the other party was just in front of you.

We have made it possible to perform remote dialogue in which sight lines are matched regardless of the orientation of the face or the position of the face image of the partner by using a camera for eye-gaze detection that accurately reproduces eye contacts. It is unlike other research cases so far.

4. Faithfully transmit and reproduce colors(as people see)

What is the power of color measurement with an ordinary RGB camera sensor?

RGB Color Gamut?

R(赤) G(緑) B(青)

Beautiful objects are more beautiful
Moderate things are also beautiful

Beautiful people are beautiful
As it is, someone else!

General RGB camera vs 2-D Colorimeter

RGB on chromaticity diagram Color Triangle

The color shown precisely on the display (Wikipedia - 加色混色)

6. Imaging Device with Monochromatic terahertz

The terahertz wave is an electromagnetic wave located at a frequency intermediate between radio waves and light, and it is actually being used for short distance high capacity wireless communication and security application (transmission imaging, etc.).

Using the fact that frequency band of the THz wave corresponds to the frequency of natural oscillation of organic molecules. We are researching and developing hardware that sensitively detects deterioration and defects of products of organic molecules and software that can analyze measured data

We have already realized two types of hardware using monochromatic coherent CW THz light source

- Terahertz laser spectroscopy measuring device pursuing broadband and high frequency accuracy (Bandwidth 0.5 to 6.0 THz, Frequency Accuracy <10 MHz (0.00001 THz), Long-term (Power Stability <0.3%))
Features: Continuous operation, maintenance free, no need for vibration isolator
- Development of terahertz spectroscopic imaging equipment pursuing high power, small size and low price (Maximum output 0.1 μW, frequency line width 15 GHz, size 30 x 30 x 30 cm 3 or less)
Features: Continuous operation, maintenance free, room temperature operation detector available, compact, low price

The monochromatic coherent CW terahertz light source is based on the principle of difference frequency generation by continuous wave infrared laser light as excitation light for high grade semiconductor GaP (gallium phosphorus) crystal, and by applying feedback on the frequency and output of infrared light. High frequency accuracy and output stability can be obtained even at terahertz frequency sweep.

Real-time imaging of Pseudo-crystalline polymorphic transition by THz spectroscopic imaging

Anhydride vs hydrate

5. Know the function of sympathetic nerves from cerebral blood flow NIRS

Wearable, compact high resolution NIRS imaging device

Time-dependent measurement with CMOS image sensor

Time-resolved waveform

Scattering coefficient and Absorption coefficient 求める

Influence of the thickness of the surface layer structure was reduced, and NIRS was realized with improved accuracy

Time-resolved CMOS image sensor applied for near-infrared spectroscopy

Structure of phantom ↑ and obtained time-resolved data ↓

Fast charge transfer with less than 100 ps to storage diode is realized

Imaging sensor used for NIRS (LEFM)

Remote Reproduction Lab

Imaging Devices Lab

Color Fidelity Lab

Terahertz Device Lab

X-ray CT Lab

NIRS Lab



About Shizuoka University

Campus Location



Shizuoka University 2

Outline of Shizuoka University

- Faculties 6
- School of Regional Development 1
- Graduate Schools 5
 - Master's Course 3
 - Doctor's Course 2
 - Professional Degree Course 2
- Research Institute 2
- Students
 - Undergraduate 8,602 (including 103 students in number of School of Regional Development)
 - Postgraduate Master's Course 1,356
 - Doctor's Course (3-year Doctor's Course) 215
 - Professional Degree Course 53
 - International Students 396 (About 28% of them are from China)
- Staff 1,168
- Budget About ¥16.0 billion



Shizuoka Campus



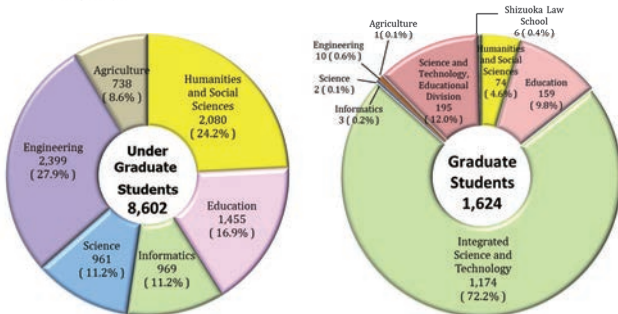
Hamamatsu Campus

As of May 1, 2017

Number of Students

Total of 10,226 Undergraduate and Graduate Students Enrolled

<Enrollment>



As of May 1, 2017

Mission

1. Teaching for the future:

Shizuoka University will provide students with in-depth knowledge that meets world-class standards so that they can become responsible citizens of tomorrow who are prepared to meet complex international challenges with an indefatigable spirit and concern for all humanity.

