
University of Arkansas:

P1.

First of all, I would like to thank the Search Committee for giving me a chance to visit the campus and to do a presentation here.

I am very grateful to their invitation.

In the following, I will show you my vision and goal for this Department and my action plans to lead this department to reach the goal. The actions plans cover research, education and service. In addition, I will also discuss my management style.

This presentation takes about 30 Minutes.

After that, I will answer questions.

P2.

To talk about my vision for this department, we need to know what we are facing.

The world is more inter-disciplinary and collaborative.

The problems we need to solve today usually require techniques from several different disciplines, such as problems in bioengineering. Therefore, communication and transition of ideas and results between different disciplines must be based on a language people can understand. Visualization techniques are obviously the easiest and most efficient way to communicate ideas and results between different disciplines.

Another important issue is Internet computing. Internet has simplified and improved our lives in many ways. Through Internet, "Distance" is no longer a barrier in human collaboration. People from different country or continents can work together as if they are in the same room. Human being productivity has increased dramatically during the past decade. Obviously whoever has a dominating role in the design and development of Internet infrastructure and Internet computing (including the handling of Internet problems such as spam, viruses/worms, digital copyrights, identity theft, electronic fraud, electronic warfare, etc.) will have a bigger share in the control of human lives and the world's order.

What we can see is, computing today has

reached a point that only those who know how to use internet computing as a core and visualization techniques as a communication means to integrate, to combine different computation models and computation tools to solve multi-disciplinary problems in urgent areas such as SECURITY and PUBLIC HEALTH will excel.

P3.

P4.

New level of success means BETTER REPUTATION and RANKINGS.

A higher ranking would not only attract more high-quality students to this department,

but also increase its chances in getting external supports.

P5.

We need an Action Plan for each of the Research, Education and Service Areas. My action plan for research include the following items.1. ... 5. 6. Pushing for creation of technology centers in the college such as

Center for Visualization and
Virtual Environment

Center for Internet Computing

Center for Bio-Informatics

The importance of these items is not

necessarily sorted in this order, but I do believe the first item is the most important thing we should do.

I will address these items in the following, starting with item 3 because information used by this item will be used by item 1 too.

P6.

It is well known that the top CS Depts are much larger. E.g., MIT's no 1 ranked CS program has 91 faculty. Stanford's no 2 ranked CS program has 51 faculty. CMU's no 3 ranked CS program has 48 faculty. Berkeley's no 4 ranked CS program has 46 faculty. Cornell's no 5 ranked CS program has 50 faculty. And they all have large number of PhD students

annual PhD graduates.

P7.

The good thing is, one does not (always) have to be highly ranked. Small CS depts can be highly ranked. E.g., Cal Tech's no 15 CS program has 15 faculty members. Rice Univ's no 19 CS program has 18 faculty members.

P8.

The key to improve in rankings and reputation is to focus through growing selective areas of excellence. (The areas of excellence of Cal Tech's CS dept are: computer vision/graphics, algorithms, networking. The areas of excellence of Rice's CS dept are: AI/robotics, graphics/geometric modeling, systems.)

We will continue to expand the strength of all our research areas, but we will put extra resources in three selected areas that are most critical to the future of this department.

(and have the best chance to excel nationally (i.g., bio-informatics, vision/graphics, networking

P9.

One thing in common for all these top CS departments they all have good size of research funding per faculty. Each faculty at MIT has \$685,000 per year.

Each faculty at Stanford has \$730,000 per year.

The smaller depts,

such as Cal Tech has \$500,000 per faculty per year.

Even Rice has \$350,000 per faculty per year.

P10.

For this dept to improve reputation and rankings important issue would be to significantly increase of this dept, whatever it takes.

We will encourage faculty to write more high-quality proposals each year (3-4), and explore our opportunities with other federal agencies such as Army, Homeland Security, NIH and private companies such as

We will use Arkansas' Parliament members to build connections especially with Army and other federal agencies in places with huge amount of cash to spend.

P11.

We hope each faculty member can publish 3 journal articles and 4 conference papers in high quality journals and conferences.

