

Randy Pausch's Last Lecture: *Really Achieving Your Childhood Dreams*

Given at Carnegie Mellon University

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McConomy Auditorium

Carnegie Mellon

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Introduction by Indira Nair, Carnegie Mellon's Vice Provost for Education:

Hi. Welcome. It's my pleasure to introduce you to the first of our new university's lectures titled *Journeys* – lectures in which members of our community will share with us reflections and insights on their personal and professional journeys. Today's Journey's lecture as you all know is by Professor Randy Pausch. The next one is on Monday, September 24th by Professor Roberta Klatzky.

To introduce Professor Randy Pausch, our first Journeys speaker, I would like to introduce Randy's friend and colleague, Steve Seabolt. Steve has been at Electronic Arts for six years and is the Vice President of Global Brand Development for *The Sims* label at Electronic Arts. As you all know, *The Sims* is one of the most, if not the most successful PC games in the world, with sales approaching over \$100,000,000. Prior to that, Steve was the Vice President for Strategic Marketing and Education at EA, bridging academia and Electronic Arts. His goal was to work with academics so there was an effective educational pathway for kids with building games as their dreams. It was in that role that Randy and Steve became colleagues and friends. Before Electronic Arts, Steve was the worldwide Ad Director for Time Magazine and CEO of Sunset Publishing, which is a very favorite magazine in the Southwest, and as CEO there, one of the things he started was school tours, because like Randy he shares a passion for inspiring kids of all ages to share their excitement for science and technology.

So to introduce Randy, his friend Steve Seabolt. Steve?

[applause]

Steve Seabolt, Vice President of Worldwide Publishing and Marketing for Electronic Arts (EA):

Thank you very much. I don't mean to sound ungracious by correcting you, but given that our PR people are probably watching this on webcast, I'd catch heck if I went home and didn't say that it

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was 100 million units for *The Sims*. [laughter] Not that big numbers matter to Electronic Arts. [laughter]

I don't see any empty seats anywhere, which is a good thing, which means I just won a bet from Randy as a matter of fact. Depending upon who's version of the story you hear, he either owes me 20 dollars or his new Volkswagen. [laughter] So, I'll take the car.

It's a pleasure to be here, thank you very much. I'm going to start by covering Randy's academic credentials. It's a little bizarre for me to be standing here at Carnegie Mellon, which is a school I couldn't get into no matter how much I contributed to this institution. [laughter] But, no really, I'm not kidding! You all think, oh gosh he's humble. Really, no, I'm not humble at all. Very average SAT scores, you know, right in the middle of my high school class of 900. Anyway, Randy. Randy earned – it really pisses me off that Randy's so smart—actually I called him, we decided about, what, four weeks, ago and we heard the news went from bad to horrific. It was on a Wednesday night and I said look – we have two choices. We can play this really straight and very emotional , or we can go to dark humor. And for those of you who know Randy well, he was like oh, dark humor! So I called him the next day and I was like, *dude you can't die*. And he's like, *what do you mean?* And I said, *well, when you die, the average of IQ of Seabolt's friends is going to like drop 50 points*. [laughter] To which he responded, *we need to find you some smarter friends*. [laughter] So you're all smart because you're here, so if you want to be my friend, I'll be over in a corner of the reception room.

Randy earned his undergraduate degree in Computer Science at Brown in 1982. His Ph.D. in CS from Carnegie Mellon in 1988 and taught at the University of Virginia where he was granted tenure a year early. He joined the Carnegie Mellon faculty in 1997 with appointments in the CS, HCI and Design departments. He has authored or co-authored five books and over 60 reviewed journal and conference proceeding articles, none of which I would understand. With Don Marinelli, he founded the Entertainment Technology Center, which quickly became the gold standard organization for training artists and engineers to work together. It is my view and the view of our company, Electronic Arts, that the ETC is the interactive program by which all others in the world are judged.

I met Randy in the Spring of 2004, and when I look back it's sort of hard to imagine it's only been three years given the depth of our friendship. The ETC already had a very strong relationship with EA and with Randy. And Randy as he always does, for those of you who know him well, wanted to learn more, with his own eyes, about how the games business works, and how games really got made. So he spent a summer in residence at EA, and I was his primary contact point. We were in my view the odd couple. Randy the brilliant, charming, Carnegie educated CS professor. And me who went to the University of Iowa on a wing and a prayer. We spent a lot of time together that semester and for those of you who know Randy well, that's a lot of turkey sandwiches on white bread with mayo. [laughter, clapping] My kids tease me about being "white." There's nobody more "white" than Randy. [laughter] We spent an enormous amount of time together. We taught each other about each other's very interesting, strange cultures to the other. Academic versus the corporate world. And we developed a deep friendship woven together with stories about our kids, our wives, our parents, as well as deep discussions about the paramount nature of integrity in

everything you do, family first, religion, our shared joy in connecting people and ideas, and deploying money and influence to do good. And the importance of having a lot of laughs along the way.

Randy's dedication to making the world a better place is self evident to anyone who has crossed paths with him. Whether it's directly influencing students, creating organizations like the ETC, building tools like Alice or doing what he probably does best, which is bridging cultures. As Ben Gordon, EA's Chief Creative Officer, says of Randy, *even more important than Randy's academic, philanthropic, and entrepreneurial accomplishments has been his humanity and the enthusiasm he brings to students and coworkers on a daily basis.*

For those of you who know Randy, Randy brings a particular zest for life and humor, even while facing death. To Randy, this is simply another adventure. It is my great honor to introduce Dylan, Logan and Chloe's dad, Jai's husband, and my very dear friend, Dr. Randy Pausch. [applause]

Randy Pausch:

[responding to a standing ovation] Make me earn it. [laughter]

It's wonderful to be here. What Indira didn't tell you is that this lecture series used to be called the Last Lecture. If you had one last lecture to give before you died, what would it be? I thought, damn, I finally nailed the venue and they renamed it. [laughter]

So, you know, in case there's anybody who wandered in and doesn't know the back story, my dad always taught me that when there's an elephant in the room, introduce them. If you look at my CAT scans, there are approximately 10 tumors in my liver, and the doctors told me 3-6 months of good health left. That was a month ago, so you can do the math. I have some of the best doctors in the world. Microphone's not working? Then I'll just have to talk louder. [Adjusts mic] Is that good? All right. So that is what it is. We can't change it, and we just have to decide how we're going to respond to that. We cannot change the cards we are dealt, just how we play the hand. If I don't seem as depressed or morose as I should be, sorry to disappoint you. [laughter] And I assure you I am not in denial. It's not like I'm not aware of what's going on. My family, my three kids, my wife, we just decamped. We bought a lovely house in Virginia, and we're doing that because that's a better place for the family to be, down the road. And the other thing is I am in phenomenally good health right now. I mean it's the greatest thing of cognitive dissonance you will ever see is the fact that I am in really good shape. In fact, I am in better shape than most of you. [Randy gets on the ground and starts doing pushups] [Applause] So anybody who wants to cry or pity me can down and do a few of those, and then you may pity me. [laughter]

All right, so what we're not talking about today, we are not talking about cancer, because I spent a lot of time talking about that and I'm really not interested. If you have any herbal supplements or remedies, please stay away from me. [laughter] And we're not going to talk about things that are even more important than achieving your childhood dreams. We're not going to talk about my wife, we're not talking about my kids. Because I'm good, but I'm not good enough to talk about that

without tearing up. So, we're just going to take that off the table. That's much more important. And we're not going to talk about spirituality and religion, although I will tell you that I have achieved a deathbed conversion. [dramatic pause] ... I just bought a Macintosh. [laughter and clapping] Now I knew I'd get 9% of the audience with that ... All right, so what is today's talk about then? It's about my childhood dreams and how I have achieved them. I've been very fortunate that way. How I believe I've been able to enable the dreams of others, and to some degree, lessons learned. I'm a professor, there should be some lessons learned and how you can use the stuff you hear today to achieve your dreams or enable the dreams of others. And as you get older, you may find that "enabling the dreams of others" thing is even more fun.

So what were my childhood dreams? Well, you know, I had a really good childhood. I mean, no kidding around. I was going back through the family archives, and what was really amazing was, I couldn't find any pictures of me as a kid where I wasn't smiling. And that was just a very gratifying thing. There was our dog, right? Aww, thank you. And there I actually have a picture of me dreaming. I did a lot of that. You know, there's a lot of *wake ups!* I was born in 1960. When you are 8 or 9 years old and you look at the TV set, men are landing on the moon, anything's possible. And that's something we should not lose sight of, is that the inspiration and the permission to dream is huge.

So what were my childhood dreams? You may not agree with this list, but I was there. [laughter] Being in zero gravity, playing in the National Football League, authoring an article in the World Book Encyclopedia – I guess you can tell the nerds early. [laughter] Being Captain Kirk, anybody here have that childhood dream? Not at CMU, nooooo. I wanted to become one of the guys who won the big stuffed animals in the amusement park, and I wanted to be an Imagineer with Disney. These are not sorted in any particular order, although I think they do get harder, except for maybe the first one.

