

# INTERNATIONAL COLLABORATION IN RESEARCH AND GRADUATE EDUCATION

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**Abstract** *In today's fast changing technology, due to high cost it is almost impossible for every university to have state-of-the-art equipments in the laboratories to carry out advanced research. One way to overcome this difficulty is to establish the international collaboration in advanced research and education. Here at the University of Nevada, Reno, we are developing a plan for international collaboration in research and graduate education on limited basis in the first phase. According to this plan we are establishing such collaboration with the University of New South Wales, Australia and the Advanced Telecommunication Research Institute (ATR), Japan. This paper presents various aspects of this collaborative program, difficulties involved and to overcome the bureaucratic system of the universities through mutual understanding and cooperation.*

**Index Terms** *Advanced research, collaborative program, graduate education, optical communication.*

## Introduction

We all know that the global interaction is very healthy for advanced research and brings the scientists from different parts of the world together to solve the complex problems. This is particularly useful for the universities, which are not able to afford the high cost of the research facilities. Fortunately, the latest communication technologies are very helpful in this regard where communication can be established in a shortest possible time using e-mail and internet technology. Here at the University of Nevada, Reno we are developing the international collaboration with the University of New South Wales, Australia and the Advanced Telecommunication Research Institute (ATR), Japan on a limited basis. The graduate students from the University of Nevada, Reno are going to do most of the theoretical work related to Master's theses and Ph.D. dissertations at home. Next they are going to visit to these two institutions for six months to two years. At the moment the collaboration is limited to optical communication area only due to limited research facilities on our campus. It is hoped that this program would become the role model for other programs of the university. This certainly presents unique opportunity to our graduate students not only to carry out advanced research activities in a foreign country but also learn about the people and culture and establish a new friendship. This way we can really bring the whole world together. The

various aspects of this collaborative program like program plan, duration, financial arrangements, problems and solutions are presented in the following sections.

## Program Plan and Duration

According to this plan the names of the students and their background information is provided to the institutions and contact professors in Australia and Japan at least six months to one year in advance. This helps in identifying the projects for the visiting scholars and gives sufficient time for preparing all necessary papers. The number of students is decided on the basis of availability of fellowships and research facilities. It may take more time for the students from developing countries due to complex and time consuming immigration formalities for these countries. Like most of the universities in USA, larger number of graduate students in our MS/Ph.D. programs in engineering are from China and India. The professors in Japan and Australia who are directly involved with the research activities of the students, are also members of their theses/dissertation committees. It is important to note that these professors have close interaction with the students' advisors in our university. The students are being exposed to the life and culture of these countries through the office of the international students and scholars (OISS) on the campus of the University of Nevada, Reno. This exposure may help them to know many unexpected situations in those countries and would take less time to get used to the life in the foreign land.

The duration for each graduate student is decided on a case by case basis. It depends on the research topic, available research facilities, degree program and the duration of the fellowship. At the moment we are planning to send three MS students, two to Japan and one to Australia. The MS students are supposed to complete their theses work within six to nine months period while the Ph.D. students are expected to complete the experimental part of the dissertation within one to two years time frame. This time limitation is important otherwise the students may never be able to complete the program. The first batch of three MS students is going to spend about seven months in these countries. They are supposed to leave in the first week of January 2002 and return about the end of July 2002 so that they can defend their theses in August 2002. They are already working on theses related topics as independent

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study. This would provide them sufficient theoretical background to carry our experimental work in Japan and Australia. These topics are decided in consultation with the professors responsible for their research program abroad.

### **Financial Arrangements**

The ATR in Japan is funded through private companies like Sumitomo, NEC, Nippon, Fujitsu etc. and the government of Japan. The main idea behind this collaboration is to carry out the advanced research in the futuristic technologies. The scientists from these companies and other research organizations from all over the world spend one to three years in this institute. The idea of bringing the people from industries, academia and research laboratories can certainly produce the best possible research combinations. This approach is definitely highly product oriented which has resulted into larger number of patents from the institute every year. Encouraged by the success of this joint effort, the Japanese government has started similar research centers at few other locations in the country. I think this is an excellent role model for the entire world. At present there are more than two hundred visiting scholars in this institute with a fairly large number from foreign countries including USA, Mexico, Italy, Spain, China and India. This institute has excellent research facilities in microwave photonics, optical communications and computer animation technology. The institute provides round trip air travel, part of housing expenses and monthly stipend to cover all other expenses to all the invited scholars. This is an excellent arrangement and there is tough competition to get invited as a visiting scholar in this institute.

We have made different kind of arrangements with the University of New South Wales (UNSW), Australia. This is more on a personal relationship basis with Professor Pak Chu of the Photonics Research Center of the UNSW. This center has very good research facilities in optical communication area. The uniqueness of this research center is that it has the glass and plastic fiber fabrication facilities which is very uncommon in the universities. Professor Chu has agreed to provide Research Assistantships to our students. In return these students have to do some laboratory teaching to undergraduate students. The assistantship is sufficient to cover most of the expenses including housing in the nearby colleges in Sydney. But the students have to pay for air travel from their pocket. Even then it is an excellent deal as they have the opportunity to visit and live in Australia. The students intending to go to Australia are supposed to save sufficient money for air travel, which is usually 50% of the normal fare for the students with proper identification. The life in these colleges, which are like residence halls in USA, is very disciplined. These colleges provide very good atmosphere for study and the students don't have to worry about cooking. They would as well

spend that time in their research work. It is also noticed that the international scholars can work outside the campus for certain number of hours per week without violating immigration laws. This certainly provides some supplementary income to the students.

### **Main Problems and Suggested Solutions**

The whole program of international collaboration is not free from problems and difficulties. The first problem is the willingness of the students to participate in this program. It is very common these days that in the absence of experimental research facilities, graduate students prefer to take computer simulation related problems. This takes less time and students love to work with computers rather than solving complex analytical problems and experimental verification thereafter. As already mentioned that most of the graduate students in engineering are from foreign countries who would like to stay in the USA to complete their research work. The degree and research work from USA is still looked upon very highly in the developing countries. However, as the degree awarded is from the US universities this does not become a serious problem.

The financial problem is the most serious one. It may not always be possible to find funding for the students. We are lucky to establish close relationship with these two institutions in Japan and Australia. In the absence of sufficient funds the program can not be carried out on a continuous basis. This certainly requires solution on the international level. The best way may be the support from UNESCO and other world bodies. But we should not forget that the best and faster results are always achieved on personal relationship basis. The government and other similar agencies always make the process more complicated. We are hoping to make this as a part of the "study abroad" program of the university but still the main role to be played by the professors involved in the program. Some universities have limited funds for international collaboration but not to support graduate students. Besides these main problems, there are other problems like isolation from friends and family for longer duration, adjustment in a new land and atmosphere, cultural and food habits as there may not be many people from your origin, immigration related problems etc.. The bureaucratic system of the universities is another important hurdle to overcome.

### **Conclusion**

The basic idea of the international collaborative program in research and graduate education being developed at the University of Nevada, Reno with a particular focus at the optical communication area at this time has been presented. It is hoped that this experimental program grows at a faster pace to be expanded to other areas on the campus.