We will create a list of top-tier journals and conferences and second tier journals and conferences in various research areas and faculty members will be evaluated based on the quality of their publication.

We encourage faculty to publish half as many papers in top-tier journals and conferences than twice as many papers in second-tier journals and conferences.

P12.

Larger startup funding is necessary to compete for new faculty members. It is also necessary for new faculty to quickly build up a strong research team to compete for Professional visibility and to compete for CAREER awards.

We should know that to build a larger research effort

we need to invest in research resources.

We will work with the College to increase the state funding by 50% at least.

P13.

I will address this issue in the Education part.

P14.

The sixth item is to push for creation of technology centers at the college such as

- Center for Visualization and Virtual Environments
- Center for Internet Computing and Security
- Center for Bio-Informatics

P15.

Technology centers have several advantages that to build stronger research ties with industry.

First, a technology center can provide combined of several areas. Therefore, a technology center technical problems in a broader range.

Second, the cost structure of a technology center because faculty associated with the center usually not paid by the center and the students working are paid much less than professional engineers. So it is cheaper for a company to out-source its projects to a technology center than doing the themselves.

This "Technology Center" model has been worked at several places, including U Southern California Information Sciences Institute, Johns Hopkins' Physics Lab, and Georgia Tech's GTRI.

P16.

The challenge universities are facing now is the a world that is more INTER-DISCIPLINARY, COLLABORATIVE, and GLOBAL.

Computer Science Depts of this century need to students who are more adaptable and flexible, be being technically proficient.

This is true for both undergraduate and graduate

P17.

My Action Plan for Undergraduate Education in the following items.

The first plan is to increase the number of underg

students from 220 currently to 330 in 2010.

It has been a national trend that the number of students attending CS is declining.

But the total number of students interested in this field is still very large nationally and in the state of Arizona. We should market our undergraduate program to increase the number of prospective students in the state of Arizona and the neighboring states.

Build partnerships (exchange programs) with universities in China, Malaysia, Korea, Taiwan, Japan to attract more foreign undergraduate students.

Need to redesign our website.

If we can let a student know more about our strengths, we have a better chance to recruit that student into our program. Providing an informative website is the cheapest yet the most efficient way, to recruit students.

P18.

Quality certainly is more important or as important. Our next plan is to increase the quality of undergraduate students. We need to attract more excellent high school graduates to UAF. The first thing we will do is to increase funding for undergraduate scholarships in CSCE. Other actions include organizing province-wide recruitment trips to high schools to talk to students directly, holding programming contests and providing more information about our program on our website.

P19.

The 3rd plan is to get the undergraduate CS program accredited by "ABET" in 3 yrs. UK's CS Dept went through the ABET evaluation process last year.

I was a member of the ABET committee of UK's

I was involved in every detail of the preparing process. So, I have enough experience to lead such a process. This might not be as urgent, but it needs to be done eventually.

P20.

I consider the job of a programmer a manufacturing job. A company would out-source it if at all possible. So, in addition to giving the students a good training on computer science in the broad sense, we should give them a chance to be more specialized in one or two areas, in a sense, giving them something that cannot be out-sourced to a foreign country yet.

We do this by creating, for instance, certificate programs in graphics, networking, bio-informatics, or game development. The students take some extra curricula to get the certificate. With a certificate, a student would not only have

when looking for a job, but also has less chance laid off because of the extra strength.

I am currently responsible for developing a certificate in vision/graphics for UK's CS dept. So, I have to lead such an effort here too.

P21.

In addition to increasing the width of the student knowledge, we should also increase the depth of their hands-in capability.

Our students must be able to design, not just implement. They must be able to solve multi-disciplinary projects. By looking at your course list, I can tell there is not such an effort in that direction in this dept.

But we can do more by requiring the projects of the Design class to be involved with at least one of the faculty's research grants.

P22.

My Action Plan for graduate education includes

1. Increase the number of PhD students
2. Improve the quality of PhD students
3. Improve the retention and graduation rate of

For the first item, we will try to increase the total number of graduate students by 50% (from 63 to 95), in part but with a favor in more PhD students.