OK, so being in zero gravity. Now it's important to have specific dreams. I did not dream of being an astronaut, because when I was a little kid, I wore glasses and they told me oh, astronauts can't have glasses. And I was like, mmm, I didn't really want the whole astronaut gig, I just wanted the floating. So, and as a child [laughter], prototype 0.0. [slide shown of Randy as a child lying in floating-formation on a table top] But that didn't work so well, and it turns out that NASA has something called the Vomit Comet that they used to train the astronauts. And this thing does parabolic arcs, and at the top of each arc you get about 25 seconds where you're ballistic and you get about, a rough equivalent of weightlessness for about 25 seconds. And there is a program where college students can submit proposals and if they win the competition, they get to fly. And I thought that was really cool, and we had a team and we put a team together and they won and they got to fly. And I was all excited because I was going to go with them. And then I hit the first brick wall, because they made it very clear that under no circumstances were faculty members allowed to fly with the teams. I know, I was heartbroken. I was like, I worked so hard! And so I read the literature very carefully and it turns out that NASA, it's part of their outreach and publicity program, and it turns out that the students were allowed to bring a local media journalist from their home town. [laughter] And, [deep voice] Randy Pausch, web journalist. [regular voice] It's really easy to get a press pass! [laughter] So I called up the guys at NASA and I said, I need to know where to fax some

documents. And they said, what documents are you going to fax us? And I said my resignation as the faculty advisor and my application as the journalist. And he said, that's a little transparent, don't you think? And I said, yeah, but our project is virtual reality, and we're going to bring down a whole bunch of VR headsets and all the students from all the teams are going to experience it and all those other real journalists are going to get to film it. Jim Foley's [who is nodding in the audience] going oh you bastard, yes. And the guy said, here's the fax number. So, indeed, we kept our end of the bargain, and that's one of the themes that you'll hear later on in the talk, is have something to bring to the table, right, because that will make you more welcome. And if you're curious about what zero gravity looks like, hopefully the sound will be working here. [slide shows videotape from Randy's zero gravity experience] There I am. [laughter] You do pay the piper at the bottom. [laughter, as the people in the video crash to the floor of the plane on the video] So, childhood dream number one, check.

OK, let's talk about football. My dream was to play in the National Football League. And most of you don't know that I actually – no. [laughter] No, I did not make it to the National Football League, but I probably got more from that dream and not accomplishing it than I got from any of the ones that I did accomplish. I had a coach, I signed up when I was nine years old. I was the smallest kid in the league, by far. And I had a coach, Jim Graham, who was six-foot-four, he had played linebacker at Penn State. He was just this hulk of a guy and he was old school. And I mean really old school. Like he thought the forward pass was a trick play. [laughter] And he showed up for practice the first day, and you know, there's big hulking guy, we were all scared to death of him. And he hadn't brought any footballs. How are we going to have practice without any footballs? And one of the other kids said, excuse me coach, but there's no football. And Coach Graham said, *right, how many men are on a football field at a time?* Eleven on a team, twenty-two. Coach Graham said, *all right, and how many people are touching the football at any given time?* One of them. And he said, *right, so we're going to work on what those other twenty-one guys are doing.* And that's a really good story because it's all about fundamentals. Fundamentals, fundamentals, fundamentals. You've got to get the fundamentals down because otherwise the fancy stuff isn't going to work. And the other Jim Graham story I have is there was one practice where he just rode me all practice. You're doing this wrong, you're doing this wrong, go back and do it again, you owe me, you're doing push-ups after practice. And when it was all over, one of the other assistant coaches came over and said, *yeah, Coach Graham rode you pretty hard, didn't he?* I said, *yeah.* He said, *that's a good thing.* He said, *when you're screwing up and nobody's saying anything to you anymore, that means they gave up.* And that's a lesson that stuck with me my whole life. Is that when you see yourself doing something badly and nobody's bothering to tell you anymore, that's a very bad place to be. Your critics are your ones telling you they still love you and care.

After Coach Graham, I had another coach, Coach Setliff, and he taught me a lot about the power of enthusiasm. He did this one thing where only for one play at a time he would put people in at like the most horrifically wrong position for them. Like all the short guys would become receivers, right? It was just laughable. But we only went in for one play, right? And boy, the other team just never knew what hit 'em them. Because when you're only doing it for one play and you're just not where

you're supposed to be, and freedom's just another word for nothing left to lose, boy are you going to clean somebody's clock for that one play. And that kind of enthusiasm was great. And to this day, I am most comfortable on a football field. I mean, it's just one of those things where, you know, [pulls out a football] if I'm working a hard problem, people will see me wandering the halls with one of these things, and that's just because, you know, when you do something young enough and you train for it, it just becomes a part of you. And I'm very glad that football was a part of my life. And if I didn't get the dream of playing in the NFL, that's OK. I've probably got stuff more valuable. Because looking at what's going on in the NFL, I'm not sure those guys are doing so great right now.

OK, and so one of the expressions I learned at Electronic Arts, which I love, which pertains to this, is *experience is what you get when you didn't get what you wanted*. And I think that's absolutely lovely. And the other thing about football is we send our kids out to play football or soccer or swimming or whatever it is, and it's the first example of what I'm going to call a head fake, or indirect learning. We actually don't want our kids to learn football. I mean, yeah, it's really nice that I have a wonderful three-point stance and that I know how to do a chop block and all this kind of stuff. But we send our kids out to learn much more important things. Teamwork, sportsmanship, perseverance, etcetera, etcetera. And these kinds of head fake learning are absolutely important. And you should keep your eye out for them because they're everywhere.

All right. A simple one, being an author in the World Book Encyclopedia. When I was a kid, we had the World Book Encyclopedia on the shelf. For the freshman, this is paper. ... We used to have these things called books. [laughter] And after I had become somewhat of an authority on virtual reality, but not like a really important one, so I was at the level of people the World Book would badger. They called me up and I wrote an article, and this is Caitlin Kelleher [shows slide of Caitlin wearing virtual reality headset manipulating a 3D world], and there's an article if you go to your local library where they still have copies of the World Book. Look under V for Virtual Reality, and there it is. And all I have to say is that having been selected to be an author in the World Book Encyclopedia, I now believe that Wikipedia is a perfectly fine source for your information because I know what the quality control is for real encyclopedias. They let me in.

All right, next one. [laughter] [shows slide "~~Being like~~ Meeting Captain Kirk"] At a certain point you just realize there are some things you are not going to do, so maybe you just want to stand close to the people. And I mean, my god, what a role model for young people. [laughter] [shows slide of Captain Kirk sitting at his control station on the Starship Enterprise] I mean, this is everything you want to be, and what I learned that carried me forward in leadership later is that, you know, he wasn't the smartest guy on the ship. I mean, Spock was pretty smart and McCoy was the doctor and Scotty was the engineer. And you sort of go, *and what skill set did he have to get on this damn thing and run it?* And, you know, clearly there is this skill set called leadership, and, you know, whether or not you like the series, there's no doubt that there was a lot to be learned about how to lead people by watching this guy in action. And he just had the coolest damn toys! [laughter] [shows slide of Star Trek gadgets] I mean, my god, I just thought it was fascinating as a kid that he had this thing [Takes out Star Trek Communicator] and he could talk to the ship with it. I just thought that was just

spectacular, and of course now I own one and it's smaller. [takes out cell phone] So that's kind of cool.

So I got to achieve this dream. James T. Kirk, and his alter ego William Shatner, wrote a book, which I think was actually a pretty cool book. It was with Chip Walter who is a Pittsburgh-based author who is quite good, and they wrote a book on basically the science of Star Trek, you know, what has come true. And they went around to the top places around the country and looked at various things and they came here to study our virtual reality setup. And so we build a virtual reality for him, it looks something like that. [shows slide of virtual Star Trek bridge from the 1960's TV show] We put it in, put it to red alert. He was a very good sport. [sarcastically] It's not like he saw that one coming. [laughter] And it's really cool to meet your boyhood idol, but it's even cooler when he comes to you to see what cool stuff you're doing in your lab. And that was just a great moment.

All right, winning stuffed animals. This may seem mundane to you, but when you're a little kid and you see the big buff guys walking around the amusement park and they've got all these big stuffed animals, right? And this is my lovely wife, and I have a lot of pictures of stuffed animals I've won. [laughter] [shows slides of several large stuffed animals] That's my dad posing with one that I won. I've won a lot of these animals. There's my dad, he did win that one, to his credit. And this was just a big part of my life and my family's life. But you know, I can hear the cynics. In this age of digitally manipulated images, maybe those bears really aren't in the pictures with me, or maybe I paid somebody five bucks to take a picture in the theme park next to the bear. And I said, *how, in this age of cynicism can I convince people?* And I said, *I know, I can show them the bears!* Bring them out. [several large stuffed animals are brought onto the stage] [laughter and clapping] Just put them back against the wall.

