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FINAL REPORT

for

TRAINING COURSE ON OPTICAL FIBER, SENSORS AND COMMUNICAITONS

APRIL 27 - MAY 11, 1997

KWANGJU, KOREA

ORGANIZED BY

INTERNATIONAL CENTER FOR SCIENCE AND HIGH TECHNOLOGY (ICS)

SUPPORTED BY

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATIONS (UNIDO)

COSPONSORED BY

KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY (KAIST)

KWANGJU INSTITUTE OF SCIENCE AND TECHNOLOGY (K-JIST)

REPORT PREPARED BY

B. Y. KIM, COORDINATOR

KAIST, TAEJON, KOREA

June 18, 1997

UNIDO Project TF/GLO/96/105

UNIDO Contract No. 97/081


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ABSTRACT

This report describes the process of preparation and execution of Training Course on Optical Fiber, Sensors and Communications, with the primary financial support from United Nations Industrial Development Organization (UNIDO). The training course took place at Kwangju Institute of Science and Technology (K-JIST, Kwangju, Korea) and Korea Advanced Institute of Science and Technology (KAIST, Taejon, Korea) during April 27- May 11, 1997, and was organized by International Center for Science and High Technology (ICS), Trieste, Italy. The course was coordinated by Professors Galieno Denardo of ICS and Byoung Yoon Kim of KAIST. The number of participants were limited to 40, including 20 people from the hosting country, Korea. The participants were from 5 Southeastern Asian countries, and there was a good mixture of people from industry, research laboratories, and universities. The course had 15 technical sessions including 4 laboratory training sessions, 3 laboratory tours and demonstrations in Taejon, and 3 technical management classes prepared by UNIDO (21 sessions in total). For the lectures, 13 instructors participated from 4 countries, 8 of whom were from Korea. The course covered a wide range of technologies from fiber fabrication to optical communication systems and fiber sensors as can be found in the attached materials for the course. General feelings of participants and the instructors were very positive and the training course was a successful one. It would greatly improve the organization of the course if the coordinators can have longer lead time to work with.



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1. INITIATION

Professor Galieno Denardo of ICS contacted Prof. B. Y. Kim of KAIST in October of 1996 asking if we could host a training course on Optical Fiber, Sensors and Communications at KAIST. After discussing the matter with Prof. Sang Soo Lee of KAIST, we agreed that the course could be held in Korea. Due to the availability of the classrooms, laboratory spaces and experimental facilities with a short notice, K-JIST was chosen as the venue for the course where Prof. Un-Chul Paek has established new advanced fiber fabrication facilities including MCVD preform fabrication equipment and a fiber drawing tower. Although K-JIST is a very new university, it was felt that the place was best suited for the training course with the support of several professors in the field of optical communications. At the end of November, 1996, ICS held a SPCM(Scientific Planning Coordination Meeting) at Trieste to discuss the planning of training courses in 1997 in Korea and later in Vietnam. Prof. Sang Soo Lee attended the meeting and the proposal for the Korean training course was presented and accepted by the committee. The information on KAIST and K-JIST can be found in the appendix #5.

2. PREPARATION

In January, 1997, we prepared an announcement for the course (appendix #1) and had it printed for distribution. The announcement and application forms were mailed in February to 10 countries in South East Asia including companies in Korea. More than 30 applications from 4 countries (Malaysia, Philippines, Singapore, Vietnam) were received by the end of March. It was a bit disappointing that some countries apparently failed to properly distribute the announcement in the country, and we did not have time to go through the second round for the distribution. We were able to select 20 candidates from the applicants and, at the same time, 20 people were chosen from the domestic companies (appendix #2). We finalized the time schedule for the course, arranged hotels for the participants, contacted instructors, sent out financial support request forms and collected them, dealt with the applicants visa problems, and so on. Close contact was maintained between the two coordinators, Professors Denardo and Kim, throughout the preparation process to avoid possible misunderstanding between ICS and KAIST. It was decided that the plane tickets would be reimbursed when the participant arrived in Kwangju. The local arrangement and planning for the lectures


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were managed by Professor Paek with the assistance of Professor Youngjoo Chung, which turned out to be very satisfactory. We also raised a substantial amount of supporting fund for the course from a number of companies with special thanks to SG Controls of UK.