The goal is to increase and the total number of PhD students by 75% by 2010 (from ___ to ___).

(currently, the number of graduate students is 63 PhD and ___ Masters)

This goal will be achieved by attracting more graduate students into our PhD program through the following steps:

- (a) PhD students have the highest priority to be
- (b) A PhD student with a MS in CS before joining our program can not get a MS degree here if they change their mind after joining our PhD program
- (c) do not support MS students with TAships
- (d) Increase RA positions for PhD students by 20% and our external research funding by 100% by 2023

A more informative website can also make recruiting students more effective.

P23.

We will improve the quality of graduate students

- (a) encouraging our good MS students to apply for our PhD program
- (b) we will try to provide paid summer internships, 6-month or one-year internships to top CS juniors

or seniors at top universities in China, India, Taiwan, Korea, ... with dept fund.

Once a student is familiar with our department especially when a student likes his/her research experience here, we have a better chance to re-hire him/her back into our PhD program. I got this idea from the internship program of MicroSoft Research Center in Beijing (called MRCA). Their internship program not only created excellent research results (those students made significant contribution to the research work of MRCA by publishing papers at prestigious conferences like SIGGRAPH, ... etc) but also provided them with an influx of excellent employees because most of those students joined our department after they graduated from their colleges.

- (c) our PhD student stipends must be competitive. We will make sure our PhD students are paid as much as our benchmark universities.

24.

We will

- (a) develop a more exciting and flexible curriculum
- (b) offer courses more efficiently
- (c) ensure every PhD student get financial support

We will make our graduate curriculum more exciting by introducing more courses in the experimental CS and areas of current interest such as: Computer Vision, Image Processing, Computer Graphics, Multimedia, Computer Animation, Distributed Operating Systems, Computer Networks, Virtual Reality, Advanced Networks, Neural Networks, Cryptography, Medical Bio-informatics, etc.

(note that the networking and image processing are offered differently in CS depts and ECE depts. ECE people focus more on building hardware while CS people

focus more on developing software. Another example is CAD people in ECE focus on circuit design while in CS focus more on geometric shape design.)

But more importantly, we will make our graduate curriculum more flexible by consolidating courses in the curriculum so that MS and PhD curriculum is not too many courses. This will make sure most of the courses are offered at close to full capacity so that there will be no need to cancel any courses. Therefore, PhD students can finish the required courses and enter the research stage as soon as possible.

P25.

Service is also a very important mission of us. The Chairman of the dept should work closely with DUS to ensure every student gets proper adv

every thing related his/her study in the department

In particular,

- (a) To make the advising process more efficient for the students as well, we will consider the possibility of doing group advising, i.e., instead of meeting the students individually, we provide a chance for the advisors to meet with all the advisees in an office area at the same time so that one trip is all it takes for everybody.
- (b) For graduate students who do not have a permanent supervisor yet (the duration of that time sometimes could be as long as two years), the department will assign a temporary advisor to each graduate student to help with his/her academic problems.
- (c) We will hold regular meetings (at least once a month)

to discuss the progress of our MS students and students. Each advisor, permanent or temporary, is responsible for reporting the progress of his/herself so the department (DGS) can make proper decisions on the next stage for each student. These meetings also determine if a student should be financially supported by the department subsequently.

P26.

To help faculty get involved more in professional activities (to increase visibility of the dept),

(d) the dept will provide administrative support within its power to faculty who are involved in professional activities such as conference chairman, program chairman, editor-in-chief,

(e) the dept will help faculty to seek financial assistance from the university or external sources to hold conferences and symposiums on campus in Toronto area.

P27.

I prefer a transparent, bottom-up approach. I treat people fairly and honestly. I like to do things by book.

Responsibilities of the dept chairman should be clearly defined and stated, so everybody knows exactly what the chairman can do and cannot do. Everybody should also know how the work of the department is conducted and operated. For example, The Department Operating Rules and Procedure should be regularly reviewed and revised if necessary.

