

# Promotion and Development of European Masters in the field of Computer Vision and Robotics. – Output of the EACOVIROE Project

## - "Example of the VIBOT Master program" -

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**ABSTRACT** : *This paper describes the output of the Erasmus Mundus project EACOVIROE as well as with the international offer in the field of computer vision at the « centre universitaire Condorcet », University of Burgundy. A specific focus is done on the various strategies deployed so as to ensure the sustainability of the offer in a highly competitive field.*

**Key words** : *Erasmus Mundus, international mobility, double-degree, promotion, sustainability*

### I. INTRODUCTION

Education is a necessity in every country so as to raise its level of competencies and competitiveness. Without debating the differences between internationalization and Globalization, attracting the best students is however a competitive process among universities all over the world. Education is « free » or close to be free in certain countries (which educational cost is supported by the tax payers) but this factor is not the most determining parameters in the student choices. International Ranking of the university, employment rate after graduation, relation with the industry, placements, experience with research, CVs of the teachers as well as medium of instruction or the potential scholarships offered are the most determining factors.

In order to be highly competitive the European Union through its educational agency (EACEA) has launched an attractive program called the Erasmus Mundus which tried to answer some of the issues raised above. To do so, this program is split into three different actions.

Action 1 deals with the recognition of high level Master and PhD programs which are run in an integrated way by a consortium of European partners and third country partners (meaning non European Higher Education institutions). While recognized, these courses are eligible for scholarships which are then used to attract the best student in Europe.

Action 2 deals with mobility at the LMD level for student, staffs as well as academics. Action 2 involves a consortium of European Universities and a targeted (within a geographical zone defined in the call) consortium of non European partners. Scholarships are then offered to help mobility.

Action 3 deals with the promotion of the European Studies.

The present paper presents an output of the Action 3 project as well as a strong emphasis into the action 1. The paper is divided as follows: the first part will present the action 3 project EACOVIROE with its various work packages and output and the second part will present a successful program implemented at the University of Burgundy with its various adaptations.

These two parts will focus on innovative teaching aspects, link with the industry as well as career opportunities.

### II. EACOVIROE

The **EACOVIROE** (Enhance the Attractiveness of Computer Vision and Robotics in Europe) project [3], funded by the EU, focuses on the promotion of European master courses among Asian students and the quality assurance of all procedures related to incoming/welcoming Asian students. All the outputs can be found on the web site at [www.eacoviroe.org](http://www.eacoviroe.org)



Figure 1: logo of the EACOVIRE Project.

#### Work packages:

- A general MSc survey was performed in 2009 at the European level to identify Higher Education Institutions offering master programs in the field of Computer Vision and Robotics. Two data files of roughly 430 European MSc program contacts and International relations contacts were compiled. These European higher education institutions have been invited to upload their programs on the European Master portal for Computer Vision and Robotics that was specially developed for this purpose. Every year the master information are being updated so as to provide as accurate information to the students as possible.
- A field specific European job portal has been developed and a company database has been compiled allowing job providers to upload their job offers and students to have direct access to relevant offers.
- Several actions in the field of international student hosting were done such as a survey on quality assurance procedures and the elaboration of quality assurance handbook which is given to all Erasmus Mundus students enrolled in the EEMC VIBOT and CIMET. An international seminar to report on the best practices (intercultural courses, cultural shocks, tutoring,...) will be held in France on October 14<sup>th</sup>, 2011.

#### Promotion:

- These outputs are being presented to different educational fairs in Asia (Malaysia (2010), Thailand (2010), China (Shanghai, March 2011), Japan (Tokyo, May 2011) and Indonesia (October, 2011). “Fig. 2” is an example of the flyers which were designed to promote this project.



Figure 2: examples of the flyers realised to promote the projects and disseminate the outputs.

- All outputs are also presented at international conferences and universities throughout the world. A dissemination strategy (the consortium has designed a dissemination kit including various flyers which are being proposed to each university staff/academic going abroad). The following figure (“Fig. 4”) presents a map of the various locations for the dissemination actions as well as the Asian countries (“Fig. 5”) which have been accessing our web site.



Figure 3 : map of the dissemination actions.

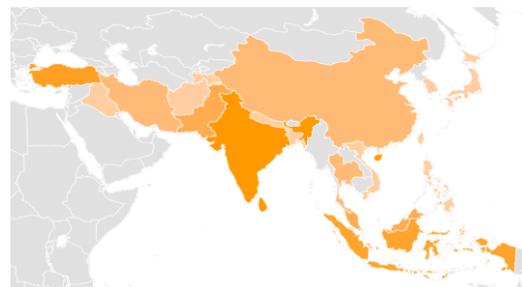


Figure 4: map of the web access from the Asian students (target group) to the EACOVIRE web site.