3. EXECUTION OF THE COURSE


The details of the program can be found in the attached Course schedule (appendix #6) and the lecture notes (appendix #7) prepared by the instructors.

On Sunday April 27, the participants registered at K-JIST for the course (appendix #3) and the hotel assignments. Lodging was provided to the participants at Chumdan Grand Hotel close to K-JIST (within about 10-minute bus ride). Instructors who needed to stay in Kwangju longer than a day were provided accommodation at Kwangju Prince Hotel close to downtown. Each participant was provided a bag containing lecture note, information and a map of the area, a copy of Aide-Memoire (appendix #9), and several reminders for the events that were going to take place during the course (appendix #8). Later in the evening, a welcome reception following the dinner was held for the participants and instructors to get to know each other. Out of 20 invited, 18 participants showed up from overseas. There were 20 domestic participants.

At 9:00 am on Monday (April 28), an opening ceremony took place where K-JIST personnel and local press were invited. Dr. Doo Bong Ha, President of K-JIST, gave a welcome address and Prof. U. C. Paek gave the opening address and brief introduction of the instructors' profiles.

The list of course titles and lecturers are attached below. The time table of the courses is enclosed separately with this report (appendix #6). The lectures followed immediately the opening ceremony. Overall, a total of 21 technical sessions (3 hours per each session) were given, which were comprised of 15 technical lecture sessions including 4 laboratory experiment sessions, 3 technical management lectures, and 3 laboratory tour sessions at KAIST, ETRI (Electronics and Telecommunications Research Institute), and KT (Korea Telecom). The three organizations located in Taejon, along with K-JIST, are the key laboratories in Korea for the fiber sensors and communications research.

All of the lectures were delivered in the Joint Lecture Hall located in the Dept. of Information and Communication of K-JIST. For convenience of the participants and instructors, a temporary phone line was installed in the lobby of the building.



Computers and terminals were provided for general usage by the participants, particularly for e-mail checking and communication with their home institutions. Refreshment was also provided on self-service basis.

The meals were primarily served in the cafeteria of K-JIST, and transportation between the hotel and K-JIST was provided by a bus operated for K-JIST. Participants were regularly picked up at the hotel by the bus at 8:00 AM for a ride to K-JIST and again at the cafeteria at 7:00 PM following the dinner for a ride back to the hotel.

A semi-formal banquet was held in the evening of Thursday, May 1, at a French restaurant located in Trade Center building in Kwangju. All the participants and some of the instructors who were available at the time joined this event. On Saturday, May 3, the participants went on an outing for sightseeing at a local Buddhist temple and an amusement park in Kwangju.

During the second week, Drs. Katsusuke Tajima of NTT, Japan, and Giovanni Abramo of Italy led by Dr. Toshiyuki Miyake of UNIDO gave lectures on technical management. Upon request by Dr. Miyake of UNIDO, a brief closing ceremony was held after the last class at K-JIST, and each participant was given a certificate for successful completion of the course.

On Thursday morning, May 8, the participants moved from Kwangju to Taejon, and had their first lab tour to ETRI. They had visited the Basic Research Division where high speed fiber switching devices and fabrication facilities for diode lasers and detectors were demonstrated. Optical communication systems were also shown.

The next morning was spent at the Fiber Optics Laboratory at KAIST where they have seen various fiber components including fiber lasers, modulators directional couplers etc., and also several fiber sensors such as fiber gyroscopes and magnetic field sensors. They had opportunities to play with a fiber interferometer that is the basis of many fiber sensors. The particular demonstration unit was prepared specifically for the training course. In the afternoon, a KT laboratory was visited to experience optical transmission systems. On Friday evening of May 9, KAIST hosted a farewell dinner for the participants where they had opportunities to express their impressions and suggestions. The next day, the participants moved to Seoul. On the way, a guided tour was provided to Korean Folk Village where they could see the traditional life style of Koreans. This concluded successfully the Training Course on Optical Fiber, Sensors and Communications.