Policy making within the department will be as follows:

possible, through various committees (executive hiring committee, graduate committee, undergraduate equipment committee etc) and faculty meetings consensus on departmental issues.

The Department will ensure that each faculty member with appropriate administrative and technical support for their purpose, the administrative and technical support will be reviewed and revised if necessary to make sure the department has sufficient support in both areas.

Every employee of the department will be treated as an employee. We will improve the morale and effectiveness of the staff members by providing appropriate recognition and competitive salaries to all staff (administrative or academic) compared to our benchmark universities.

P28.

I believe the most important job of the University and Department is to provide an environment that allows each student to reach his/her full potential. I will do my best to create a department

- a department with a bracing atmosphere,
- a department with a strong sense of community,
- a department with intellectual vigor.

P29.

This ends my presentation.

I will be glad to answer questions.

P30.

Because of the "reputation" of U Arkansas, and because of my "ambition".

U Arkansas has one of the top 70 Engineering Colleges in the United States. Under the current strong and high-profile leadership of the College of Engineering of U Arkansas should continue to grow even stronger in the near future. I like to work in an environment so that the CSCE dept can grow and thrive. With appropriate resources and effort, the CSCE dept has the potential to grow into a top60 or even a top50 College in this country.

I have the vision, leadership and experience to take the CSCE department to such a level.

The key is to build on selective areas of excellence and to further improve existing research areas and its graduate and undergraduate programs.

I want to have a chance to work with the College of Engineering Department to make this happen.

The university was established in 1881.

Currently, the university has about 18,000 students.

Student-to-faculty ratio (17:1).

Flagship campus of the University of Arkansas System.

Provides nearly 200 academic programs.

A student-centered rising star in engineering education.

P32.

I have strong experience in "research", "education", "entrepreneurship". I know how to manage/handle the challenges that we will be facing to reach a higher status in education and service.

I have the attributes required of a department chairperson, such as "leadership", "vision", "know-how", and "communication skills". I know how to lead, where to lead, and how to motivate our colleagues to achieve their potential.

These points are not only supported by my resur
by people who know me well.

P33.

Can you give us a few examples to show your en

P34. (examples of entrepreneurship)

For a business to make a profit, there are basical
strategies: providing a product or service that no
provide, or providing a product or service that is
anybody else's.

P35.

A business owner needs vision to set up the right and right strategy. To reach the goal, he needs know-how to carry out the strategy. I have both.

P36.

When we first started the business, the goal was to develop some of my previous technologies (in hardware-accelerated surface rendering). The strategy was to win SBIR/STTR (small business innovative research program/small business technology transfer program) grants to support operation of the company. It turned out that applying for SBIR/STTR grants was necessary because with the contribution of my research and later to Olympus and Ford, the company got the funding to start with and prosper. This shows my capability to do research in a strategic position that enables us to establish a relationship even with industry giants.

For a small company like ours to get projects from companies like IBM, Olympus and Ford, there are only two

PERFORMANCE and **VISION**.

We must gain their trust of our performance and convince them the strategic height of our **VISION**. I have both.

For each grant I did for outside companies, I always went the extra miles for everything we did and I always made sure that we delivered exactly what have been specified in the Grant. Therefore, I was able to win trust of highly demanding industry giants. Besides, I have the capability to design sophisticated systems that meets the exact requirements of these industry giants as well. Therefore, I was able to win contracts from these companies subsequently, even though the size of our company is really small compared with other companies.

P37.

But my most important attribute is my vision in Strategic product for the company.

For a period of nine years, the revenue of our company from delivering services to IBM, Olympus, or Ford and we made a profit in most of these cases. But it was constantly to develop a successful product or service. The company eventually developed a very successful product that can save the car redesign process by millions of dollars. The idea of the product is the 'constrained scaling based shape-altering' of trimmed NURBS or subdivision surfaces;®.

By allowing a designer to scale the body of a car in x-, y-, and/or z-direction while holding certain features unchanged, such as holes for the front lights, tail lights, handsets of the doors, or even the entire doors, or

globally or locally modify an existing model in length, height, or width (wheel base) without affecting other significant features and, consequently, avoid an entire redesign process.

