

THE 3RD INTERNATIONAL TRAINING COURSE IN INFORMATION TECHNOLOGY-BASED FOR ELECTRIC ENGINEERING EDUCATION

EEPIS, SURABAYA - INDONESIA

Duration
5th to 30th October 2009



ORGANIZERS



**THE ELECTRONIC
ENGINEERING
POLYTECHNIC INSTITUTE
OF SURABAYA (EEPIS)**



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1.0 INTRODUCTION

1.1 Preamble

This is a report from the representatives of Tanzania to the 3rd **International Training Course in Information Technology-based for Electric Engineering Education** which was held in **Electronic Engineering Polytechnic Institute of Surabaya-Institut Teknologi Sepuluh Nopember (EEPIS-ITS)**. The course was sponsored by the Government of the Republic of Indonesia under the framework of Technical Cooperation among Developing Countries (TCDC) program in cooperation with the Government of Japan through Japan International Cooperation Agency (JICA), under the Third Country Training Program (TCTP).

1.1.1 Background

Since 1974, JICA has been supporting developing countries to conduct the training programs for other developing countries, basing on common characteristics. TCTP has helped the participants to build up knowledge and skills in respective areas through technology transfer as well as to enable sending agencies to the recipient countries to build up the capacity of the human resources.

1.1.2 Coverage of the Report

The report covers the EEPIS, the cooperation between Indonesia and Japan through JICA, TCTP, TCDC, details of the trip, the curriculum followed during the training, industrial tours, major observations, proposals for the way forward and recommendations to the government of United Republic of Tanzania (GURT).

2.0 EEPIS at a Glance

EEPIS was established on 2nd June 1988. It is a sister institute to the famous engineering university in Surabaya called Sepuluh Nopember Institute of Technology (ITS). However EEPIS is an autonomy Polytechnic managed independently by a Director.

EEPIS offers full-time **Diploma 3** education and **Diploma 4** education in 4 major departments, namely:

1. Electronic Engineering;

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2. Telecommunication Engineering;
3. Industrial Electronic Engineering; and
4. Information Technology.

EEPIS is a leading polytechnic in Indonesia. As a national resource polytechnic (NRP) of engineering field, EEPIS is actively involved in development and enhancement of polytechnic education in Indonesia through, among other things, teaching staff development, workshop for technicians, and applied research initiatives.

2.1 EEPIS Conducting International Training Courses

EEPIS has conducted several training under the frameworks of 5-year cooperation between the Government of Indonesia and the Government of Japan. The first batch of this cooperation was implemented from 1993 - 1997, the second from 1998 - 2002 and the third batch from 2002 - 2006. And the 2009 batch is the final implementation in this cooperation.

EEPIS has a long track record in implementing international training course on electrical engineering education (1994 - 1999), and information technology (2000 - 2005).

2.2 EEPIS Participation in ABU ROBOCON Asia Pacific

EEPIS has participated in all the ABU Robocon since 2002 representing Indonesia with remarkable results. In 2007 they came second after China in the contest which was held in Hanoi, Vietnam. In 2008 they got to the semi-finals with a good display although they were outdone by teams from China and Japan among others.

EEPIS also participates and organizes local robot contests in Indonesia including the Indonesia Robot contest in which they have dominated the championships.

3.0 Travel Arrangements, Accommodation and Commencement of the Training Program

Travel arrangements and accommodation for all participants was organized by EEPIS, JICA and the State Secretariat of the Republic of Indonesia. Tanzanian participants traveled to Indonesia on 4th October 2009 aboard a Qatar Airways flight to Doha, Qatar then took another flight from Doha to Jakarta with one stop in Singapore. Participants

arrived in Jakarta on 5th October 2009 and then boarded another flight to Surabaya. Participants were received well and taken to Surabaya Plaza hotel in Surabaya which was accommodation throughout the training period.

On 6th October 2009 participants attended an opening ceremony attended by representatives from the Indonesian State Secretariat, JICA and EEPIS. Lectures and workshops formally started on 7th October and ended on 28th October 2009. At the closing ceremony the participants received certificates and were reminded to keep practicing what they learnt.

Participants traveled from Surabaya to Jakarta on 30th October 2009 where they were to connect a flight to Doha. However, participants missed the flight because of 4 hours delayed flight from Surabaya; then participants were then booked onto the next day's flight and spent the whole night and day in Jakarta city. Participants arrived in the country on 1st November 2009.

3.1 Participants in the 2009 Training

The training was attended by 13 participants from 8 countries namely: Kenya, Uganda, Tanzania, Pakistan, Cambodia, East Timor, Lao PDR and Bangladesh.

The organizing committee was happy that this time there was in attendance 1 lady (Tabitha Odanga from Kenya). Even happier they were that of the 13 participants, there were 4 participants who were from educational institutions with a background in Electrical Engineering who were the ideal target for the course. The rest of the participants were from various ministries in their countries.