Table (Lecture title; Instructor; Affiliation)

Lecture Title	Instructor	Affiliation
Fundamentals of Optics	Youngjoo Chung	K-JIST
Optical Fibers	Un-Chul Paek	K-JIST
Preform Fabrication	Kyunghwan Oh	K-JIST
Waveguide Devices	Ghie Hugh Song	K-JIST
Fiber Sensors	Byoung Yoon Kim	KAIST
Integrated Optics	Sang-Yung Shin	KAIST
WDM Technology	Yun C. Chung	KAIST
Ultra-High Speed Transmission	Man-Seop Lee	ETRI(Electronics and Telecommunications Research Institute)
Modern Telecommunication Networks	Yoshiaki Yamabayashi	NTT optical Network Systems Lab
Technical Management	Giovanni Abramo	Italian Research Council
Semiconductor Optical Amplifiers and Applications	George Guekos	Swiss Federal Institute of Technology
Optical Fiber Amplifiers	Yasutake Ohishi	NTT Optoelectronics Labs
Progress of Optical Fiber Technology	Katsusuke Tajima	NTT Access Network Systems Lab
Fiber Drawing Lab I, II	Kyunghwan Oh	K-JIST
MCVD Lab I, II	Kyunghwan Oh	K-JIST

4. COMMENTS AND SUGGESTIONS

The course was a very successful one that ran smoothly and very well received by the participants. It provided an excellent opportunity for the engineers, technicians and researchers working in the area of fiber optics to learn broad aspect of fiber optics and the application areas. It is certain that they will be practicing knowledge they have

obtained during the course when they return to their home countries. It should also be noted that the interaction they had among themselves will be a very important resource for their future activities as leaders in fiber optics field in their countries. One thing that could be improved for the future events is longer lead time for the preparation of the course so that more efforts can be devoted to inviting people from a larger number of countries of interest. Some participants could have been more comfortable during their stay if more variety of food could be available although it is generally difficult for newly constructed places. People involved in the course agreed that the course was a very useful one and that it should continue.

5. FIANCIAL STATEMENT

The budget had to be managed carefully, since the original budget proposal was prepared in a rushed manner without sufficient time for detailed study on the matter. Every effort was made to contain the expenses within the original itemized categories, and we have been successful in doing that with some minor variations. The overall spending was significantly greater than the support from UNIDO (US \$55,000) and was covered by the fund raised domestically from industries and by the support from K-JIST and KAIST. Therefore, we could use all the UNIDO fund to support the transportation and living expenses for the participants and lecturers from overseas as originally anticipated. We have also provided about US \$25/day for the participants as daily allowances to cover miscellaneous expenses during the stay in Korea. The following are the itemized expenses incurred during the course. (1 US\$=880 Won for the calculation.)

EXPENSE REPORT FOR THE UNIDO FUND

Training Course on Optical Fiber, Sensors and Communications
K-JIST, Kwangju, Korea, April 27 - May 11, 1997


(The budget was managed by KAIST, Taejon, Korea, and only the portion covered by UNIDO support is shown)

1. Air Fare Reimbursement for the Participants :-----	US\$14,573
(Out of 20, two did not show up, and one got his own support.)	
2. Contribution towards living expenses for the participants from overseas: ---	US\$18,805
3. Air fare reimbursement for lecturers from overseas :-----	US\$3,115
(One from Switzerland, two from Japan)	
4. Contribution towards living expenses for the lecturers from overseas:-----	US\$2,331
5. Contribution towards travel and living expenses for lecturers from Korea --	US\$568
6. Contribution towards bus rental for local transportation:-----	US\$2,561

SUBTOTAL-----	US\$41,953
Overhead to KAIST (15 % of total budget)-----	US\$ 7,403

TOTAL -----	US\$ 49,356

Since UNIDO had already paid to KAIST US\$ 44,000, the remaining US\$5,356 has to be paid to KAIST. This means we have saved US\$ 5,644 out of the originally planned budget of US\$55,000. The receipts and details of the spending can be obtained upon request.

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LIST OF APPENDICES

1. Announcement and application form
2. Participants list
3. Registration forms
4. Instructor list
5. Brochure of KAIST and K-JIST
6. Training Course Schedule
7. Lecture notes for the course
8. Miscellaneous handouts for the participants
9. Aide Memoire
10. Questionnaire filled in by the participants after the course.
11. Certificate for the participants

Appendix #2

ICS-UNIDO Training Course on Optical Fiber, Sensors and Communications
1997. 4. 27 - 5. 11
Kwangju, Korea