P38.

The design process of a car usually takes 24 to 48 months with a cost of about \$400 million.

By avoiding the redesign process while altering an existing model, a car company saves both on time and money significantly.

Our product is the only one of this kind and, consequently, has the entire market share.

P39.

I was the main architect of the project, responsible for everything from system design to global and local implementation. This shows my capability in designing a strategy, building a team and leading the team to reach the business strategy plan.

Running a business and running a CS dept, to be successful are the same, you need vision and know-how for execution. So, I think my experience in running a business will help me run this department.

P40.

Show us examples of your leadership in dept affairs.

P41.

I have extensive experience in supervising Post D and Masters. My record includes 11 PhD/Post D

I have experience in undergraduate program accreditation. UK's CS Dept went through the ABET evaluation last year. I was involved in every detail of the process. So, I have enough experience to lead such an effort here (if such a process is needed). This might not be urgent, but it needs to be done eventually.

I am currently responsible for developing a certificate program in vision/graphics for UK's CS dept. This involves developing new courses and developing study plan. So, I have to lead such an effort here too.

I have developed three new courses in Vision/Graphics. Including "computer animation", "free-form solid

and "computer aided geometric design".

"Computer Animation" is a very popular course

I coordinated the courses that the Vision/Graphics teaches on a annual basis.

I also consolidated our undergraduate courses so students wouldn't have to wait for one more semester or one more year to graduate because the required courses were not available.

So I have experience in most aspects of teaching

P42.

I have been a program committee member of many international conferences, including 6 this year.

I am an editors of 3 international journals.

I am an Engineering College Council member, re
Computer Science department.

I am a third year University Senate member, repr
College of Engineering.

So I have service experience in my professional
as within the university structure.

P43.

My research record includes 120 research papers
papers), 26 externally funded research grants (PL
I have been continuously supported by NSF durin
14 years. I have also been supported by fortune 5
such as IBM, Ford, Honda (twice) and Olympus
I have coordinated or been involved in large-scal
disciplinary grant proposals more than five times

So, I have extensive experience in all aspects of well. These records show I have enough experience in all these three areas.

P44.

Where did you get your start-up fund?

P45.

Our startup fund was US\$200,000.

This money came from three resources:

personal loans, our investment gain on stock markets (both Taiwan and US), and award money I received from the

Dr. Sun Yat-sun Technology Invention Award in 1985.

P46.

Since the startup fund is quite small, so the first contract we received from IBM to implement in micro code of IBM's Trimmed NU surface rendering algorithm was very critical for the early day of the business because it not only provided us with the capital we needed to run the business, but also gave us a good reason to convince other companies to grant us contracts subsequently.

P47.

Teaching Experience

P48.

I have more than 30 yrs of teaching experience (to be specific, 33 years).

I have been a TA (5 yrs), an instructor (2 yrs), and A professor (24 yrs).

So I know all aspects of teaching.

P49.

My teaching has three goals:

- (1) to make sure the students understand the course materials well,
- (2) to make sure the students know how to use/apply the materials they learn in class, and
- (3) to make sure the students are evaluated fairly

P50.

To achieve the first goal,
I use a motivation-driven approach in my lectures: I first explain the background and applications of the result first, then explain the theory that leads to the result.

I give many examples in my notes (see, e.g., my CS633 notes).

I encourage the students to be involved and active in my lectures. (for those who find it difficult to do so, I encourage them to ask questions or make comments after class.)

I make all my class notes available on line so that by copying my notes in class, they can closely follow my lectures on course materials.

(My class notes such as CS633, CS631, CS535, have been used by some of my students and coll their own classes.)

P51.

To achieve the second goal,

1. I give applications for each covered result;
 2. I provide students with sample programs to he initiate their work (see my web pages).
 3. I encourage students to share their ideas.
 4. I award students with extra credit if they have on assignments.
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P52.

To achieve the third goal,

1. I always let the students know at the outset of

exactly what is expected.