Jai Pausch (Randy's wife):

It's hard to hear you. [adjusts Randy's microphone]

Randy Pausch:

Thanks honey. [laughter] So here are some bears. We didn't have quite enough room in the moving truck, and anybody who would like a little piece of me at the end of this, feel free to come up and take a bear, first come, first served.

All right, my next one. Being an Imagineer. This was the hard one. Believe me, getting to zero gravity is easier than becoming an Imagineer. When I was a kid, I was eight years old and our family took a trip cross-country to see Disneyland. And if you've ever seen the movie *National Lampoon's Vacation*, it was a lot like that! [laughter] It was a quest. [shows slides of family at Disneyland] And these are real vintage photographs, and there I am in front of the castle. And there I am, and for those of you who are into foreshadowing, this is the Alice ride. [laughter] And I just thought this was just the coolest environment I had ever been in, and instead of saying, *gee, I want to experience this*, I said, *I want to make stuff like this*. And so I bided my time and then I graduated with my Ph.D. from Carnegie Mellon, thinking that meant me infinitely qualified to do anything. And I dashed off

my letters of applications to Walt Disney Imagineering, and they sent me some of the damned nicest go-to-hell letters I have ever gotten. [laughter] I mean it was just, *we have carefully reviewed your application and presently we do not have any positions available which require your particular qualifications*. Now think about the fact that you're getting this from a place that's famous for guys who sweep the street. [laughter] So that was a bit of a setback. But remember, the brick walls are there for a reason. The brick walls are not there to keep us out. The brick walls are there to give us a chance to show how badly we want something. Because the brick walls are there to stop the people who don't want it badly enough. They're there to stop the *other* people.

All right, fast forward to 1991. We did a system back at the University of Virginia called Virtual Reality on Five Dollars a Day. Just one of those unbelievable spectacular things. I was so scared back in those days as a junior academic. Jim Foley's here, and I just love to tell this story. He knew my undergraduate advisor, Andy Van Dam, and I'm at my first conference and I'm just scared to death. And this icon in the user interface community walks up to me and just out of nowhere just gives me this huge bear hug and he says, *that was from Andy*. And that was when I thought, *ok, maybe I can make it*. Maybe I do belong. And a similar story is that this was just this unbelievable hit because at the time, everybody needed a half a million [dollars] to do virtual reality. And everybody felt frustrated. And we literally hacked together a system for about five thousand dollars in parts and made a working VR system. And people were just like, *oh my god*, you know, the Hewlett Packard garage thing. This is so awesome. And so I'm giving this talk and the room has just gone wild, and during the Q and A, a guy named Tom Furness, who was one of the big names in virtual reality at the time, he goes up to the microphone and he introduces himself. I didn't know what he looked like but I sure as hell knew the name. And he asked a question. And I was like, I'm sorry did you say you were Tom Furness? And he said yes. I said, *then I would love to answer your question, but first, will you have lunch with me tomorrow?* [laughter] And there's a lot in that little moment, there's a lot of humility but also asking a person where he can't possibly say no. [laughter] And so Imagineering a couple of years later was working on a virtual reality project. This was top secret. They were denying the existence of a virtual reality attraction *after* the time that the publicity department was running the TV commercials. So Imagineering really had nailed this one tight. And it was the Aladdin attraction where you would fly a magic carpet, and the head mounted display, sometimes known as *gator vision*. And so I had an *in*. As soon as the project had just, you know they start running the TV commercials, and I had been asked to brief the Secretary of Defense on the state of virtual reality. OK, Fred Brooks and I had been asked to brief the Secretary of Defense, and that gave me an excuse. So I called them. I called Imagineering and I said, *look, I'm briefing the Secretary of Defense. I'd like some materials on what you have because it's one of the best VR systems in the world*. And they kind of pushed back. And I said, *look, is all this patriotism stuff in the parks a farce?* And they're like, hmm, ok. [laughter] But they said this is so new the PR department doesn't have any footage for you, so I'm going to have to connect you straight through to the team who did the work. Jackpot! So I find myself on the phone with a guy named Jon Snoddy who is one of the most impressive guys I have ever met, and he was the guy running this team, and it's not surprising they had done impressive things. And so he sent me some stuff, we talked briefly and he sent me some stuff, and I said, *hey, I'm going to be out in the area for a conference shortly,*

would you like to get together and have lunch? Translation: I'm going to lie to you and say that I have an excuse to be in the area so I don't look too anxious, but I would go to Neptune to have lunch with you! [laughter] And so Jon said sure, and I spent something like 80 hours talking with all the VR experts in the world, saying if you had access to this one unbelievable project, what would you ask? And then I compiled all of that and I had to memorize it, which anybody that knows me knows that I have no memory at all, because I couldn't go in looking like a dweeb with, you know, [in dweeby voice] *Hi, Question 72*. So, I went in, and this was like a two hour lunch, and Jon must have thought he was talking to some phenomenal person, because all I was doing was channeling Fred Brooks and Ivan Sutherland and Andy Van Dam and people like that. And Henry Fuchs. So it's pretty easy to be smart when you're parroting smart people. And at the end of the lunch with Jon, I sort of, as we say in the business, made "the ask." And I said, *you know, I have a sabbatical coming up*. And he said, *what's that?* [laughter] The beginnings of the culture clash. And so I talked with him about the possibility of coming there and working with him. And he said, *well that's really good except, you know, you're in the business of telling people stuff and we're in the business of keeping secrets*. And then what made Jon Snoddy Jon Snoddy was he said, *but we'll work it out*, which I really loved. The other thing that I learned from Jon Snoddy – I could do easily an hour long talk just on what have I learned from Jon Snoddy. One of the things he told me was that wait long enough and people will surprise and impress you. He said, *when you're pissed off at somebody and you're angry at them, you just haven't given them enough time*. Just give them a little more time and they'll almost always impress you. And that really stuck with me. I think he's absolutely right on that one. So to make a long story short, we negotiated a legal contract. It was going to be the first – some people referred to it as the first and last paper ever published by Imagineering. That the deal was I go, I provide my own funding, I go for six months, I work with a project, we publish a paper. And then we meet our villain. [shows slide of a picture of a former dean of Randy's] I can't be all sweetness and light, because I have no credibility. Somebody's head's going to go on a stick. Turns out that the person who gets his head on a stick is a dean back at the University of Virginia. His name is not important. Let's call him Dean Wormer. [laughter] And Dean Wormer has a meeting with me where I say I want to do this sabbatical thing and I've actually got the Imagineering guys to let an academic in, which is insane. I mean if Jon hadn't gone nuts, this would never have been a possibility. This is a very secretive organization. And Dean Wormer looks at the paperwork and he says, *well it says they're going to own your intellectual property*. And I said, *yeah, we got the agreement to publish the paper. There is no other IP. I don't do patentable stuff*. And says, *yeah, but you might*. And so deal's off. Just go and get them to change that little clause there and then come back to me. I'm like, *excuse me?* And then I said to him, *I want you to understand how important this is. If we can't work this out, I'm going to take an unpaid leave of absence and I'm just going to go there and I'm going to do this thing*. And he said, *hey, I might not even let you do that. I mean you've got the IP in your head already and maybe they're going to suck it out of you, so that's not going to fly either*. [laughter] It's very important to know when you're in a pissing match. And it's very important to get out of it as quickly as possible. So I said to him, *well, let's back off on this. Do we think this is a good idea at all?* He said, *I have no idea if this is a good idea*. I was like, [sarcastically] *OK, well we've got common ground there*. Then I said, *well is this really your call? Isn't this the call of the Dean of Sponsored Research if it's an IP issue?* And he said, *yeah, that's true*.

I said, *but so if he's happy you're happy?* [So he says] *Yeah, then I'd be fine. Whoosh!* Like Wile E. Coyote, I'm gone in a big ball of dust. And I find myself in Gene Block's office, who is the most fantastic man in the world. And I start talking to Gene Block and I say *let's start at the high level*, since I don't want to have to back out again. *So let's start at the high level. Do you think this is a good idea?* He said, *well if you're asking me if it's a good idea, I don't have very much information. All I know is that one of my star faculty members is in my office and he's really excited, so tell me more.* Here's a lesson for everybody in administration. They both said the same thing. But think about how they said it, right? [In a loud, barking voice] *I don't know!* [In a pleasant voice] Well, I don't have much information, but one of my star faculty members is here and he's all excited so I want to learn more. They're both ways of saying I don't know, but boy there's a good way and a bad way. So anyway, we got it all worked out. I went to Imagineering. Sweetness and light. And all's well that ends well.

