

## **COMPUTER**

### **1. PURPOSE OF THE COURSE**

Refer to each sub-course.

### **2. TRAINING PROGRAM**

(1) General Orientation and Japanese Language Program

The General Orientation and Japanese Program are organized at the Chubu International Centre of JICA prior to the technical training, to assist participants in understanding Japan and adjusting themselves to life in Japan, and thus to facilitate effective training.

(2) Technical Training

Refer to each sub-course. (Total: five sub-courses)

### **3. NUMBER OF PARTICIPANTS TO BE ENROLLED**

8 persons (See each sub-course for details. If each sub-course is filled, some sub-courses may accept second candidates.)

Candidate should be qualified.

### **4. TRAINING DURATION**

From March 11, 2013 to October 30, 2013

(1) Briefing

March 12, 2013

(2) General Orientation

From March 13, 2013 to March 15, 2013

(3) Japanese Language Program

From March 18, 2013 to May 2, 2013

(4) Technical Training

From May 8, 2013 to October 25, 2013

### **5. TRAINING INSTITUTION**

(1) General Orientation / Japanese Language Program

Chubu International Centre (JICA CHUBU), JICA

4-60-7, Hiraike-cho, Nakamura-ku, Nagoya, 453-0872, Japan

Tel: +81(\*)-52(\*\*)-533-0220      Fax: +81(\*)-52(\*\*)-564-3751

URL: <http://www.jica.go.jp/branch/cbic/index.html>

(2) Technical Training

Hokuriku Branch Office, JICA

Rifare Bldg (Office Tower) 4F, 1-5-2, Honmachi, Kanazawa-shi, Ishikawa-ken, 920-0853, Japan

Tel: +81(\*)-76(\*\*)-233-5931      Fax: +81(\*)-76(\*\*)-233-5959

(\*) country code of Japan (\*\*) area code

### **6. CONDITIONS OF APPLICATION**

(1) Applicants should have graduate degree in a certain scientific or engineering educational course of a university or an institute of technology, showing the certified list of subject items with the marks obtained

in each subject.

(2) Applicants should have an adequate ability in English conversation to be able to perform satisfactorily in the course. (TOEFL score: more than 490)

(3) Applicants should be good in health, both physically and mentally, to undergo the training; pregnancy is regarded as a disqualifying condition for participation in the training.

(4) Applicants should not be presently serving in the military.

## **7. APPLICANTS MUST SUBMIT ANNEX WITH THE APPLICATION DOCUMENTS**

(1) Applicants should submit the certified list of subject items with the marks obtained in each subject issued by a university or an institute of technology.

(2) Applicants should decide their order of preference 1<sup>st</sup> ~6<sup>th</sup> from the following six sub-courses. Once an applicant decides, he/she should write the order of preference in Annex sheet. This will be used only as a reference for the screening committee.

Note: Applicants should be capable enough to pursue any of the sub-courses in order for the training institute to have a wider range of decision on screening. This is why any lack of preferences may result in an unsatisfactory application.

(3) Applicants are required to answer the questions on Annex sheet.

**Sub-Course Title: ①Interactive Education System**

(The number of acceptable participant : Maximun 2)

**Purpose of the Course:**

The objective of the training course is to provide the latest available computer techniques for interactive education system using image processing and computer graphics. In this course, the participant designs and implements an interactive color design education system using image processing and computer graphics. The participant is expected to use computer programming language C and have fundamental knowledge about computer graphics.

**Course Description:****(1) Learn Basics**

Image processing and computer vision (using OpenCV, Processing)  
Computer graphics (using OpenGL, Processing)  
Color design science and technologies

**(2) Design and implement of an interactive color design education system using image processing and computer graphics**

Basic color design knowledge tutorial  
Design simulation of color combinations  
Web page design analysis  
Color analysis of images input by camera

**(3) Evaluations**

Intended purpose and achieved result (usage)  
Achievement level  
Project productivity  
Other feedbacks

**Hardware and software environment**

Hardware: Personal Computer, High Vision Web Camera, High Vision Video Camera  
OS: Windows 7, optional - Android  
IDE: Microsoft Visual Studio 2010  
Computer Languages: C, C++, Processing  
Software Libraries: OpenCV, OpenGL, and Processing libraries

**Sub-course Title: ②Information Analysis of Web Contents in Social Media**

(The number of acceptable participant : 2)

**Purpose of the Course:**

The purpose of this course is to develop statistical methods to analyze and to explore a huge amount of messages in social media.