2. I clearly specify the requirements of the course materials to be covered, grading policy, program (see, e.g., my CS535 and CS633 programming late penalty, and numerical scale to be used in on the first day of class.
3. I provide students with solution sets for all homework assignments and exams (see my web pages) so not only know the solutions to the questions, but if their works are graded fairly.
4. I have different expectations for graduate and undergraduate students though.
5. For an undergraduate or programming-extension students are evaluated based on two subjects: programming assignments and tests. I usually put equal weight so the effort of the students can be evaluated fairly. However, I encourage students to do critical thinking to get extra credit if they do so such as providing

improvement on existing techniques.

For a seminar course or advanced topics,

I evaluate the students mainly based on the quality of their work.

i.e., I will follow the numerical scale, but a student's original

ideas will get more extra credit than the ones with more technical

P53.

Course taught recently:

Computer Animation (CS633, G)

Computer Graphics (CS535, G)

Computer Aided Geometric Design (CS631, G)

Intro. Numerical Methods (CS321, U)

P54.

Quality of teaching

CS633: 3.7 out of 4

-46-

CS631: 4.0 out of 4

CS535: 3.8 out of 4

CS321: 3.9 out of 4

I wouldn't say I am an excellent teacher, but I do
am a great teacher and my students enjoy my tea

P55.

Research Experience

P56.

My Research areas: ...

As the co-owner of a successful hi-tech software
for more than 10 years,

I also have extensive experience in industrial R&
entrepreneurship.

So, I have in-depth knowledge of research in both academic and private sectors.

P57: Research record: 120 research papers ...

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Finish the slide then say:

I am the sole PI of 22 of these 26 grants.

I have been continuously supported by NSf for t

I have also been funded by Fortune 500 compan

Ford, Honda (2), Olympus

Some of them are quite large, including my own

Hence, in addition to writing proposals and man

projects, I also have extensive experience in lead

supervising research projects.

P58: Important Research Contributions ...

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I have made important contributions in several areas:

1. I was the first person to develop hardware devices that can generate/render parametric curves and surfaces. This work won me the prestigious Dr. Sun Yat-sen Technology Invention Award.
2. My joint work with Ardy Goshtasby: "A Parallel B-Spline Surface Fitting algorithm" [45] initiated a new research area, parallel spline algorithms. The area is still active today.
3. The best result in this area was obtained by me, showing that constant time complexity is possible for parallel B-spline surface interpolation [34].

P59: Continue on Contributions ...

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4. Together with Brian Barsky at Berkeley, we d

the so called "Interproximation" technique, a combination of "interpolation" and "approximation".

5. Working jointly with Bill Luken, I developed an efficient trimmed NURBS surface rendering technique for IBM.
6. I was the first person to work on constrained surface techniques on NURBS and subdivision surface techniques make the redesign process of a car or appliance much simpler and, consequently, can save those industries money and time in making changes to an existing model.
7. I have also worked extensively on subdivision surfaces. One of only a few who have played critical roles in this area.

P60: Professional recognition:

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During the past 8 yrs, I have been an NSF panel

7 time and 4 of them are for CAREER awards.

I am currently an editor of 3 international journals.

I have been a program committee member for more than

25 international conferences.

This year along, I am a committee member of

6 international conferences.

So, I have built a reputation among peers in my

research areas.

P61 : Current Research Projects:

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Currently, I am working on 4 research projects.

Most of them involve subdivision surfaces.

Two of them are funded by NSF. I am the PI of two

of them. The first one, Virtual 3D Plastic Surge

is challenging because it requires techniques from several different disciplines: plastic surgery, computer science, micro-biology, physics, ... etc. This is a very exciting project because its impact can be seen immediately and can change the lives of people.

(include the two figures I sent Shuhua here)

P62 : Blending and warping

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Here is an example of what virtual plastic surgery can do for you. This is a simple application of blending and warping techniques.

P63 : Morphing and boundary reshaping

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Another example of what virtual plastic surgery can do for you. This is a simple application of morphing and boundary reshaping.

64 : My research interests:

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My research interests center around the design of graphics and geometric algorithms, with special emphasis on the modeling of geometric shapes and computation techniques for rendering and geometric problems.