Some brick walls are made of flesh. So I worked on the Aladdin Project. It was absolutely spectacular, I mean just unbelievable. Here's my nephew Christopher. [Shows slide of Christopher on Aladdin apparatus] This was the apparatus. You would sit on this sort of motorcycle-type thing. And you would steer your magic carpet and you would put on the head-mounted display. The head-mounted display is very interesting because it had two parts, and it was a very clever design. To get throughput up, the only part that touched the guest's head was this little cap and everything else clicked onto it – all the expensive hardware. So you could replicate the caps because they were basically free to manufacture. [Showing slide of Randy cleaning a cap] And this is what I really did is I was a cap cleaner during the sabbatical. [laughter] I loved Imagineering. It was just a spectacular place. Just spectacular. Everything that I had dreamed. I loved the model shop. People crawling around on things the size of this room that are just big physical models. It was just an incredible place to walk around and be inspired. I'm always reminded of when I went there and people said, *do you think your expectations are too high?* And I said, *you ever see the movie Charlie and the Chocolate Factory? Willy Wonka and The Chocolate Factory? Where Gene Wilder says to the little boy Charlie, he's about to give him the chocolate factory. He says "Well Charlie, did anybody ever tell you the story of the little boy who suddenly got everything he ever wanted?" Charlie's eyes get like saucers and he says, "No, what happened to him?" Gene Wilder says, "He lived happily ever after."* [laughter]

OK, so working on the Aladdin VR, I described it as a once in every five careers opportunity, and I stand by that assessment. And it forever changed me. It wasn't just that it was good work and I got to be a part of it. But it got me into the place of working with real people and real HCI user interface issues. Most HCI people live in this fantasy world of white collar laborers with Ph.D.s and masters degrees. And you know, until you got ice cream spilled on you, you're not doing field work. And more than anything else, from Jon Snoddy I learned how to put artists and engineers together, and that's been the real legacy.

We published a paper. Just a nice academic cultural scandal. When we wrote the paper, the guys at Imagineering said, *well let's do a nice big picture.* Like you would in a magazine. [Showing slide of first page of the paper, with a photo at the top that spans two columns]. And the SIGGRAPH

committee, which accepted the paper, it was like this big scandal. *Are they allowed to do that?* [laughter] There was no rule! So we published the paper and amazingly since then there's a tradition of SIGGRAPH papers having color figures on the first page. So I've changed the world in a small way. [laughter] And then at the end of my six months, they came to me and they said, *you want to do it for real? You can stay.* And I said no. One of the only times in my life I have surprised my father. He was like, *you're what?* He said, *since you were, you know [gesturing to height of a child's head], this is all you wanted, and now that you got it, and you're... huh?* There was a bottle of Maalox in my desk drawer. Be careful what you wish for. It was a particularly stressful place. Imagineering in general is actually not so Maalox-laden, but the lab I was in – oh, Jon left in the middle. And it was a lot like the Soviet Union. It was a little dicey for awhile. But it worked out OK. And if they had said, *stay here or never walk in the building again,* I would have done it. I would have walked away from tenure, I would have just done it. But they made it easy on me. They said you can have your cake and eat it too. And I basically became a day-a-week consultant for Imagineering, and I did that for about ten years. And that's one of the reasons you should all become professors. Because you can have your cake and eat it too.

I went and consulted on things like DisneyQuest. So there was the Virtual Jungle Cruise. And the best interactive experience I think ever done, and Jesse Schell gets the credit for this, Pirates of the Caribbean. Wonderful at DisneyQuest.

And so those are my childhood dreams. And that's pretty good. I felt good about that. So then the question becomes, how can I enable the childhood dreams of others. And again, boy am I glad I became a professor. What better place to enable childhood dreams? Eh, maybe working at EA, I don't know. That'd probably be a good close second. And this started in a very concrete realization that I could do this, because a young man named Tommy Burnett, when I was at the University of Virginia, came to me, was interested in joining my research group. And we talked about it, and he said, *oh, and I have a childhood dream.* It gets pretty easy to recognize them when they tell you. And I said, *yes, Tommy, what is your childhood dream?* He said, *I want to work on the next Star Wars film.* Now you got to remember the timing on this. Where is Tommy, Tommy is here today. What year would this have been? Your sophomore year.

Tommy:

It was around '93.

Randy Pausch:

Are you breaking anything back there young man? OK, all right, so in 1993. And I said to Tommy, *you know they're probably not going to make those next movies.* [laughter] And he said, *no, THEY ARE.* And Tommy worked with me for a number of years as an undergraduate and then as a staff member, and then I moved to Carnegie Mellon, every single member of my team came from Virginia to Carnegie Mellon except for Tommy because he got a better offer. And he did indeed work on all three of those films. And then I said, *well that's nice, but you know, one at a time is kind of inefficient.* And people who know me know that I'm an efficiency freak. So I said, *can I do this in*

mass? Can I get people turned in such a way that they can be turned onto their childhood dreams? And I created a course, I came to Carnegie Mellon and I created a course called Building Virtual Worlds. It's a very simple course. How many people here have ever been to any of the shows? [Some people from audience raise hands] OK, so some of you have an idea. For those of you who don't, the course is very simple. There are 50 students drawn from all the different departments of the university. There are randomly chosen teams, four people per team, and they change every project. A project only lasts two weeks, so you do something, you make something, you show something, then I shuffle the teams, you get three new playmates and you do it again. And it's every two weeks, and so you get five projects during the semester. The first year we taught this course, it is impossible to describe how much of a tiger by the tail we had. I was just running the course because I wanted to see if we could do it. We had just learned how to do texture mapping on 3D graphics, and we could make stuff that looked half decent. But you know, we were running on really weak computers, by current standards. But I said I'll give it a try. And at my new university [Carnegie Mellon] I made a couple of phone calls, and I said I want to cross-list this course to get all these other people. And within 24 hours it was cross-listed in five departments. I love this university. I mean it's the most amazing place. And the kids said, *well what content do we make?* I said, *hell, I don't know. You make whatever you want. Two rules: no shooting violence and no pornography.* Not because I'm opposed to those in particular, but you know, that's been done with VR, right? [laughter] And you'd be amazed how many 19-year-old boys are completely out of ideas when you take those off the table. [laughter and clapping]

Anyway, so I taught the course. The first assignment, I gave it to them, they came back in two weeks and they just blew me away. I mean the work was so beyond, literally, my imagination, because I had copied the process from Imagineering's VR lab, but I had no idea what they could or couldn't do with it as undergraduates, and their tools were weaker, and they came back on the first assignment, and they did something that was so spectacular that I literally didn't, ten years as a professor and I had no idea what to do next. So I called up my mentor, and I called up Andy Van Dam. And I said, *Andy, I just gave a two-week assignment, and they came back and did stuff that if I had given them a whole semester I would have given them all As. Sensei, what do I do?* [laughter] And Andy thought for a minute and he said, *you go back into class tomorrow and you look them in the eye and you say, "Guys, that was pretty good, but I know you can do better."* [laughter] And that was exactly the right advice. Because what he said was, you obviously don't know where the bar should be, and you're only going to do them a disservice by putting it anywhere. And boy was that good advice because they just kept going. And during that semester it became this underground thing. I'd walk into a class with 50 students in it and there were 95 people in the room. Because it was the day we were showing work. And people's roommates and friends and parents – I'd never had parents come to class before! It was flattering and somewhat scary. And so it snowballed and we had this bizarre thing of, well we've got to share this. If there's anything I've been raised to do, it's to share, and I said, *we've got to show this at the end of the semester. We've got to have a big show.* And we booked this room, McConomy. I have a lot of good memories in this room. And we booked it not because we thought we could fill it, but because it had the only AV setup that would work, because this was a zoo. Computers and everything. And then we filled it. And we more than

filled it. We had people standing in the aisle. I will never forget the dean at the time, Jim Morris was sitting on the stage right about there. We had to kind of scoot him out of the way. And the energy in the room was like nothing I had ever experienced before. And President Cohen, Jerry Cohen was there, and he sensed the same thing. He later described it as like an Ohio State football pep rally. Except for academics. And he came over and he asked exactly the right question. He said, *before you start*, he said, *where are these people from?* He said, *the audience, what departments are they from?* And we polled them and it was all the departments. And I felt very good because I had just come to campus, he had just come to campus, and my new boss had seen in a very corporal way that this is the university that puts everybody together. And that made me feel just tremendous.

So we did this campus-wide exhibition. People performed down here. They're in costume, and we project just like this and you can see what's going on. You can see what they're seeing in the head mount. There's a lot of big props, so there's a guy white water rafting. [shows slides of a BVW show] This is Ben in E.T. And yes, I did tell them if they didn't do the shot of the kids biking across the moon I would fail him. That is a true story. And I thought I'd show you just one world, and if we can get the lights down if that's at all possible. No, ok, that means no. All right. All right we'll just do our best then. [Shows "Hello.world" world done in the BVW class, audience applauds at the end.] It was an unusual course. With some of the most brilliant, creative students from all across the campus. It just was a joy to be involved. And they took the whole stage performance aspect of this way too seriously [shows pictures of very strange costumes students wore]. And it became this campus phenomenon every year. People would line up for it. It was very flattering. And it gave kids a sense of excitement of putting on a show for people who were excited about it. And I think that that's one of the best things you can give somebody – the chance to show them what it feels like to make other people get excited and happy. I mean that's a tremendous gift. We always try to involve the audience. Whether it was people with glow sticks or batting a beach ball around... or driving [shows photo of audience members leaning in their seats to steer a car]. This is really cool. This technology actually got used at the Spiderman 3 premiere in L.A., so the audience was controlling something on the screen, so that's kind of nice. And I don't have a class picture from every year, but I dredged all the ones that I do have, and all I can say is that what a privilege and an honor it was to teach that course for something like ten years.