Among the masters listed on the EACOVIRE web site, three of them are ERASMUS MUNDUS MASTER and offer scholarships for students as well as

scholars. More explanations on their mobility schemes can be found in [1].

The next part will briefly describes two of these EMMC and emphasizes on the EMMC VIBOT showing the link with the research, the economical actors and the society so as to, address most of the relevant issues and assure its sustainability.

### III. EMMC MASTERS IN THE FIELD OF COMPUTER AND ROBOTICS

#### EMARO

European Master on Advanced Robotics, is an integrated Master course promoted and managed inside the Erasmus Mundus Framework by three European institutions and three Asian institutions, namely: École Centrale de Nantes- France (coordinator), Warsaw University of Technology - Poland, University of Genova - Italy, Asian Institute of Technology - Thailand, Faculty of Science and Technology, Keio University – Japan, Shanghai Jiao Tong University – China.

#### CIMET

Within the CIMET Consortium composed of four European Universities, the University of Saint-Etienne offers and coordinates the English taught, 2-year master course “Color in Informatics and Media Technology” (CIMET, [www.master-erasmusmundus-color.eu](http://www.master-erasmusmundus-color.eu)). The curriculum covers innovative areas such as color, photonics, computer vision and imaging science, computer science and multimedia technology.

The specificities of the CIMET Master lies in the innovative pedagogical methods of teaching and learning and the Cross-European mobility scheme offered to student and teaching staff. Those two aspects are indeed enhancing the excellence and value-added of the Master program.

#### VIBOT

The European Erasmus Mundus Master course on Computer Vision and Robotics ([VIBOT](http://www.vibot.org), [www.vibot.org](http://www.vibot.org)) offers the opportunity to highly motivated, excellent students around the world to take up MSc courses in the field of Computer Vision and Robotics and receive an Erasmus Mundus grant.

This program strives for excellence in terms of teaching, research methods and results, and is proposed by a consortium of three universities: Heriot Watt University (Scotland), University of Girona (Spain) and uB (France), each bringing in their complementary specializations and large research networks.

In September 2010, the 5<sup>th</sup> cohort started in Scotland. Since 2006, a total of 140 international students have followed the program (“Fig. 5”).



Figure 5 : Citizenship of the 140 students recruited the last 5 years from 40 different countries.

The significant increase in number of applicants and corresponding number of nationalities shows the general interest for this type of excellence programs (see figure 6) and led to the creation of a broader educational (see figure 7) offer so as to match the students interests and the financial sustainability of the program.

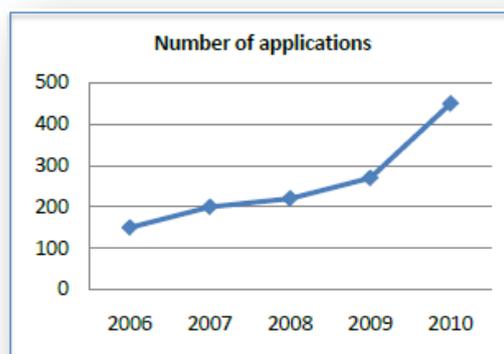


Figure 6: Number of applicants to the EEMC VIBOT.

### IV VIBOT a SUCCESS STORY

Structured as the EMMC VIBOT, the University of Burgundy (uB) offers various international programs which offer double diplomation and various specialties, see “Fig. 7” for instance.

These programs are jointly run with:

[Universiti Teknologi Malaysia](#) (specialty « Artificial Intelligence »), [Universiti Teknologi Petronas](#) (specialty « embedded systems »), [Universitat de Girona](#) (*Master in Visio por Computador i Robotics* (VICOT)) [Gunardarma University](#) in Indonesia.

The program offers also student exchanges with the USA and Thailand.

All the partnerships have been set up on a dual basis : educational and research, meaning that after graduation students can easily pursue their studies within the network higher education institutions or research laboratories.

## Masters in Computer Vision



Vibot



Masters in  
Computer  
Vision



VICOT

**Course Structure**

1	France	France	France	Digital Signal Processing Introduction to Image Processing Sensors and Digitalization Software Engineering Applied Mathematics (Local Culture)
2	Spain	France	Spain	Probabilistic Robotics Autonomous Robots Scene segmentation and Interpretation Visual Perception Medical Image Analysis (Local Culture)
3	Scotland	France	Spain	Advanced Image Analysis Multi-Sensor Fusion and Tracking Real Time Imaging and Control Robotics Project (Local Culture)
4	Research Training Period			

**Specialty**

Artificial Intelligence 	Embedded systems 	International "SarMag" Integrated Program Bachelor & Master in 4 years 
Malaysia	Malaysia	3 years Indonesia
France	France	1 year France
Research Training Period		
5 000 €	5 000 €	2 000 € + Gunadarma fees
2	2	2
<a href="#">CLICK HERE</a>	<a href="#">CLICK HERE</a>	<a href="#">CLICK HERE</a>

**Fees**

16 000 €	2 000 €	6 000 €
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**Degrees**

		
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**websites :**

<a href="#">CLICK HERE</a>	<a href="#">CLICK HERE</a>	Not yet online
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**Possibility student exchange :**

University of Tennessee (Knoxville-USA)	<a href="#">CLICK HERE</a>
Asian Institute of Technology (AIT-Thailand)	<a href="#">CLICK HERE</a>



Figure 7 : educational offers based on the erasmus Mundus Vibot at the University of Burgundy.