The work spreads over 23 subject areas.

65 : Current Research

66 : Recent focus: subdivision surfaces

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My recent research focuses on subdivision surfaces, the de-facto standard for generating freeform curved surfaces of arbitrary topology in visualization and animation applications

I will show you some of my work in this area.

67 : Applications of SSs

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Subdivision surfaces are used almost everywhere now: graphical modeling, games, and animation.

68 : Commercial packages

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Actually,

Subdivision surfaces have already been used by commercial software as primary representation such as: Pixar's Renderman, ...

69 : What is a SS?

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Subdivision surfaces have several different forms.
But, just what is a subdivision surface?

70 : Def of a SS

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Given a control mesh and a set of refining (subdivision) rules, a subdivision surface is generated by iteratively refining (subdividing) the control mesh to form new and finer control meshes.

The mesh refining process consists of defining new vertices (face points, edge points and vertex points) and connecting the new vertices to form new edges and faces of a new control mesh.

A subdivision surface is the limit surface of the sequence of control meshes. The limit surface is called a subdivision surface because the mesh refining (subdivision) is a generalization of the uniform B-spline surface subdivision technique.

Subdivision surfaces include uniform B-spline surfaces and piecewise Bezier surfaces as special cases.

Actually subdivision surfaces include non-uniform surfaces and NURBS surfaces as special cases. Therefore, this is the most general surface representation scheme we have so far.

71 : Why are SSs so special?

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Subdivision surfaces are special because subdivision surfaces can do things other can not.

72 : One piece rep

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You can represent any shape with just one subdivi

surface because there is no limit on the topology of the control mesh of a subdivision surface.

73 : Boolean operations

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including the results of Boolean operations

74 : Why is one-piece rep good?

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One piece rep avoids the so-called "crack" (or, gap) problem.

With multi-piece rep, you will always get cracks no matter how precisely the Boolean operation is performed.

75 : Multi-resolution

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Subdivision surfaces are good for internet data transmission because subdivision surfaces are s (i.e., having multi-resolution property)

76 : Real-time scaling (multi-resolution)

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such as this example. Since there is always some on the screen, the user would not get bored.

77 : Cover both reps

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Subdivision surfaces cover both polygon form and parametric form. These might not seem so important to you, but they are important to people in design and manufacturing.

Polygon form is good for machining, finite-element mesh generation, and manufacturing.

Parametric form is good for design and representation. Therefore, you have a rep scheme that is good for almost anything.

78 : Features

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Can model any kind of special features: sharp edges, sharp corners, creases, darts, ..., anything, through modifying the refining rules or repeating vertices or edges.

79 : One thing is missing (keep the LR corner
blank initially. Then do a fly-in on CAD/CAM)

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Nevertheless, subdivision surfaces have not been
by one industry yet. Which industry?

80 : CAD/CAM.

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CAD/CAM.

81 : Why?

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Why?

Because for quite a while people did not know how to
parametrize subdivision surfaces, and there were no
error control mechanism and adaptive subdivision
techniques for subdivision surfaces either.

82 : Slide 86

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These techniques are important.

Without error control, we can not ...

Without parametrization techniques, we can not do
things such as ...

Without adaptive subdivision techniques, subdivision
surfaces are simply too expensive to use.

83 : Works on SS parametrization

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Things started to change in 1998.

J. Stam presented the first parametrization technique for Catmull-Clark subdivision surfaces.

Zorin et al presented parametrization technique for Loop subdivision surfaces in 2002.

We presented a new parametrization technique for Catmull-Clark subdivision surfaces this year.

Why is a new technique necessary?

84 : Applications of new technique

For one, the new technique is an explicit representation you don't need a look-up table to get the value of CCSS at a given point.

Second, the new technique uses only half the number of eigen basis functions in the representation.

Therefore, the new parametrization technique is more efficient, but can also be used to compute the position and normal of a subdivision surface at any given point.

Therefore, several things are possible now, such as:

85 : Surface Evaluation

--

You can compute the EXACT value of a subdivision surface at any point of the parameter space now.