Table 1: List of Participants

No.	Name	Country
1.	Mr. Phouxay Viengvixay	Lao PDR
2.	Mr. Phonesay Phongsavath	Lao PDR
3.	Mr. Mohammad Shamim Alam	Bangladesh
4.	Mr. Md. Golam Sarwar	Bangladesh
5.	Mr. Van Buntho	Cambodia
6.	Mr. Soun Hun	Cambodia

7.	Mr. Aviti Thadei Mushi	Tanzania
8.	Mr. Jackson John Justo	Tanzania
9.	Mr. Polycarpo Antonio Dos Reis Mendes	East Timor
10.	Mr. Paulino Lopes Lubdara	East Timor
11.	Ms. Tabitha Alice Namale Odanga	Kenya
12.	Mr. Tumushabe Samuel	Uganda
13.	Mr. Abdul Hameed Shaikh	Pakistan

4.0 The Course

4.1 Purpose of the Course

The purpose of the course is to provide participants from Asian and African countries with an opportunity to upgrade relevant techniques, knowledge and teaching methodology in the field of Electric Engineering by utilizing Information Technology-based methods.

4.2 Objectives of the Course

The training program was designed to enable participants:

1. To handle the electric laboratory equipment for practice, maintenance and repair;
2. To develop IT-based teaching material for practice in industrial electronics; and
3. To enhance participant capability on advanced application of electrical engineering, especially on power electronics and drives system technology.

4.3 Curriculum for the Training

The curriculum was designed to cover:

1. Advances and trends in power electronics and drive system technology;
2. Advances in control techniques for power electronics and drive systems;
3. Power electronics applications in renewable energy;
4. Power converter circuits;
5. Drive systems for AC and DC machines;
6. Simulation on power electronics and drive systems;
7. Microcontrollers and their applications in power electronics and drives;

8. PLCs and their application in drives;
9. PC application in control of drive systems;
10. PID control of power electronics and drive systems;
11. Fuzzy logic controller for power electronics and drive systems;
12. Workshop on implementation of ICT for power electronics and drive systems;
13. Country report; and
14. Project work.

4.4 Training Process

This training was intensive with lectures, workshops/laboratories and industrial visits. Every topic covered was followed by a workshop or laboratory work.

Lectures and workshops were held from Monday to Friday from 0900 until 1645 hours. Lecture and workshop sessions were carried out on topics listed above in 4.3 by a team of competent lecturers, instructors and technicians from EEPIS and experts from other renowned institutions.

To implement the objectives of the course, several tools were used in different laboratories as seen in Figure 1 - 6. The figures show training modules, training panels, motor drives, microcontrollers, PLCs, laboratory and workshop sessions.

The figures are as follows:

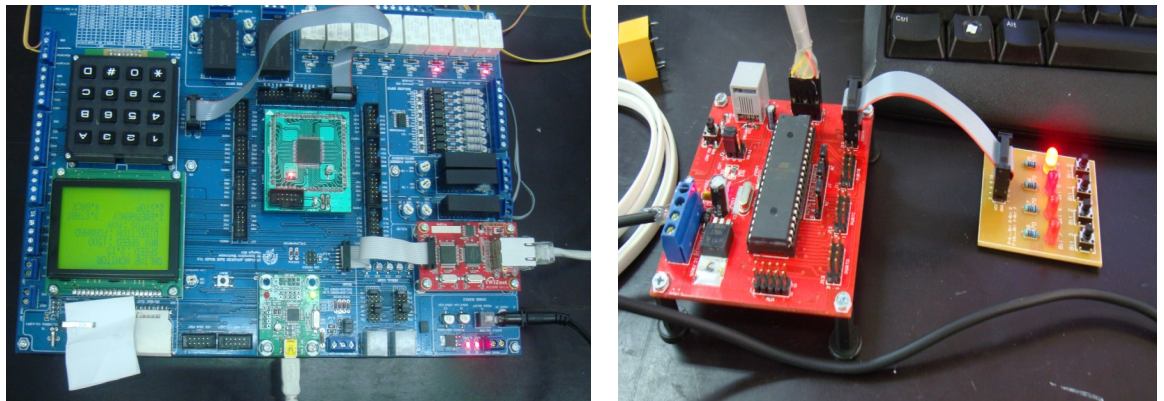


Figure 1: Microcontroller training modules used during workshop sessions



Figure 2: Participants in one of the workshops implementing programming of a microcontroller



Figure 3: Participants during workshop session soldering components onto a Vero-board



Figure 4: Participants in electrical machines laboratory attending a lecture and a workshop on implementing motor drives