And all good things come to an end. And I stopped teaching that course about a year ago. People always ask me what was my favorite moment. I don't know if you could have a favorite moment. But boy there is one I'll never forget. This was a world with, I believe a roller skating ninja. And one of the rules was that we perform these things live and they all had to really work. And the moment it stopped working, we went to your backup videotape. And this was very embarrassing. [Shows image of Roller Ninja world presentation] So we have this ninja on stage and he's doing this roller skating thing and the world, it did not crash gently. Whoosh. And I come out, and I believe it was Steve, Audia, wasn't it? Where is he? OK, where is Steve? Ah, my man. Steve Audia. And talk about quick on your feet. I say, *Steve, I'm sorry but your world has crashed and we're going to go to videotape.* And he pulls out his ninja sword and says, *I am dishonored! Whaaa!* And just drops!

[applause and laughter] And so I think it's very telling that my very favorite moment in ten years of this high technology course was a brilliant ad lib. And then when the videotape is done and the lights come up, he's lying there lifeless and his teammates drag him off! [laughter] It really was a fantastic moment.

And the course was all about bonding. People used to say, you know, what's going to make for a good world? I said, *I can't tell you beforehand, but right before they present it I can tell you if the world's good just by the body language. If they're standing close to each other, the world is good.*

And BVW was a pioneering course [Randy puts on vest with arrows poking out of the back], and I won't bore you with all the details, but it wasn't easy to do, and I was given this when I stepped down from the ETC and I think it's emblematic. If you're going to do anything that pioneering you will get those arrows in the back, and you just have to put up with it. I mean everything that could go wrong did go wrong. But at the end of the day, a whole lot of people had a whole lot of fun. When you've had something for ten years that you hold so precious, it's the toughest thing in the world to hand it over. And the only advice I can give you is, *find somebody better than you to hand it to.* And that's what I did. There was this kid at the VR studios way back when, and you didn't have to spend very long in Jesse Schell's orbit to go, *the force is strong in this one.* And one of my greatest – my two greatest accomplishments I think for Carnegie Mellon was that I got Jessica Hodgins and Jesse Schell to come here and join our faculty. And I was thrilled when I could hand this over to Jesse, and to no one's surprise, he has really taken it up to the next notch. And the course is in more than good hands – it's in better hands. But it was just one course. And then we really took it up a notch. And we created what I would call the dream fulfillment factory. Don Marinelli and I got together and with the university's blessing and encouragement, we made this thing out of whole cloth that was absolutely insane. Should never have been tried. All the sane universities didn't go near this kind of stuff. Creating a tremendous opportunistic void. So the Entertainment Technology Center was all about artists and technologists working in small teams to make things. It was a two-year professional master's degree. And Don and I were two kindred spirits. We're very different – anybody who knows us knows that we are very different people. And we liked to do things in a new way, and the truth of the matter is that we are both a little uncomfortable in academia. I used to say that I am uncomfortable as an academic because I come from a long line of people who actually worked for a living, so. [Nervous laughter] I detect nervous laughter! And I want to stress, Carnegie Mellon is the only place in the world that the ETC could have happened. By far the only place. [Shows slide of Don Marinelli in tie-dyed shirt, shades and an electric guitar, sitting on a desk next to Randy, wearing nerd glasses, button-up shirt, staring at a laptop. Above their heads were the labels "Right brain/Left brain"] [laughter] OK, this picture was Don's idea, OK? And we like to refer to this picture as Don Marinelli on guitar and Randy Pausch on keyboards. [laughter] But we really did play up the left brain, right brain and it worked out really well that way. [Shows slide of Don looking intense] Don is an intense guy. And Don and I shared an office, and at first it was a small office. We shared an office for six years. You know, those of you who know Don know he's an intense guy. And you know, given my current condition, somebody was asking me ... this is a terrible joke, but I'm going to use it anyway. Because I know Don will forgive me. Somebody said,

given your current condition, have you thought about whether you're going to go to heaven or hell? And I said, *I don't know, but if I'm going to hell, I'm due six years for time served!* [laughter] I kid. Sharing an office with Don was really like sharing an office with a tornado. There was just so much energy and you never knew which trailer was next, right? But you know something exciting was going to happen. And there was so much energy, and I do believe in giving credit where credit is due. So in my typically visual way, if Don and I were to split the success for the ETC, he clearly gets the lion's share of it. [Shows image of a pie chart divided 70/30 (Don/Randy)] He did the lion's share of the work, ok, he had the lion's share of the ideas. It was a great teamwork. I think it was a great yin and a yang, but it was more like YIN and yang. And he deserves that credit and I give it to him because the ETC is a wonderful place. And he's now running it and he's taking it global. We'll talk about that in a second.

Describing the ETC is really hard, and I finally found a metaphor. Telling people about the ETC is like describing Cirque du Soleil if they've never seen it. Sooner or later you're going to make the mistake. You're going to say, *well it's like a circus*. And then you're dragged into this conversation about *oh, how many tigers, how many lions, how many trapeze acts?* And that misses the whole point. So when we say we're a master's degree, we're really not like any master's degree you've ever seen. Here's the curriculum [Shows slide of ETC curriculum, listing "Project Course" as the only course each semester; audience laughs] The curriculum ended up looking like this. [shows slightly more detailed slide]. All I want to do is visually communicate to you that you do five projects in Building Virtual Worlds, then you do three more. All of your time is spent in small teams making stuff. None of that book learning thing. Don and I had no patience for the book learning thing. It's a master's degree. They already spent four years doing book learning. By now they should have read all the books.

The keys to success were that Carnegie Mellon gave us the reins. Completely gave us the reins. We had no deans to report to. We reported directly to the provost, which is great because the provost is way too busy to watch you carefully. [laughter] We were given explicit license to break the mold. It was all project based. It was intense, it was fun, and we took field trips! Every spring semester in January, we took all 50 students in the first year class and we'd take them out to Pixar, Industrial Light and Magic, and of course when you've got guys like Tommy there acting as host, right, it's pretty easy to get entrée to these places. So we did things very, very differently. The kind of projects students would do, we did a lot of what we'd call *edutainment*.

We developed a bunch of things with the Fire Department of New York, a network simulator for training firefighters, using video game-ish type technology to teach people useful things. That's not bad. Companies did this strange thing. They put in writing, *we promise to hire your students*. I've got the EA and Activision ones here. I think there are now, how many, five? Drew knows I bet. [Drew Davison, head of ETC-Pittsburgh, gestures with five fingers]. So there are five written agreements. I don't know of any other school that has this kind of written agreement with any company. And so that's a real statement. And these are multiple year things, so they're agreeing to hire people for summer internships that we have not admitted yet. That's a pretty strong statement about the quality of the program. And Don, as I said, he's now, he's crazy. In a wonderful

complimentary way. He's doing these things where I'm like, *oh my god*. He's not here tonight because he's in Singapore because there's going to be an ETC campus in Singapore. There's already on in Australia and there's going to be on in Korea. So this is becoming a global phenomenon. So I think this really speaks volumes about all the other universities. It's really true that Carnegie Mellon is the only university that can do this. We just have to do it all over the world now.

One other big success about the ETC is teaching people about feedback [puts up bar chart where students are (anonymous) listed on a scale labeled "how easy to work with"] -- oh I hear the nervous laughter from the students. I had forgotten the delayed shock therapy effect of these bar charts. When you're taking Building Virtual Worlds, every two weeks we get peer feedback. We put that all into a big spreadsheet and at the end of the semester, you had three teammates per project, five projects, that's 15 data points, that's statistically valid. And you get a bar chart telling you on a ranking of how easy you are to work with, where you stacked up against your peers. Boy that's hard feedback to ignore. Some still managed. [laughter] But for the most part, people looked at that and went, *wow, I've got to take it up a notch. I better start thinking about what I'm saying to people in these meetings*. And that is the best gift an educator can give is to get somebody to become self reflective.