No.	Nation	Name	Affiliation	No.	Name(KOREA)	Affiliation
1	Malaysia	Abdullah Bin Chik	Univ. Malaysia Sabah	1	Hyung Myung MOON	Daewoo Telecom
2	Malaysia	Boey See Pong	Optical Communication Engineering	2	Ki-Won RYOO	Daewoo Telecom
3	Malaysia	Dong Tieng Huan	Optical Communication Engineering	3	Sung-Taek LIM	Daewoo Telecom
4	Malaysia	Kalsom Mohd. Ghazalli	Company(Sirim Berhad)	4	Gi-Bum KIM	Daewoo Telecom
5	Malaysia	Kamisah Binti Mohamad Mahbor	Company(Sirim Berhad)	5	Jin-Hyun LEE	Daewoo Telecom
6	Malaysia	Mahamod Bin Ismail	Univ. Kebangsaan Malaysia	6	Min Jeong KANG	Korea Telecom. Research Center
7	Malaysia	Mohd Zubir Mat Jafri	Univ. Sains Malaysia	7	Soon-young SOH	Hanwha Group
8	Malaysia	Shaharuddin Safri	Company(Sirim Berhad)	8	Jae Oh BYUN	Kumho Information & Telecom. Lab.
9	Singapore	Zhou Feng	Nanyang Technological Univ.	9	Jae Dong KIM	LG Cable Research Center
10	Philippines	Albert T. Acosta	Univ. of Santo Tomas	10	Sun-Hup MOON	Taihan Electronic Wire Co., Ltd.
11	Philippines	Edmundo M. Mamboyo	Philippines Long Distance Telephone Com.	11	Sang Ho CHA	Samsung Electronics co. Ltd.
12	Philippines	Hermelito O. Go	Mindanao State Univ., Iligan Inst. of Tech.	12	Byoung-Seok PARK	KEPRI
13	Philippines	Joffer R. Mejillano	Industrial Technology Dev't Inst.	13	Taesang PARK	KIST
14	Philippines	Jose Claro Naperi Monje	Ateneo de Manila Univ.	14	IL-Bum KWON	KRISS
15	Philippines	Maria Beatriz L. Lacsamana	Univ. of Santo Tomas	15	Chi Young RYU	KAIST
16	Vietnam	Nguyen Quang Duong	Inst. of Optical Technology	16	Joong Wan PARK	KAIST
17	Vietnam	Pham Van Hoi	NCST of Vietnam	17	Mi Sun LEE	FiberPro
18	Vietnam	Phung Huu An	Inst. of Materials Science	18	Sung Hyun NAM	ADD
				19	Keedo HAN	Hanwha Group
				20	Chul Goo LEE	WOIL

< ICS-UNIDO Training Course on Optical Fiber, Sensors and Communications >
1997. 4. 27 - 5. 11

< **Instructors' Address** >

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Information for Participants

Dear Participant:

We are looking forward to your participation in the Training Courses on Optical Fiber, Sensors and Communication to be held at Kwangju Institute of Science and Technology (K-JIST) in Korea, April 27 - May 11, 1997. In this letter, we provide information to assist you in making plans to attend the Training Course. We also enclose a preliminary program, a registration form, and maps of K-JIST and nearby areas. Early registration is encouraged for better organization of the Course. Check-in will take place primarily on Sunday, April 27, 1997, from 2:00 p.m. to 6 p.m. in Dept. of Information and Communication at K-JIST. Reception will be held between 8 p.m. and 10 p.m. in the Faculty Dining Hall in K-JIST.

Transportation will be provided during this time to the nearby hotels (Chumdan Grand Motel and Ramada Motel) where the participants will stay while in Kwangju. Shuttle buses will run between the hotels and K-JIST every hour between 2 p.m. and 6 p.m. The hotel rooms are mostly Korean style(ondol) and each room will be shared by two people. If you have preferences in terms of room mates, please let us know.

Air Transportation

K-JIST is located in the northwestern corner of Kwangju City, 300 km south of Seoul. Kwangju Airport is in south of Kwangju City about 30 Minutes of driving distance from K-JIST. Kwangju Airport is mainly served by domestic carriers, Korean Air and Asiana Airlines. Most of foreign participants will first arrive at Kimpo International Airport, go through immigration and customs areas, and then proceed to the domestic departure area for the connection flight to Kwangju.