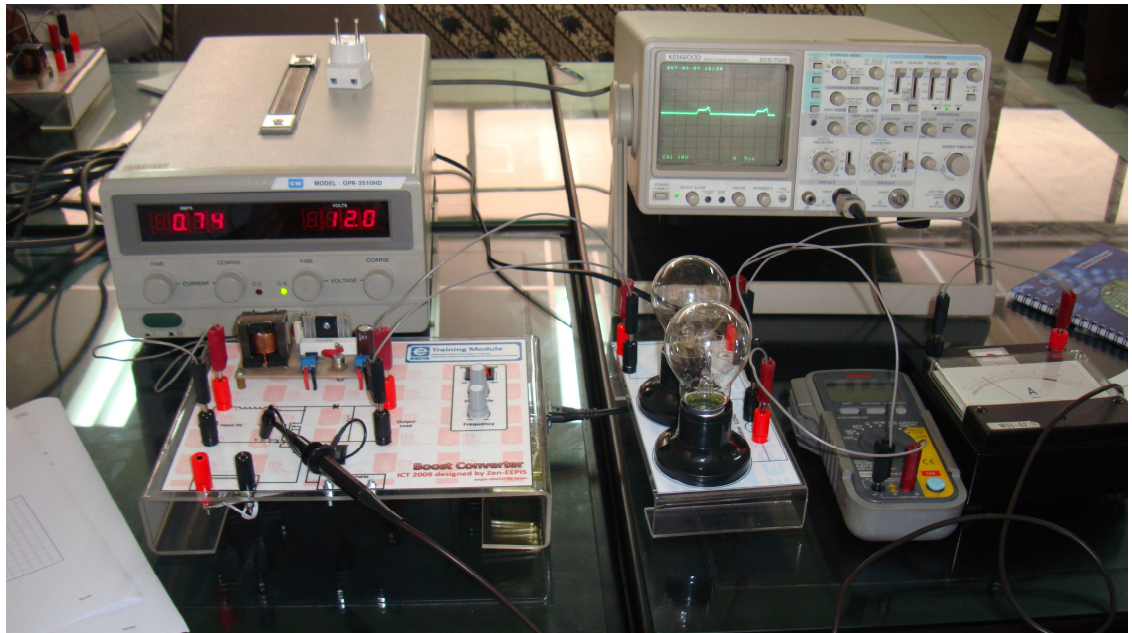


Figure 5: Experimental arrangements of implementing a boost converter



Figure 6: During tea break Tanzanian participants in discussion with EEPIS instructor. Seen behind the three people is the instrumentation practice board



Figure 7: AC motors and conveyor belts in one of the laboratories ready to be used with the designed converters and controllers in a workshop

4.5 Project Work

Nearing the end of the training each participant was required to implement a project based on the topics covered in the curriculum that interested him/her most and implement it in **one** day. The projects were supervised by the lecturers from EEPIS.

4.6 Company Visits

To broaden the view of participants in implemented technologies, several study visits of companies in Surabaya and Bali were arranged. In Surabaya, participants visited Rosella Baru sack factory which is semi-automated. During this visit participants saw the application of power electronics, drive systems i.e. variable frequency drives, PLCs and man-machine interfaces, pneumatics, PID controllers and other advanced technologies. Figure 8 and 9 show participants visiting in Rosella Baru sack factory:



Figure 8: Participants visit to Rosella Baru sack factory in a group photo with the factory management

The other factory visited in Surabaya was PT. Sepanjang Baut Sejahtera which produces steel fasteners i.e. bolt and nuts for a wide range of applications; this visit is shown in Figure 10 and 11.



Figure 9: On left participants at Rosella Baru sack weaving section, and right motor drives



Figure 10: PT Sepanjang Baut Sejahtera factory



Figure 11: Participants inside the steel factory

The participants visited Politeknik Negeri Bali (The State Polytechnic of Bali) which is a polytechnic offering variety of diplomas ranging from tourism to engineering. At the polytechnic participants visited laboratories and had a long discussion with the management about various issues related to effective running of a polytechnic. Thereafter, participants visited Jenggala Ceramic shop in Bali which deals with manufacturing high quality ceramic products (pots, plates, cups etc) for export and domestic. Furthermore, the participants had a chance to do ecotourism where they tasted variety of coffee, saw variety of aroma therapy, and saw coffee plantations.

4.7 Country Report and Action Plan Presentations

Each participant/s was/were required to prepare a 15 minute presentation about their country. The contents were mainly about the development of Information technology and how it is used for Electrical Engineering education, special emphasis was placed on power electronics and drive system technology in the participants' countries. In addition the country report covered details of culture and social practices in the participants' country. Figure 12 top and bottom show Tanzanian participants presenting their country report.



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Figure 12: Tanzanian participants presenting country report

After the training it is expected that the participants will be able to apply the concepts learnt during the course to improve teaching methodology in electrical engineering in their various countries and assist in curriculum development and laboratory development strategy to incorporate IT in electrical engineering education. The action plan was to serve as a guide to all participants to implement the training materials. Each participant prepared action plan and presented it after the country report presentations.