The participant is expected to have experiences on the Web programming and statistical data analysis, and, ideally, pattern recognition and natural language processing with open source frameworks.

Programming and data analysis skills will be also developed through the course.

**Course Description:**

Course Description:

**(1) Learn Basics**

- Statistical Data Analysis with R
- Natural Language Processing
- Pattern Recognition,
- Web programming
- OpenGL programming

**(2) Independent Study under a specific research project theme:**

Some suggested themes:

- Development of internet navigation system using Web programming.
- Development of internet DB system for social media data, using Apache, Python and/or Java, and MySQL.

Additional theme may be possible, depending on the needs and skills of the student through discussions.

**(3) Hardware and Software environments**

OS: Linux, Windows 7, Mac OS

Software: Necessary software systems are available if needed.

Open source: Fedora Core, Apache, Python, Java, MySQL for social media DB

**Sub-course Title: ③Embedded Computer Systems Design**

(The number of acceptable participant : 1)

**Technology field:** Computer science and engineering

**Purpose of the Course:**

The participants are expected to learn design methodologies for embedded computer systems including processor and interface modules to be implemented into FPGAs (field programmable gate arrays) by using a graphical design tool called Visual Elite.

**Course Description:**

Suggested projects include the following steps:

(1) Basic training:

- Design of functional circuit module by using logic-gate symbols, truth tables, state-transition charts, and flow charts.

- Implementation of the functional circuit modules into FPGAs.

- Assembler-level programming using an original 16-bit processor module and its emulator system.

(2) Development of advanced processor modules providing some accelerator circuits such as decimal adder, floating-point adder, and/or parallel pipeline sorting unit, including designs for processor architecture and instruction set.

(3) Development of practical embedded computer systems using the advanced processor modules described above usable for such as robot controlling, computer network switching, or special purpose accelerating general computer systems.

**Hardware Environment:**

Windows-7 workstation and Note book

**Software tools:**

Visual Elite and related tools (graphical logic systems design tools by English).

**Required knowledge:**

Basic theory for gate-level logic circuit designs.

Basic software programming for describing flow charts.

**Sub-Course Title: ④Visualization Techniques in Computer Graphics**

(The number of acceptable participant : 1)

**Technology Field:** Computer Graphics, Geographic Information System, Remote Sensing, and Web programming.

**Purpose of the course:**

The objective of the training course is to provide the latest available computer techniques for visualizing our natural and man-made environments. The techniques for building 3D graphics contents in the internet site are learned by this project study. Some examples are as follows:

- Application of geo-visualization techniques for presenting and exploring structures and processes from geospatial data;
- real-time visualization techniques, including modeling of buildings and trees in 3D urban city, texturing for rendering such models;

**Course Description:**

(1)Learn Basics

- Remote sensing and Geographic Information System (GIS)
- OpenGL or Mesa 3D programming
- Knowledge of AutoCad, AutoCad Civil 3D, AutoCad Map 3D

(2)Independent Study under a specific research project theme:

Some suggested themes:

- Development of an application program for modeling and rendering of 3D city, using AutoCad Civil 3D 2013.
- Development of visualizing 3D Earth environment, based on the remote sensing data and GIS.
- Building 3D graphics scenes and animations using Maya 2013 or 3Ds Max 2013.
- Making of 3D Graphics animation movies using Maya or 3Ds Max.
- Development of navigation system using GPS and GIS data.
- Development of internet DB system for GIS and remote sensing images, using apache, PHP (or JSP), and MySQL.
- Analizing the remotely sensed satellite image data.

Additional theme may be possible, depending on the needs and skills of the student through discussions.