So the ETC was wonderful, but even the ETC and even as Don scales it around the globe, it's still very labor intensive, you know. It's not Tommy one-at-a-time. It's not a research group ten at a time. It's 50 or 100 at a time per campus times four campuses. But I wanted something infinitely scalable. Scalable to the point where millions or tens of millions of people could chase their dreams with something. And you know, I guess that kind of a goal really does make me the Mad Hatter. [Puts on a Mad Hatter's green top hat]. So Alice is a project that we worked on for a long, long time. It's a novel way to teach computer programming. Kids make movies and games. The head fake -- again, we're back to the head fakes. The best way to teach somebody something is to have them think they're learning something else. I've done it my whole career. And the head fake here is that they're learning to program but they just think they're making movies and video games. This thing has already been downloaded well over a million times. There are eight textbooks that have been written about it. Ten percent of U.S. colleges are using it now. And it's not the good stuff yet. The good stuff is coming in the next version. I, like Moses, get to see the promised land, but I won't get to set foot in it. And that's OK, because I can see it. And the vision is clear. Millions of kids having fun while learning something hard. That's pretty cool. I can deal with that as a legacy. The next version's going to come out in 2008. It's going to be teaching the Java language if you want them to know they're learning Java. Otherwise they'll just think that they're writing movie scripts. And we're getting the characters from the bestselling PC video game in history, *The Sims*. And this is already working in the lab, so there's no real technological risk. I don't have time to thank and mention everybody in the Alice team, but I just want to say that Dennis Cosgrove is going to be building this, has been building this. He is the designer. This is his baby. And for those of you who are wondering, *well, in some number of months who should I be emailing about the Alice project*, where's Wanda Dann? Oh, there you are. Stand up, let them all see you. Everybody say, *Hi Wanda*.

Audience:

Hi, Wanda.

Randy Pausch:

Send her the email. And I'll talk a little bit more about Caitlin Kelleher, but she's graduated with her Ph.D., and she's at Washington University, and she's going to be taking this up a notch and going to middle schools with it. So, grand vision and to the extent that you can live on in something, I will live on in Alice.

All right, so now the third part of the talk. Lessons learned. We've talked about my dreams. We've talked about helping other people enable their dreams. Somewhere along the way there's got to be some aspect of what lets you get to achieve your dreams. First one is the rule of parents, mentors and students. I was blessed to have been born to two incredible people. This is my mother on her 70th birthday. [Shows slide of Randy's mom driving a race car on an amusement park race course] [laughter] I am back here. I have just been lapped. [laughter] This is my dad riding a roller coaster on his 80th birthday. [Shows slide of dad] And he points out that he's not only brave, he's talented because he did win that big bear the same day. My dad was so full of life, anything with him was an adventure. [Shows picture of his Dad holding a brown paper bag.] I don't know what's in that bag, but I know it's cool. My dad dressed up as Santa Claus, but he also did very, very significant things to help lots of people. This is a dormitory in Thailand that my mom and dad underwrote. And every year about 30 students get to go to school who wouldn't have otherwise. This is something my wife and I have also been involved in heavily. And these are the kind of things that I think everybody ought to be doing. Helping others.

But the best story I have about my dad – unfortunately my dad passed away a little over a year ago – and when we were going through his things, he had fought in World War II in the Battle of the Bulge, and when we were going through his things, we found out he had been awarded the Bronze Star for Valor. My mom didn't know it. In 50 years of marriage it had just never come up.

My mom. [Shows picture of Randy as a young child, pulling his Mom's hair]. Mothers are people who love even when you pull their hair. And I have two great mom stories. When I was here studying to get my Ph.D. and I was taking something called the theory qualifier, which I can definitively say is the *second* worst thing in my life after chemotherapy. [laughter] And I was complaining to my mother about how hard this test was and how awful it was, and she just leaned over and she patted me on the arm and she said, *we know how you feel honey, and remember when your father was your age he was fighting the Germans*. [laughter] After I got my Ph.D., my mother took great relish in introducing me as, *this is my son, he's a doctor but not the kind that helps people*. [laughter] These slides are a little bit dark [meaning "hard to see"], but when I was in high school I decided to paint my bedroom. [shows slides of bedroom] I always wanted a submarine and an elevator. And the great thing about this [shows slide of quadratic formula painted on wall] [interrupted by laughter] – what can I say? And the great thing about this is they let me do it. And they didn't get upset about it. And it's still there. If you go to my parent's house it's still there. And

anybody who is out there who is a parent, if your kids want to paint their bedroom, as a favor to me let them do it. It'll be OK. Don't worry about resale value on the house.

Other people who help us besides our parents: our teachers, our mentors, our friends, our colleagues. God, what is there to say about Andy Van Dam? When I was a freshman at Brown, he was on leave. And all I heard about was this Andy Van Dam. He was like a mythical creature. Like a centaur, but like a really pissed off centaur. And everybody was like really sad that he was gone, but kind of more relaxed? And I found out why. Because I started working for Andy. I was a teaching assistant for him as a sophomore. And I was quite an arrogant young man. And I came in to some office hours and of course it was nine o'clock at night and Andy was there at office hours, which is your first clue as to what kind of professor he was. And I come bounding in and you know, I'm just I'm going to save the world. There're all these kids waiting for help, da da, da da, da da, da da. And afterwards, Andy literally Dutch-uncled – he's Dutch, right? He Dutch-uncled me. And he put his arm around my shoulders and we went for a little walk and he said, *Randy, it's such a shame that people perceive you as so arrogant. Because it's going to limit what you're going to be able to accomplish in life.* What a hell of a way to word "you're being a jerk." [laughter] Right? He doesn't say you're a jerk. He says people are perceiving you this way and he says the downside is it's going to limit what you're going to be able to accomplish.

When I got to know Andy better, the beatings became more direct, but. [laughter] I could tell you Andy stories for a month, but the one I will tell you is that when it came time to start thinking about what to do about graduating from Brown, it had never occurred to me in a million years to go to graduate school. Just out of my imagination. It wasn't the kind of thing people from my family did. We got, say, what do you call them? jobs. And Andy said, *no, don't go do that. Go get a Ph.D. Become a professor.* And I said, *why?* And he said, *because you're such a good salesman that any company that gets you is going to use you as a salesman. And you might as well be selling something worthwhile like education.* [long pause, looks directly at Andy van Dam] Thanks.

Andy was my first boss, so to speak. I was lucky enough to have a lot of bosses. [shows slide of various bosses] That red circle is way off. Al is over here. [laughter] I don't know what the hell happened there. He's probably watching this on the webcast going, *my god he's targeting and he still can't aim!* [laughter] I don't want to say much about the great bosses I've had except that they were great. And I know a lot of people in the world that have had bad bosses, and I haven't had to endure that experience and I'm very grateful to all the people that I ever had to have worked for. They have just been incredible.

But it's not just our bosses, we learn from our students. I think the best head fake of all time comes from Caitlin Kelleher. Excuse me, *Doctor Caitlin Kelleher*, who just finished up here and is starting at Washington University, and she looked at Alice when it was an easier way to learn to program, and she said, *yeah, but why is that fun?* I was like, *'cause uh, I'm a compulsive male...I like to make the little toy soldiers move around by my command, and that's fun.* She's like, *hmm.* And she was the one who said, *no, we'll just approach it all as a storytelling activity.* And she's done wonderful work showing that, particularly with middle school girls, if you present it as a storytelling activity, they're

perfectly willing to learn how to write computer software. So all-time best head fake award goes to Caitlin Kelleher's dissertation.

President Cohen, when I told him I was going to do this talk, he said, *please tell them about having fun, because that's what I remember you for.* And I said, *I can do that, but it's kind of like a fish talking about the importance of water.* I mean I don't know how to not have fun. I'm dying and I'm having fun. And I'm going to keep having fun every day I have left. Because there's no other way to play it.

So my next piece of advice is, you just have to decide if you're a Tigger or and Eeyore. [shows slide with an image of Tigger and Eeyore with the phrase "Decide if you're Tigger or Eeyore"] I think I'm clear where I stand on the great Tigger/Eeyore debate. [laughter] Never lose the childlike wonder. It's just too important. It's what drives us. Help others. Denny Proffitt knows more about helping other people. He's forgotten more than I'll ever know. He's taught me by example how to run a group, how to care about people. M.K. Haley – I have a theory that people who come from large families are better people because they've just had to learn to get along. M.K. Haley comes from a family with 20 kids. [audience collectively "aaahs"] Yeah. Unbelievable. And she always says it's kind of fun to do the impossible. When I first got to Imagineering, she was one of the people who dressed me down, and she said, *I understand you've joined the Aladdin Project. What can you do?* And I said, *well I'm a tenured professor of computer science.* And she said, *well that's very nice Professor Boy, but that's not what I asked. I said what can you do?* [laughter]

And you know I mentioned sort of my working class roots. We keep what is valuable to us, what we cherish. And I've kept my [high school] letterman's jacket all these years. [Puts on letterman's jacket] I used to like wearing it in grad school, and one of my friends, Jessica Hodgins would say, *why do you wear this letterman's jacket?* And I looked around at all the non-athletic guys around me who were much smarter than me. And I said, *because I can.* [laughter] And so she thought that was a real hoot so one year she made for me this little Raggedy Randy doll. [takes out Raggedy Randy] [laughter] He's got a little letterman's jacket too. That's my all-time favorite. It's the perfect gift for the egomaniac in your life. So, I've met so many wonderful people along the way.