5.0 Observations

1. During the training the lecturers, technicians and students at EEPIS worked together in research-based and problem solving learning. The curriculum of EEPIS is designed such that students gain skills which are useful to industry;
2. The institution has a staff development program whereby each year some lecturers go for research training in Japan;
3. Each year the academic staffs undertake design and consultation projects for the local industries and national research agencies. There are quite a number of lecturers who are involved in research on fuzzy logic, power electronics and ICT among other topics of interest;
4. In the above approach the institution has been able to design and construct their own training modules for power electronics and drives

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and also automated systems like conveyors, thus improving the learning process and also saving costs;

5. The Polytechnic institutes limit the number of students per class to not more than 30. This allows easy access between the teachers and students;
6. The Bali State Polytechnic allows only 3 students to attend 1 practical in one session. This helps to equip students with more skills by having more time to practice;
7. Regardless of less English language skills, the EEPIS students and lecturers are conversant and competent with current technological issues due to internalization of knowledge and books into their own language (Bahasa); and
8. After graduation, the graduates from EEPIS usually go either to work in industries or join universities abroad or local at Masters Level or PhD Level. This is a competitive trait for the polytechnic.

6.0 Skills Learnt

According to the objectives of the course, the participants gained skills on the use of ICT in power electronics and drives technology, fuzzy logic, and control systems. This went hand in hand with networking opportunities between the participants and the resource persons. This was possible notwithstanding the language barrier between some instructors and the participants.

The training was relevant in helping developing third world countries in the process of industrialization. The training was effective in tackling the topics outlined in the curriculum within stipulated time but most areas required more time for comprehensive coverage of the materials. In addition, there was need for more time to allow participants to absorb and practice the materials learned; for example the duration could have been 8 weeks instead of 4.

7.0 Proposals on the way forward for ECSE, CoET and UDSM

ECSE, CoET as a learning institution has a lot to learn from Indonesia and specifically EEPIS, the following outlined points are proposals based on the Tanzanian participants fully participation in the training, that:

1. In line with the UDSM vision and mission emphasis is to be put to encourage investigative and problem-solving based learning in order to enhance technological training;

2. A leaf could be borrowed from EEPIS and start encouraging student-lecturer collaboration in research and design of projects for the institution and industries. This concept can help improve students' and lecturers' knowledge and skills in performing practical analysis of systems;
3. One of the institutions in Rwanda utilizes staffs from EEPIS who go and provide training at that college in Rwanda, it is suggested that CoET follow the same;
4. ECSE should aim higher (*to find a way to encourage students*) to participate in robot contests worldwide, however it could begin by liaising with Kenya Polytechnic University College (KPUC) in Kenya;
5. More lecturers and Instructors should attend such training courses abroad without waiting for a courtesy call from Indonesia instead they can arrange directly with EEPIS and ask for support from GURT for funding;
6. ECSE should look for such training from countries developed technologically like Japan (asking JICA for assistance), Singapore, and Korea etc.;
7. UDSM should design curricula which answer the needs of industry, decrease the number of students per class especially in tutorial and laboratory sessions and by reducing the teacher/student ratio; and
8. At CoET there is big need for well equipped laboratories on electrical machines, power electronics and drives, computers and instrumentation (control), telecommunications, electronics etc. With such laboratories it will be easier for students to practice and simulate different systems, and it will allow researchers, lecturers and instructors to conduct research.

8.0 Recommendations to the Government

This report recommends that:

1. The GURT take an active role in making sure that every time there is such a training opportunity it sends right and qualified persons. For example, the ministry workers would do better to hurry up documents processing when it is training issue because the two participants from Tanzania's documents were late for more than a week and arrived very late to Indonesian embassy. Such a case happened last year (2008) in which a Tanzanian participant's documents were received late at the Indonesian embassy when the training had started. That prevented him from attending the course;
2. The ministry desk officials should always keep an eye for such training and inform UDSM and other institutions;

3. Moreover, the ministry of Foreign Affairs and others should have the names list of junior staff of higher learning institutions to enable quick communication when training is available;
4. The responsible ministries could increase budget for educational matters especially in science and engineering subjects to enable those interested to get funding for studies and laboratory work. There is need of equipped laboratories at CoET and everywhere else within the country;
5. Scientific contests could be initiated from lower levels of primary schools to increase participation in science subjects. This has been a case in Indonesia where they hold an annual rocket competition. In addition activities such as Astronomy could be encouraged to a wider population of Tanzanians to raise awareness of the public towards scientific subjects; and
6. The GURT could go one step further to reestablish the FTCs, upgrade VTCs or establish polytechnic institutions which will produce the workforce required by industry.

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