Hussain continued . . .

as control for photogrammetric processing done in the office. That's why we have our students go out into the field to collect the information necessary for the basis of their photogrammetric projects. Due to computers, they are learning to use more advanced techniques. For example, we are seeing more and more types of imagery being generated from satellites. (Satellites don't use conventional photography, even though the images look very much like photographs. They use devices such as radiometric scanners or radar which penetrate areas under cloud cover.) The current shuttle missions also have a major interest in mapping and the satellite industry has made it possible to image the entire earth within a ten-day cycle.

Q: Will you describe some of the practical applications of photogrammetry information?

A: The information provided by modern imaging technology is so extensive that as engineers, our main challenge is to determine how we can automate and get the information processed rapidly. Once that is accomplished there are all kinds of interesting applications, including national resource planning, management and defense. Photogrammetric techniques are used to obtain a complete inventory of the nation's food and water supply, as well as measuring the amount of salinity in the soil. You can even rapidly predict what the volume of a particular crop will be during the coming year. This type of information-gathering is also used in planning our national security. For example, if our satellite measurements indicate that a particular country we aren't very friendly with will be having extensive crop failures, we can anticipate that they will be diverting a lot of their resources toward food, rather than spending it on military hardware. A more common application of photogrammetry would be the monitoring of landslide areas or dams where cracks have appeared. Other applications include the biomedical field where precise quantitative measurements can enable the engineer to design prosthetics and artificial limbs that are capable of performing—as precisely as possible—just like the human joints do. So photogrammetry encompasses many areas and offers a versatile solution for all types of measurement needs in engineering, construction, mining and industrial processes. Another advantage is that it is a non-contact system and you don't have to disturb the object that you are measuring. A measurement can be taken at a very close range or it can be taken from photographs which have been shot in space. It is a science that has a very strong mathematical and geometric basis, and it adapts well to the rapidly developing computer technology.

Students must master the ability to communicate and express their ideas.

Q: What makes the surveying engineering program at CSU, Fresno unique?

A: First of all CSU, Fresno is one of about six universities in the U.S. that offer a B.S. degree program in surveying and photogrammetry. In fact, in 1979 our surveying engineering program was the first program in the nation to be accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Because of the rapid technological advancements taking place in this field, there is increasing demand for college education for entry into the profession. Our program is progressively in step with the current developments in the field and it gives equal emphasis to both practical experience and theoretical principles. Our faculty is highly competent and is constantly striving to enhance the quality of the program. Our graduates are in demand, and that is very rewarding.

Q: In order to become an engineer, what skills must a student develop?

A: Engineering students should enjoy math and science, rather than approach it as a drudgery. I try to encourage my students to see geometric equations in their own minds so that eventually they can visualize a problem automatically, along with the solution. Another very important skill that students must master is the ability to communicate and express their ideas. In fact, an engineer should be able to sketch an idea on paper, as well as express his or her ideas verbally to colleagues and clients. Computers are already making it easier to communicate ideas because now you can sit down at a graphics terminal and start designing with a light pen, make modifications very easily, and come up with the final design in a few minutes. Twenty years ago the same design might have taken you 30 days!

Finally, I believe that there is a need for engineers to develop a strong ethical sense toward their profession. Sometimes shortcuts are taken or certain decisions are made based on economic restraints that are not the right decisions technologically. If students have the commitment to spend four years obtaining a degree in engineering, they should also have the lifelong commitment to be responsible professionals.