Loyalty is a two way street. There was a young man named Dennis Cosgrove at the University of Virginia, and when he was a young man, let's just say things happened. And I found myself talking to a dean. No, not that dean. And anyway, this dean really had it in for Dennis, and I could never figure out why because Dennis was a fine fellow. But for some reason this Dean really had it in for him. And I ended up basically saying, *no, I vouch for Dennis.* And the guy says, *you're not even tenured yet and you're telling me you're going to vouch for this sophomore or junior or whatever?* I think he was a junior at the time. I said, *yeah, I'm going to vouch for him because I believe in him.* And the dean said, *and I'm going to remember this when your tenure case comes up.* And I said, *deal.* I went back to talk to Dennis and I said, *I would really appreciate you... that would be good.* But loyalty is a two-way street. That was god knows how many years ago, but that's the same Dennis Cosgrove who's carrying Alice forward. He's been with me all these years. And if we only had one person to send in a space probe to meet an alien species, I'm picking Dennis. [laughter] You

can't give a talk at Carnegie Mellon without acknowledging one very special person. And that would be Sharon Burks. I joked with her, I said, *well look, if you're retiring, it's just not worth living anymore*. Sharon is so wonderful it's beyond description, and for all of us who have been helped by her, it's just indescribable. I love this picture because it puts here together with Syl, and Syl is great because Syl gave the best piece of advice pound-for-pound that I have ever heard. And I think all young ladies should hear this. Syl said, *it took me a long time but I've finally figured it out. When it comes to men that are romantically interested in you, it's really simple. Just ignore everything they say and only pay attention to what they do. It's that simple. It's that easy*. And I thought back to my bachelor days and I said, *damn*. [laughter]

Never give up. I didn't get into Brown University. I was on the wait list. I called them up and they eventually decided that it was getting really annoying to have me call everyday so they let me in. At Carnegie Mellon I didn't get into graduate school. Andy had mentored me. He said, *go to graduate school, you're going to Carnegie Mellon. All my good students go to Carnegie Mellon*. Yeah, you know what's coming. And so he said, *you're going to go to Carnegie Mellon no problem*. What he had kind of forgotten was that the difficulty of getting to the top Ph.D. program in the country had really gone up. And he also didn't know I was going to tank my GRE's because he believed in me. Which, based on my board scores was a really stupid idea. And so I didn't get into Carnegie Mellon. No one knows this. 'Til today I'm telling the story. I was declined admission to Carnegie Mellon. And I was a bit of an obnoxious little kid. I went into Andy's office and I dropped the rejection letter on his desk. And I said, *I just want you to know what your letter of recommendation goes for at Carnegie Mellon*. [laughter] And before the letter had hit his desk, his hand was on the phone and he said, *I will fix this*. [laughter] And I said, *no no no, I don't want to do it that way. That's not the way I was raised*. [In a sad voice] *Maybe some other graduate schools will see fit to admit me*. [laughter] And he said, *look, Carnegie Mellon's where you're going to be*. He said, *I'll tell you what, I'll make you a deal. Go visit the other schools*. Because I did get into all the other schools. He said, *go visit the other schools and if you really don't feel comfortable at any of them, then will you let me call Nico?* Nico being Nico Habermann [the head of Carnegie Mellon's Computer Science Dept.] and I said, *OK deal*. I went to the other schools. Without naming them by name -- [in a coughing voice] Berkeley, Cornell. They managed to be so unwelcoming that I found myself saying to Andy, *you know, I'm going to get a job*. And he said, *no, you're not*. And he picked up the phone and he talked in Dutch. [laughter] And he hung up the phone and he said, *Nico says if you're serious, be in his office tomorrow morning at eight a.m.* And for those of you who know Nico, this is really scary. So I'm in Nico Habermann's office the next morning at eight a.m. and he's talking with me, and frankly I don't think he's that keen on this meeting. I don't think he's that keen at all. And he says, *Randy, why are we here?* And I said, *because Andy phoned you? Heh-heh*. [laughter] And I said, *well, since you admitted me, I have won a fellowship. The Office of Naval Research is a very prestigious fellowship. I've won this fellowship and that wasn't in my file when I applied*. And Nico said, *a fellowship, money, we have plenty of money*. That was back then. He said, *we have plenty of money. Why do you think having a fellowship makes any difference to us?* And he looked at me. There are moments that change your life. And ten years later if you know in retrospect it was one of those moments, you're blessed. But to know it *at the moment* with Nico staring through your

soul. [laughter] And I said, *I didn't mean to imply anything about the money. It's just that it was an honor. There were only 15 given nationwide. And I did think it was an honor that would be something that would be meritorious. And I apologize if that was presumptuous.* And he smiled. And that was good.

So. How do you get people to help you? You can't get there alone. People have to help you and I do believe in karma. I believe in paybacks. You get people to help you by telling the truth. Being earnest. I'll take an earnest person over a hip person every day, because hip is short term. Earnest is long term.

Apologize when you screw up and focus on other people, not on yourself. And I thought, how do I possibly make a concrete example of that? [Speaking to stage hand] Do we have a concrete example of focusing on somebody else over there? Could we bring it out? [Speaking to audience] See, yesterday was my wife's birthday. If there was ever a time I might be entitled to have the focus on me, it might be the last lecture. But no, I feel very badly that my wife didn't really get a proper birthday, and I thought it would be very nice if 500 people— [an oversized birthday cake is wheeled onto the stage] [applause] Happy—

Everyone:

...birthday to you [Randy: *her name is Jai*], happy birthday to you. Happy birthday dear Jai, happy birthday to you! [applause]

[Jai walks on stage, teary-eyed. She walks with Randy to the cake. Randy: *You gotta blow it out.* The audience goes quiet. Jai blows out the candle on the cake. Randy: *All right.* Massive applause.]

Randy Pausch:

And now you all have an extra reason to come to the reception. [laughter] Remember brick walls let us show our dedication. They are there to separate us from the people who don't really want to achieve their childhood dreams. Don't bail. The best of the gold's at the bottom of barrels of crap. [Shows slide of Steve Seabolt next to a picture of The Sims] [laughter] What Steve didn't tell you was the big sabbatical at EA, I had been there for 48 hours and they loved the ETC, we were the best, we were the favorites, and then somebody pulled me aside and said, *oh, by the way, we're about to give eight million dollars to USC to build a program just like yours. We're hoping you can help them get it off the ground.* [laughter] And then Steve came along and said, *they said what? Oh god.* And to quote a famous man, *I will fix this.* And he did. Steve has been an incredible partner. And we have a great relationship, personal and professional. And he has certainly been point man on getting a gaming asset to help teach millions of kids and that's just incredible. But, you know, it certainly would have been reasonable for me to leave 48 hours after that sabbatical, but it wouldn't have been the right thing to do, and when you do the right thing, good stuff has a way of happening.

Get a feedback loop and listen to it. Your feedback loop can be this dorky spreadsheet thing I did, or it can just be one great man who tells you what you need to hear. The hard part is the listening to it.

Anybody can get chewed out. It's the rare person who says, *oh my god, you were right*. As opposed to, *no wait, the real reason is...* We've all heard that. When people give you feedback, cherish it and use it.

Show gratitude. When I got tenure I took all of my research team down to Disneyworld for a week. And one of the other professors at Virginia said, *how can you do that?* I said *these people just busted their ass and got me the best job in the world for life. How could I not do that?*

Don't complain. Just work harder. [shows slide of Jackie Robinson, the first black major league baseball player] That's a picture of Jackie Robinson. It was in his contract not to complain, even when the fans spit on him.

Be good at something, it makes you valuable.

Work hard. I got tenure a year early as Steve mentioned. Junior faculty members used to say to me, *wow, you got tenure early. What's your secret?* I said, *it's pretty simple. Call my any Friday night in my office at ten o'clock and I'll tell you.*

Find the best in everybody. One of the things that Jon Snoddy as I said told me, is that you might have to wait a long time, sometimes years, but people will show you their good side. Just keep waiting no matter how long it takes. No one is all evil. Everybody has a good side, just keep waiting, it will come out.

And be prepared. Luck is truly where preparation meets opportunity.

So today's talk was about my childhood dreams, enabling the dreams of others, and some lessons learned. But did you figure out the head fake? [dramatic pause] It's not about how to achieve your dreams. It's about how to lead your life. If you lead your life the right way, the karma will take care of itself. The dreams will come to you.

Have you figured out the second head fake? The talk's not for you, it's for my kids. Thank you all, good night.

[applause; standing ovation for 90 seconds; Randy brings Jai onto the stage and they take a bow; they sit down in their seats; standing ovation continues for another minute]

Randy Bryant:

Thank you everyone. I'd like to thank all of you for coming. This really means a lot I know to Randy. He had this theory even up to yesterday that there wouldn't be anyone in the room.

Randy Pausch [from seat]:

After CS50...