Ground Transportation form Airport to Hotel

A popular means of transportation from the airport is by taxi. The cost should be below 10,000 Won. (900Won = 1 U.S. Dollar). It is to be noted that most of taxi drivers in Kwangju do not speak English. When asked for the destination, show him the following information, also on a separate sheet. :

광주 광산구 쌍암동 첨단단지내

첨단 그랜드 모텔

(Chumdan Grand Motel, Tel : 82-62-955-5000, Fax : 82-62-955-5007)

라마다 모텔 (Ramada Motel, Tel : 82-62-955-7333, Fax : 82-62-971-9286)

Some participants will stay at chumdan Grand Motel and others will stay at Ramada Motel. These two hotels are located side by side.

Meals

Meals will be provided in the K-JIST cafeteria starting Sunday evening. While in Taejon, similar arrangements will be made. Participants are free to obtain meals themselves at their own expenses. The cafeteria is located in the K-JIST campus and serves mostly Korean style foods. The cafeteria is open 7 days a week and serves breakfast, lunch and dinners. The cost will be covered under the support for participants. Meals are served in the cafeteria according to the schedule below:

Breakfast : 8:00 a.m. - 9:00 p.m.
Lunch : 12:00 a.m. - 1:00 p.m.
Dinner : 6:00 a.m. - 7:30 p.m.

In addition to the cafeteria, there a number of restaurants near K-JIST in the Chumdan Area.

Contact persons

The persons responsible for organizing the details for the Training Course may be contacted ahead for answers to questions or assistance.

Prof. B. Y. Kim, Dept. of Physics, KAIST
Tel:82-42-869-2527, FAX:82-42-869-5527, E-mail : yoonkim@sorak.kaist.ac.kr

Prof. Y. Chung, Dept. of Information and Communication, K-JIST
Tel:82-62-970-2214, FAX:82-62-970-2204, E-mail : ychung@cactus.kjist.ac.kr

Bank Services

Bank services are available on-site at Hanil Bank on campus between 9:30 a.m. and 5:00 p.m., Monday through Friday, and between 9:30 a.m. and 1:00 p.m. on Saturday, for travelers checks and currency exchange.

Items to Bring

We note that the weather in Korea is very pleasant in April and May. Typical minimum and maximum daily temperatures vary from 10°C and 20°C. Some warm clothing is suggested for mornings and evenings. Tennis courts are available.

NOTIFICATION

TO
PARTICIPANTS
OF

ICS-UNIDO TRAINING COURSE ON OPTICAL FIBER SENSORS AND COMMUNICATIONS
(April 28 - May 11, 1997)

1. About Meal

- We do not offer the dinner of May 8 (Thursday) and the breakfast of May 9 (Friday), 10 (Saturday). Please have them at the restaurant of your Hotel.
- The lunches of May 8, 9 are available at KAIST Cafeteria (2nd floor). Please do not forget to hand over lunch coupons to a clerk. The lunch coupons will be given you in a few minutes after you get this notification.
- A buffet is prepared for the dinner of May 9 at KAIST Cafeteria (2nd floor). Please do remember that the airfare for your returning home will be offered to you there.

2. About Lodging

- May 8 and 9 : Hotel Princess (at Yusong, Taejon) TEL 823-9901
Ondol (1 room for 2 men)
- May 10 : Hotel President (at Seoul) TEL 02-753-3131
Twin bedroom (1 room for 2 men)

3. About Money Exchange

You have to exchange your money at the airport because your airfare will be given you by Korean Won. Banks at the airport and their exchange time available are as follows:

Korea Exchange Bank	7:00 - 20:00	(TEL 02-664-0102~4)
Cho-Heung Bank	6:30 - 21:00	(02-661-0541~8)
Shin-Han Bank	6:50 - 19:30	(02-663-5000~4)

* If you have any further question, please feel free to contact with us.

Professor Byoung Yoon Kim TEL 869-2527
(Dept. of Physics, #4306)

Dr. Hyo Sang Kim, Seung Kwan Kim TEL 869-2567, 8172
(Dept. of Physics, #4318)

- SCHEDULE -

May 8 (Thursday):

11:00 Arrival at KAIST
11:00 ~ 12:00 Distribution of Notification and Lunch coupons
12:00 ~ 13:00 Lunch (KAIST Cafeteria, 2nd floor)
14:00 Leaving for ETRI
14:20 Arrival at ETRI
14:30 ~ 16:30 Lab tour at ETRI
16:30 Leaving for Hotel Princess
17:00 Arrival at Hotel Princess
Check-in and dinner