(3) Hardware and Software environments

**OS:** Linux, Windows 7, OSX

**Softwares:** Maya 2012, 3Ds Max 2012 for 3D graphics,

IDL 6.3 and Matlab for visualization,

AutoCad Civil 3D 2013 for 3D City Modeling,

Authoring tools: Adobe Premiere Pro, After Effects, Audition,Photoshop, Illustrator,

Open source: Fedora Core, Apache, PHP, Grass for GIS, MySQL for Remote Sensing image DB

Exclusive use of a workstation computer with a strong graphic card such as NVIDIA Quadro 2000 for the project study

## **Sub-Course Title: ⑤Intelligent Robot Control & Ubiquitous Sensor**

(The number of acceptable participant : Maximun2}

### **Purpose of the Course:**

The participant is expected to have fundamental technologies about the Internet and computer programming skill. In this course, the participant design basic and implement the software technology about intelligent robot.

### **Course Description:**

#### **(1) Map construction and environment recognition by robot**

Recently, it has become possible to recognize the environment of the robot using the image by the advancement of the image processing technique. Especially, the three-dimensional map construction based on the stereo seeing and the multi aspect geometry and the image recognition and the place recognition that uses the amount of the image feature are important technologies for robotics.

Keyword: Position Tracking, Global localization, Bayes filter, Kalman filter, Visal SLAM (Simultaneous Localization and Mapping).

#### **(2) Application of particle filter to object tracking**

The particle filter is a technique for presuming the state of the system from the time series of the observation, and it is paid attention in various fields in recent years. In the robot, it is used due to the pursuit problem (position of the object and posture of the object). The application to SLAM is actively researched.

Keyword: Visual tracking, Bayes filter, Monte Carlo method, Bootstrap filter.

#### **(3) Scale-Invariant Feature Transform (SIFT) for pattern recognition**

SIFT that is the amount of the local part feature based on the image inclination is a strong mechanism in the rotation, the scale transition, and the illumination change of the object.

Keyword: SIFT, PCA-SIFT, GLOH(Gradient location and orientation), Randomized Trees, HOG

#### **(4) Pattern recognition processing for image understanding**

It is necessary to use processing of the collation of the image of the background difference and the template match practicably in various environments of the illumination variation and the noise. It is important for us to select an appropriate image feature. Therefore, the technique of detection and the analysis of the moving object are constructed.

Keyword: SRF(Statistic Reach Feature), CHALAC(Cubic Higher order Local Auto-Correlation)

### **Hardware and software environment**

Hardware: Personal Computer (Intel Core i 7), Robots (Robovie, Palro, iRobot and some original robots), High Vision Camera Unit, Mote sensor, Wireless Location sensor (Ekahau), Kinect, Laser Range Scanner.

Computer Software: Microsoft (Developer Network Academic Alliance, Office Enterprise), Adobe (Creative Suite, Flex Builder), CG (Maya Unlimited, 3D Studio MAX), SPSS (Base, Categories, Conjoint, Tables, DataVal, Amos, Clementine), Matlab/Simulink, etc

**ANNEX**

## Japan –Mexico Exchange Program 2012

Full Name	
Where to contact	Tel. Fax. Email.
TOEFL Score	

Please refer to the course information and write your order of first to sixth preference below.

Sub-course title	Your order
Interactive Education System	
Information Analysis of Web Contents in Social Media	
Embedded Computer Systems Design	
Visualization Techniques in Computer Graphics	
Intelligent Robot Control & Ubiquitous Sensor	

Describe the subject of your interest and explain what kind of skill you want to acquire through this course.

Write your work experience

To participate in this course,

☐ I quit my job    ☐ I keep my position at work    ☐ Others (                      )

Explain how you would like to use your training experience on your return.

Introduce yourself

You must attach the certified list of subject items with the marks obtained in each subject issued by the university or institute of technology that you graduated from. And please check the documents with the below check list before submitting the documents.



#### Check List

- ☐ Application form: Did you fill the all blank? Were there no doubts on your remarks in the document?
- ☐ Annex: Did you fill out the all blank?
- ☐ Attachment: Did you attached your certified list of subject items?

Caution: If there is any mistaken in the documents, the applicant will not be accepted in this course.