86 : Texture mapping

--

You can do texture mapping in a uniform way
The one on the left might look more impressive,
but it is the one on the right that is more
difficult to do (to keep all patterns in a
uniform size everywhere)

87 : Texture mapping 1

--

Can handle objects with holes as well.

88 : Boolean operations

--

Boolean operations can be done more precise and
more efficient

89 : Boolean operations 1 (real time)

--

Most importantly,
boolean operations can be performed in real time

90 : Trimming

--

Surface trimming is basically a surface intersection
process.

With the new parametrization technique, it can be
as efficiently as Boolean operations.

91 : Adaptive tessellation

--

With the new technique, it is possible to have new optimum tessellation technique for rendering polygons. The conformity requirement is not an issue at all.

92 : Animation (fat horse)

--

Crack free, real-time animation is possible because the computation process is more efficient now and the representation is one-piece.

93 : What is error control? Slide 97

--

Error control is the main factor if a representaito
scheme can be used for CAD/CAM

94 : Building bridge between two reps

--

Error control technique builds a bridge between
parametric rep and the polygon rep.

95 : The problem is solved

--

We have solved this problem completely with th
for both regular patches and extra-ordinary patc
This is the first one.

96 : Adaptive subdivision

--

The adaptive subdivision problem was solved early
(2004)

97 : Adaptive subdivision 1

--

Here is an example that will show you a representation
enough (within the given tolerance) but much less
elements in the tessellated result.

98 :

"Subdivision Surfaces: A representation scheme for graphics (including visualization and animation) and CAD/CAM applications"

--

Subdivision surfaces, as I have pointed out at the beginning, are quickly becoming the primary representation scheme for all graphics (including visualization and animation) and CAD/CAM applications. We are happy that we are part of the team in making this happen.

99 : Acknowledgement

100: Management Style:

101.

I prefer a transparent, bottom-up approach. I treat people fairly and honestly. I like to do things by book.

102.

Responsibilities of the dept chairman should be clearly defined and stated, so everybody knows exactly what they can and cannot do. Everybody should also know how the department is conducted and operated. For that purpose, Department Operating Rules and Procedures will be developed and revised if necessary.

103.

Policy making within the department will be as transparent as possible, through various committees (executive

hiring committee, graduate committee, undergraduate equipment committee etc) and faculty meetings consensus on departmental issues. Committee members will be rotated periodically. Will form an Executive Committee to help the Chairman to handle important departmental

104.

The Department will ensure that each faculty member has with appropriate administrative and technical support for the purpose, the administrative and technical support will be reviewed and revised if necessary to make sure the department has sufficient support in both areas.

105.

Every employee of the department will be treated as an individual employee. We will improve the morale and effectiveness

The staff members by providing appropriate recompensating competitive salaries to all staff (administrative or academic) compared to our benchmark universities.

106.

I believe the most important job of the University and Department is to provide an environment that allows each person to reach his/her full potential. So, I will do my best to lead the department

- a department with a bracing atmosphere,
 - a department with a strong sense of community,
 - a department with intellectual vigor.
-

107.

108.

Research, teaching and service are all very important. But research should carry more weight.

109.

For us to grant tenure to a junior faculty member, a faculty member must be able to convince us that they are strong in research, teaching and service, but is also diligent and persistent. We don't want to give someone tenure only to find out that person is relaxing once the job is done.

We can not guarantee that this is completely achievable, but we can set up a mechanism to ensure every Associate Professor and Full Professor work as hard as possible. I plan to implement an internal STEP system for both the Associate Professor and Full Professors. The Associate Professor level will be divided into 3 STEPs and the Full Professor level will be divided into 3 STEPs.

110.

Climbing from a lower step to a higher step requires the satisfaction of certain research achievement (e.g., journal/conference publications, number of external grants, ... etc).

An Associate Professor will be considered for promotion if he or she reaches the third STEP of the Associate level.

Most importantly, salary status for each STEP will be determined. A faculty will be recommended for a raise once he or she reaches a lower STEP to a higher STEP.