May 9 (Friday):

09:10 Leaving for KAIST
09:30 Arrival at KAIST **Administration**
09:50 ~ 10:10 Watching KAIST News (~~Management~~ B/D, 1st floor)
10:20 ~ 12:00 Lab tour at KAIST (I)
 A-team: Prof. B.Y.Kim's Lab (10:30 ~ 12:00)
 B-team: Prof. Y. H. Lee's Lab (10:30 ~ 11:00)
 Prof. Y. C. Chung's Lab (11:00 ~ 11:30)
 Prof. S. Y. Shin's Lab (11:30 ~ 12:00)
12:00 ~ 13:00 Lunch (KAIST Cafeteria, 2nd floor)
13:30 ~ 15:00 Lab tour at KAIST (II)
 B-team: Prof. B.Y.Kim's Lab (13:30 ~ 15:00)
 A-team: Prof. Y. H. Lee's Lab (13:30 ~ 14:00)
 Prof. Y. C. Chung's Lab (14:00 ~ 14:30)
 Prof. S. Y. Shin's Lab (14:30 ~ 15:00)
15:20 Leaving for Korea Telecom.
15:40 ~ 17:00 Lab tour at KT
17:30 Leaving for KAIST
18:00 Dinner (Buffet) - KAIST Cafeteria, 2nd floor
20:00 Leaving for Hotel Princess

May 10 (Saturday):

09:00 Leaving Hotel Princess for Yong-in (**check-out**)
11:00 Arrival at the Folk Village (Yong-in)
11:00 ~ 15:30 Touring + Lunch
15:30 Leaving for Seoul
17:00 Arrival at Hotel President



*International Centre for Science
and High Technology*

AIDE-MÉMOIRE

Optical Fiber, Sensors and Communications

Kwangju Institute of Science and Technology (K-JIST)
Kwangju, Korea
27 April -11 May 1997

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BACKGROUND AND JUSTIFICATION

The field of measurement using optical devices and instrumentation has expanded rapidly in recent years. New situations in industry and the environment have enhanced the need for high quality sensors to be integrated into control systems. In parallel with the progress of sensors based on micro electronics, those based on optical techniques have expanded significantly, particularly with the increasing use of optical fibers and laser sources.

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The advancement of the field owes much to the development of fiber optics and associated optoelectronic devices for the telecommunication industry. Many optical fiber sensors capitalize upon the use of low cost sources, detectors and the specialized optical fibers that have been developed for other purposes. With the world-wide expansion of optical fiber telephone networks for voice, TV and computer data communications there is now a wide availability of high quality optical and associated electronic components at competitive prices. Coupled to this the expansion of the optoelectronics market for domestic consumer products, such as CD player, infrared remote control for many devices, has led to an expansion of novel technology available to the sensor engineer and designer.

The expertise needed to deal with optical fiber sensors overlaps in part with that which is also to be utilized in optical communications. Therefore training technicians in optical fiber sensors will also contribute to the training of experts in optical communications. It is also important to point out that the progress in optical fibers is due especially to their use in telecommunications (LAN, MAN, long distance communications ...).

In this connection already important activities exist or are planned in several developing countries.

The new communication networks are based on the transmission of laser signals in optical fibers. The technology of optical fiber networks is unique and the experts who handle them need a scientific background. The optical fiber networks (telephone, TV transmission,...) are cheaper and much more effective than the old copper cable systems.

The picture indicates different situations: some developing countries have already entered the world of industrialization; many others are just users of optical fibers and relevant devices. Certainly all of them need to create or to strengthen a class of experts in optical high tech. and to undertake production activities in this field.

Optical fiber technology has many applications in different situations. It represents the main feature of modern communications and can be amazingly useful offering a wide class of sensors. Despite the very different types of applications

many basic technical aspects are common to both sensors and telecommunication technology, and a good technician must be acquainted with all of them.

JCS can cope with the need of the formation of technicians and experts responsible for industrial planning in this specific field. Therefore, the opportunity created by a training course aimed at industry technicians and experts will strongly emphasize a culture of technology transfer and thus help the economical development of the region.

OBJECTIVES OF THE TRAINING COURSE

- to train experts in those sectors of technology which are cost-effective and offer opportunities for innovation;
- to enhance the use of systems and devices which are based on optical physics.