2. Commitment to research:

Shizuoka University strives to contribute to worldwide peace and human happiness through the pursuit of excellence in humanities and biological and physical sciences.

3. Contribution to the local community:

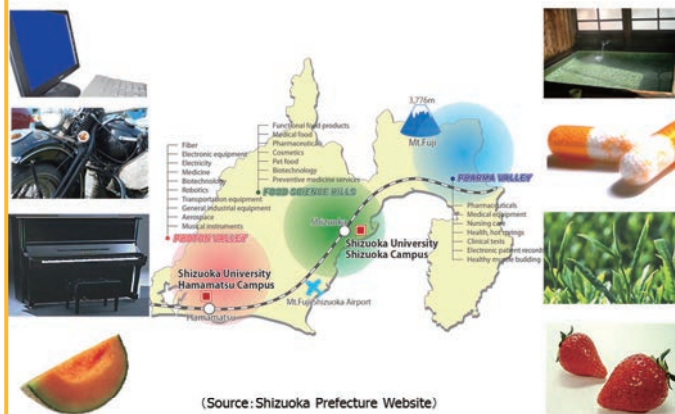
Shizuoka University recognizes the importance of a strong bond to the local community and will explore innovative methods of becoming an indispensable resource in reinventing community life.



Campus Character "Shizuopi"

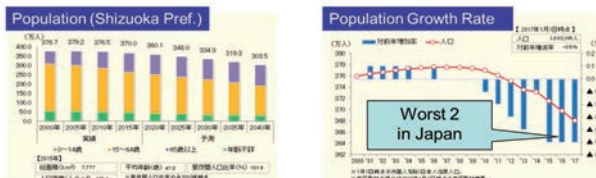
About Shizuoka Prefecture

Industry of Shizuoka Prefecture



(Source: Shizuoka Prefecture Website)

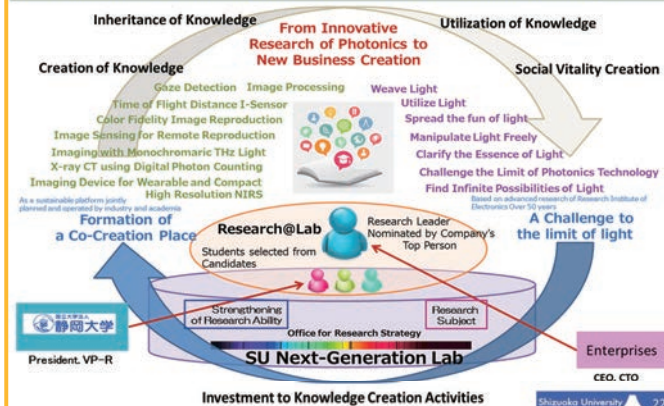
Decline of Local Regions



Worst 2 in Japan



Innovation caused by SU Next-generation Lab with Light



Industries of HAMAMATSU

Location : The Japanese Middle
 Land area : 1,511km² (The 2nd largest city)
 Population : 820,000 (The 16th largest city)
 The amount of manufacturing Shipment : 25,168 Hundred Million yen (The 8th largest companies in Hamamatsu)
 The amount of wholesale/retail sale : 30,059 Hundred Million yen (The 16th largest city)
 The amount of agriculture production : 533 Hundred Million yen (The 4th largest city)



Photonics technology

In 1926, electronic television was invented by Prof. KENJIRO TAKAYANAGI. It's first time in the world.

YAMAHA KAWAI TOYOTA SUZUKI HONDA YAMAHA HAMAMATSU