## V. ORGANISATION AND DECISION BODIES

All masters presented on figure 7 are run with the same framework

### A) Governing bodies

A *Memorandum of Agreement* signed by all partners contains all rules regarding: selection, admission procedure, registration cost, knowledge/IP sharing, course validation and recognition [2], data sharing and data protection, quality evaluation... Cooperation and management of these programs take place through three councils “Fig. 8”: the *Administration and Academic Board*, the *Quality Board* and the *Industrial Board*. Each partner is committed to implement and respect rules and criteria in his own institution.



Figure 8 : Governing bodies

The *Administration and Academic Board*, takes all decisions relative to student selection, examination and

evaluation procedure, certificates as well as transcripts delivery in accordance with each partner legislation rule. The AAB is composed of the Master coordinator and two representatives per Partner University.

For specific focus points, external members, after approval of the AAB members, can be associated to the board.

Meetings (on site) or by visio-conference of the AAB occur four times a year.

The *quality board* is composed of one representative per Partner University as well as an equal number of external advisers. This board analyzes the on-line surveys filled by the students, teachers, industrial partners as well as visiting scholars and make recommendations to the AAB so as to improve the overall running of the master course.

The *Industrial Board* is composed by one representative per Partner University as well as one representative of the industry.

It is in charge of organizing the VIBOT Day (see below) as well as providing feedback from the economical world in order to adapt the teaching contents related to the market needs and trend..

### B )VIBOT Day

Each year, a one day workshop is organized gathering students, academics and the actors of the economical sectors. Built around scientific presentations (oral or poster) , the day consists in networking (jobs offers, placement, scholarships) between the various participants (see “Fig. 9”).

**Sponsors**

BAE SYSTEMS | IEE | PIRELLI  
 Continental | seebyte | Luxscan

**Collaborating companies**

TOSHIBA | dset | FUNDACIÓ cim  
 EMO | bdigital | alma IT SYSTEMS  
 IOGEO | AQENSE

**Erasmus Mundus**

The Erasmus Mundus programme is a co-operation and mobility programme in the field of higher education. It aims to enhance quality in European higher education and to promote intercultural understanding through cooperation with third countries. The programme is intended to strengthen European co-operation and international links in higher education by supporting high-quality European Masters Courses This enables students and visiting scholars from around the world to engage in postgraduate studies of European universities, as well as by encouraging the outgoing mobility of European students and scholars towards third countries.



## Masters Erasmus Mundus in Vision & Robotics

The only Erasmus Mundus in Vision and Robotics in Europe!

Three years after the first graduated promotion, the European Commission has renewed its support to the Vivot Masters stating: «this innovative program provides a unique masters course in Europe addressing the future needs identified of industry and research in this area».

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Figure 9: example of the flyers for the VIBOT Day 2011 event

A total of 30 and more companies from SMEs to larger groups have attended the last three editions and each of them have offered internships to students and scholarships to the program contributing to the sustainability of the program and better insertion into the job market. The following figures present some statistics regarding these aspects.

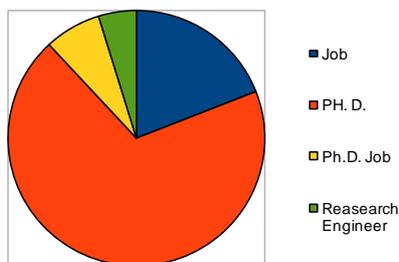


Figure 10 : Professional placemes of our graduates over three promotions (example for the VIBOT Master)

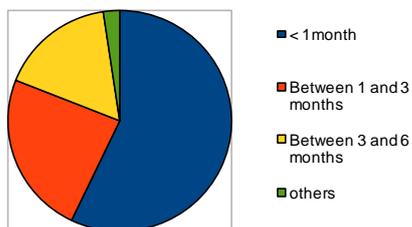


Figure 11 : Time to market after graduation for three promotions (2006\_2008, 2007\_2009, 2008\_2010)

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- [3] Campus France, n°15, Mai-Juin 2010.

## V. CONCLUSION

This paper has presented the outputs of two Erasmus Mundus projects (action 1 and Action 3). It has presented in details how the EEMC VIBOT is running and what have been the output of this master program in term of double degrees, internationalization, job offers, scholarships and research aspects.