STRUCTURE OF THE TRAINING COURSE

The course will be devoted to the description and discussion of the latest technologies implicated in the use of optical fiber for sensors and communications.

Course titles: Fundamental of Optics, Optical Fibers, Preform Fabrication, Waveguide Devices, Fiber Sensors, Integrated Optics, WDM Technology, Ultra-high Speed Transmission, Optical Fiber Amplifiers, Network.

Lab exercises on Fiber Drawing and Coating and on Preform Fabrication by MCVD will also be held.

Lab exercise I - Fiber Drawing and Coating

In this course, the actual fiber drawing process will be demonstrated on the 3-m long fiber draw tower at K-JIST. Schematics of the structure of the drawing tower will be explained. The process involved in the diameter control, polymer coating will be explained and demonstrated on site.

Lab exercise II - Preform Fabrication by MCVD

The aim of this course is to demonstrate actual preform fabrication process in the MCVD system and to give the participants an hands-on experience. The structure of the MCVD system will be explained along with its functions in the process. The topics will include: deposition, sintering and collapse of the preform

PARTICIPATION

The training course will bring together 20 participants from South-East Asia, mainly physicists, engineers, technicians or managers involved in the industrial use of optical fiber.

EXPECTED OUTPUTS

The training course is structured in a way to advance the scientific and technological level of participants and to create a group of expert technicians in the field of applications of optical fiber and relevant technologies to optical communication and fiber optic systems for industrial testing and environmental control.

DOCUMENTATION

The documents available for the training course will be:

- 1) Aide-mémoire of the training course.
- 2) Programme and list of participants.
- 3) Lecture notes, bibliography and copies of manual of exercises
- 4) A list of selected bibliography on Optical Fibers (papers and abstracts)

LANGUAGE

The training course will be conducted in English and no translation facilities will be available. It is expected that the participants have a good command of English.

TIME AND VENUE

The Training Course will take place from 27 April to 11 May 1997 at:

Kwangju Institute of Science and Technology (K-JIST)
Department of Information and Communication
572 Sangam-dong, Kwangsan-ku
Kwangju 506-712, Korea
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FINANCIAL ADMINISTRATIVE ARRANGEMENTS FOR UNIDO-ICS FINANCED PARTICIPANTS

For those who will be invited by ICS to participate in the training course, round-trip air-economy transportation from the airport of departure will be arranged and prepaid tickets issued where necessary.

Room and board at the training course venue will be provided upon arrival to Kwangju. Reservation will be made for all participants at the Chaumder Grand

Hotel. Tel: +82-62-955-5000, Fax: +82-62-955-5007 or at Ramada Hotel, Tel: +82-62-955-7333, Fax: +82-62-971-9286.

The participants will be required to bear all expenses in their home country incidental to travel abroad, including expenditures for passport, visa, and any other miscellaneous items.

ICS will not assume responsibility for any of the following costs which may be incurred by the participant while attending the meeting:

- (1) compensation for salary or related allowances during the period of the workshop;
- (2) any costs incurred with respect to insurance, medical bills and hospitalization fees;
- (3) compensation in the event of death, disability or illness;
- (4) loss or damage to personal property of participants while attending the workshop.

VISA ARRANGEMENTS

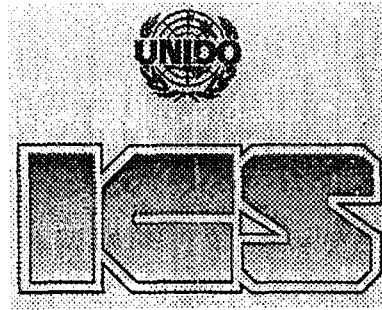
Participants are requested to arrange for their visa as early as possible at the Embassy of Korea in their home country. In case of difficulties, please advise the contact person mentioned below.

CONTACT PERSON

For additional information, please contact:

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*This Is To Certify That
Abdullah Bin Chik*

*Has Successfully Completed
ICS-UNIDO Training Courses on
Optical Fiber, Sensors and Communications
K-JIST, Kwangju, Korea
April 27 - May 11, 1997*

A handwritten signature in cursive script, appearing to read 'Byoung Yoon Kim'.

Byoung Yoon Kim (KAIST), Coordinator

A handwritten signature in cursive script, appearing to read 'Un-Chul Paek'.

Un-Chul Paek (K-JIST), Program Manager