Randy Bryant:

I know. I'm the other Randy. That's been my role here for the past 10 years ever since Randy Pausch came here on the faculty. And what I mean by that is, I introduce myself. I'm Randy Bryant from Computer Science. They go, *oh, Randy from CS. You're the one that does all that cool stuff of building virtual worlds and teaching children how to program.* And I go, *no, no, sorry. That's the other Randy. I'm the wrong one. Sorry, I'm just like a dull nerd.* [laughter] So, but I'm very pleased today to be able to sort of run a brief series of ways in which we want to recognize Randy for his contributions he's made to Carnegie Mellon, to computer science and to the world at large. So we have a few – it will be a brief program. We have a few people I'll be bringing up one after the other. I'm sort of the MC here. So first I'd like to introduce who you've already met, Steve Seabolt from Electronic Arts. [applause]

Steve Seabolt:

My family wondered whether or not I would make it through the introduction. [voice starts to crack up] And I did that but I might not do so well now. So bear with me. As Randy mentioned, he and I, Carnegie Mellon and Electronic Arts share a particular passion about nurturing young girls and trying to encourage young girls to stay with math and stay with science. Every geek in the world shouldn't be a guy. You know, it's such a twist of fate that there's so many people that are worried about off-shoring, and at the same time companies are forced to off-shore, there are fewer and fewer students entering computer science. And the number of women entering computer science just keeps dropping like a rock. There are way too few Caitlins in this world. And Caitlin, we need so many more of you. And with that in mind, Electronic Arts has endowed a scholarship fund. It's the Randy Pausch endowed scholarship fund, established in 2007 by EA. In honor of Randy's leadership and contribution to education, computer science, digital entertainment, and his commitment to women in technology. This scholarship will be awarded annually to a female undergraduate CMU student who demonstrates excellence in computer science and a passion in the pursuit of a career in video games. Randy, we're so honored to do this in your name. [applause]

Randy Bryant:

Next I'd like to introduce Jim Foley. He's on the faculty at Georgia Tech and he's here representing the ACM Special Interest Group in Computer Human Interaction. Jim. [applause]

Jim Foley:

[motions to Randy Pausch to come on stage; gives him a hug] That was for Jim. [applause] ACM, the Association for Computing Machinery is a group of about 100,000 computing professionals. One of their special areas of interest is computer human interaction. A few weeks ago, someone who's a very good friend of Randy's wrote a citation which was endorsed by a number of people and went to the executive committee of SIGCHI, which on behalf of the SIGCHI membership, has authorized this special presentation. The citation was written by Ben Schneiderman and worked on then by Jenny Preese and Ben Peterson, and endorsed by a whole bunch of your friends and now from the executive committee. So let me read to you the citation. *Special award for professional contributions. Randy Pausch's innovative work has spanned several disciplines and has inspired both*

mature researchers and a generation of students. His deep technical competence, choice of imaginative projects and visionary thinking are always combined with energy and passion. We've seen that. From his early work on the simple user interface toolkit to his current work on 3D Alice programming language, he has shown that innovative tool design enables broad participation in programming, especially by women and minorities. Randy Pausch has vigorous commitment to engaging students at every level by compelling and intellectually rigorous projects, and his appealing lecture style for a role-model for every teacher and lecture. Yes, yes yes. [voice starts to crack up] His work has helped make team project experiences and educational computing research more common and respected. As a National Science Foundation Presidential Young Investigator, a Lilly Teaching Foundation Teaching Fellow, co-founder of the CMU ET Center and consultant for Disney Imagineering and EA, Randy's done pioneering work in combining computing interface design and emotionally rich experiences. For these and many other contributions, the ACM SIGCHI executive council is proud to present to Randy Pausch a special award for professional contributions. [applause] [Randy comes back on stage to receive award]

Randy Bryant:

Thank you, Jim. Next I'd like to introduce Jerry Cohen, the President of Carnegie Mellon University. [applause]

Jerry Cohen:

Thank you other Randy. [Tries to move Randy Pausch's bag of props to the side of the podium] You know you're traveling heavy, buddy. Many of us have been thinking about and talking about how we can recognize you on this campus in a way that is lasting and fitting in terms of what you meant to this university. A lot of people are involved in this. You thought the provost wasn't paying attention all those years. [laughter] Actually, one of the ways we're going to remember you is this \$50,000 bill for stuffed animals. \$47,862.32 for pizza. You've made great contributions, Randy, we really appreciate it. [laughter] One thing we could not do, regrettably, is figure out a way to capture the kind of person that you are. You're humanity, what you've meant to us as a colleague, as a teacher. As a student. And as a friend. There's just no way to capture that. There is our memories, however. And there is a way to remember you every day, as people walk this campus. So we've come up with an idea. You've done great things for this campus and for computer science and for the world. Surely Alice will live on. But the one we're going to focus on right now is what you've done to connect computer science with the arts. It was remarkable, it was stunning. It's had enormous impact, and it will last, I daresay forever. So to recognize that, we are going to do the following. Good job, other Randy. [laughter, as Randy Bryant gets the projector to show the next slide] In order to effect this, we had to build a building. [Shows slide of mockup of Gates building] A hundred million dollar building which will allow us to do the following. You'll note, by the way, to orient people. So the Purnell Center for the Arts is the home of the School of Drama. That modern looking new thing, half of which has a green roof, is the new Gates Center for Computer Science. And we had long planned to connect these two physically, both to allow people to get down from the cut to lower campus, and you have to admit it carries tremendous symbolic importance. Well

on behalf of the Board of Trustees of Carnegie Mellon and on behalf of the entire university, I'm pleased to announce today that the bridge connecting these two will be known as the Randy Pausch Memorial Footbridge. [shows slide of mockup of bridge] [applause] Now actually based on your talk today we're thinking now about putting up a brick wall up at either end, and let students see what they can do with it. [laughter] Randy, there'll be a generation of students and faculty to come here who will not know you, but they will cross that bridge, they will see your name, and they'll ask those of us who did know you. And we will tell them that unfortunately they were not able to experience the man, but they are surely experiencing the impact of the man. Randy, thank you for all that you've done for Carnegie Mellon. We're going to miss you. [applause] [Randy walks on stage and gives Jerry a hug]

Randy Bryant:

So every good show needs a closing act, and so to do that I'll invite Andy Van Dam. [applause]

Andy Van Dam:

Oh how I love having the last word. [applause] But to have to go on after that fabulous show, I don't know whether that was good planning. Well I started in Brown in 1965 and it has been my pleasure and great joy not just to teach thousands of undergraduates and some graduates, but also to work one-on-one with a couple hundred of them. And over 35 have followed me into teaching I'm proud to say. Out of those best and brightest it was very clear that Randy would stand out. He showed great promise early on and a passion about our field and about helping others that you've seen amply demonstrated today. It was matched by fierce determination and by persistence in the face of all brick wall odds. And you've heard a lot about that and seen that demonstrated as he fights this terrible disease. Like the elephant's child, however, he was filled with satiable curiosity, you remember that. And what happened to the elephant's child, he got spanked by all of his relations, and you've heard some of that. He was brash, he had an irrepressible, raucous sense of humor, which led to the fantastic showmanship that you saw today. He was self-assured, occasionally to the point of outright cockiness. And stubborn as a mule. And I'm a Dutchman and I know from stubbornness. The kind way to say it is he had an exceedingly strong inner compass, and you've seen that demonstrated over and over again. Now, having been accused of many such traits myself, I rather thought of them as features, not bugs. [laughter] Having had to learn English the hard way, I was a fanatic about getting students to speak and write correct English from the get-go. And Randy the mouth had no problem with that. But he did have one problem. And I'm having a problem with my machine here, here we go. [gets slide to project on screen]. And that was another part of my fanaticism which dealt with having American students learn about foreign cultures. And specifically about food cultures, and more specifically yet, about Chinese food culture. So I would take my students to this wonderful Chinese restaurant where they cooked off the menu using a Chinese menu. And I tried to get Randy to sample this. But would Mr. White Bread touch that stuff? [laughter] Absolutely not. And worse, he refused to learn to eat with chopsticks. I was chairman at the time and I said, *Randy, you know, I'm not going to let you graduate if you don't learn to eat with chopsticks!* [laughter] *It's a requirement, didn't you see that?* He of course didn't believe that. And

so it came time for graduation and I handed him his diploma. And this was the picture one of my friends took. [Shows slide of Brown University commencement, 1982, Randy dressed in his cap and gown, opening his diploma, his mouth wide open in surprise] And what you see is Randy opening his diploma to show it to his parents, and there was an autographed copy of the menu in Chinese and no diploma. [laughter, applause] It was one of the few times I got the better of him, I have to confess. Well here we are today, all of us, and hundreds and hundreds of people all over the country, I dare say all over the world, participating in this great event to celebrate you and your life. Randy is the person, the Mensch, as we say in Yiddish. Your manifold accomplishments as a model academic, especially as a mentor to your students. Your Disneyland expeditions not only were unique but they are legendary. You have more than fulfilled the terms of Brown University Charter, which are: to discharge the offices of life with usefulness and reputation. Your utter devotion to your family and your career are exemplary, and continue unabated as you cope with the immensity of your situation. You exemplify undaunted courage and grace under pressure. The most terrible pressure one can imagine. Randy, you have been and you will continue to be a role model for us. [Voice starts cracking up] Thank you so much for all you have done for us. And to allow us to tell you privately and in such a public way how much we admire, honor, and indeed love you. [applause]

[standing ovation]