Science Buddies: Yihe Dong's Intel Science Talent Search Blog

by Yihe Dong

Introduction

I did not give myself too much hope when I stuck the thick envelope containing my application materials for the Intel Science Talent Search (STS) into the mailbox. I knew that this event is the most difficult: there are about 1,600 applicant submissions from all over the nation, and those 1,600-plus projects are probably all very qualified studies conducted by very serious students who represent America's brightest young scientists. Therefore, it takes a great deal of work and luck to be selected as one of the 300 semifinalists, and even more to be selected as one of the 40 national finalists to present in Washington, D.C.

My own submission package contained over a year's worth of research, three recommendation letters, and a series of responses (or essays, if you make the answers long enough) to the questions on the application. You are allowed to submit work that you presented in previous competitions. In fact, many people do so.

After our applications go into the "mystery office" in D.C., they go through a group of evaluators, as I later found out. Those evaluators are scientists from around the country, who come to Washington, D.C. for the sole purpose of reading our research reports, applications, and the recommendation letters. After rigorous evaluation, 300 lucky semifinalists are selected. After another two weeks of agonizing waiting, the 40 national finalists are picked out of the 300 semis.

I shrieked when I received the phone call informing me of my finalist status. I did not know that the finalists were notified before the media release. Even if I had known this, I still wouldn't have expected a phone call. So yes, I was extremely excited when I found out that I could participate in the Intel STS Science Talent Search (STS, the finalist week in D.C.). The selection process is not only based on scientific merit, but also on a student's attitude toward science, personality, character, and his or her participation in extracurricular activities.

Thursday, March 6

March 6th marked the beginning of the most exciting week I have experienced thus far.

After arriving in D.C., I was thrilled at the sight of my fellow finalists. That was not, however, the first time we "met." Every Intel Science Talent Search (known affectionately by us finalists as "Intel") finalist was asked to create a Facebook account. While most of us already had an account, the few anti-Facebook people had to reluctantly give in to Intel's request. Therefore, we all found previous contacts and helped answer each other's questions before the Intel STS week.

I usually do not pay much attention to the place I stay during a competition, but the St. Regis Hotel deserves special comment. Built in 1926, the St. Regis is located just two blocks from the White House (some people could see the White House from their room windows). The hotel was pure luxury. For example, I could fit 10 within the mirror in the bathroom! The food was absolutely amazing, for a lack of other words to describe the delicacies they served us. One of my friends even jokingly remarked, "Even if I don't win the $100,000, I will eat $100,000 worth of food here." Most of the scientific activities took place at the St. Regis hotel, including the judging interviews, special presentations and talks, the e-lounge (our awesome computer room filled with Dell XPS's), etc.

Friday, March 7

Judging

There are four rounds of interviews for each finalist over the span of the next two days. From talking to previous finalists, I learned that judging is very intense. The judges ask very tough questions, almost to the point of picking on the finalist, so interviewees need solid evidence to back up every statement.

Besides being intense, the judges' questions are carefully selected and span across many scientific and mathematical disciplines, including biology, physics, astronomy, and chemistry, etc. It's this challenging question variety, in particular, that makes it so difficult. The questions can be about anything, and there is no way to prepare for them except by accumulating vast amounts of knowledge and getting into the habit of thinking critically and creatively. Being confident though, and bold, helps out. Just listen to what they've asked and take a moment to think of your answer.

After some of the finalists came out of a judging session, the rest of us immediately swarmed around them, trying to extract some valuable information. However, we ended up doing more consoling than anything else. Most of the questions were different for each finalist anyway, and I've figured out that it's best to keep an open mind with your own original thoughts.

After seeing people coming out of the judging rooms shaking their heads and hearing the almost horrifying experiences of the judges' interrogations, I became quite nervous. Indeed, the judges leave the impression that even the wrong pronunciation may cause suspicion about the validity of your answers. After my many college admissions interviews and participation in many different competitions that involve some sort of presentation, I have risen to the rank of a "science fair veteran" and I seldom become nervous anymore. But this time, the process was different. There was no way of predicting what the judges would ask and how they would react to my answers.

In my first interview, the questioning started off easy. "If you were the sustainable development advisor for the President, what energy source would you advise the president to promote?" I thought through this question carefully and came up with a response regarding the immense amount of solar energy that Earth is receiving every one hour. Then the judge turned the question into how I would store solar energy and transform it into a form that households can use. Although I had an idea about what my answer would be, it took me a while to organize my thoughts and present it to the judges. But it's better to take a moment to collect your thoughts than to just blurt out an answer that might make sense.

Then I had a more difficult question. While I did not know the answer, I tried to describe my way of thinking and went as far as I could before getting stuck. I quickly learned that it is all right to use the famous phrase, "I don't know." Nobody knows everything, so it's ok to admit that there is an area you should learn more about. However, you should say everything you know that is related to the topic before admitting defeat. Do not give up easily. Maybe you will strike gold somewhere along the way.

After the first interview, I felt my muscles loosen up. I realized that it really not that bad. As long as I concentrated, presented a valid argument, and presented the chain of thought by which I arrived at my answers, I knew I was trying my best. Besides, the other people were "suffering" the same treatment, so at least I was not alone.

From my interviewing experiences, I have found that the thought process is more important than how many facts you are able to recite to answer the question. Of course, having broad knowledge is going to help you greatly with the process, but memorizing the encyclopedia does not guarantee that you will do well. These questions tested intelligence in science, not the memory capability of an individual.

My other interviews went moderately well. The more interviews I had, the more confident I felt. Even though some questions included topics that I had heard either nothing or very little about, I tried my best to find a starting point. With the judges' guidance, I was able to find some possible solutions and ways to explain my answers.

Oh yes, another note: most of the questions are open-ended, allowing you some degree of freedom in terms of interpretation and creative thinking. This is a huge plus, as there are always multiple approaches to solve the same problem.

I believe that there really is no "right" answer to most of the questions. In fact, I think that the judges intentionally encourage us to think creatively from different perspectives. For example, when I finished answering one of the questions, one of my judges commented, "Hmm, I have never thought about it that way. But maybe it will work."

In the evening, Ted Hoff, the co-inventor of the microprocessor and an STS alumnus, gave the keynote speech. While jokingly presenting his STS project from back in 1954, he spoke about the influence that particular project had on his career. Hoff's presentation made me feel powerful. Maybe one day, if I continue to work hard, I can become a scientist and contribute to the world just like Ted Hoff has.

Saturday, March 8

Second Day of Judging

The second day of judging went better than the first one did. After all, I had accumulated some experiences and gotten used to the "mode" of thinking hard. In fact, I came to enjoy the judging very challenging and very challenging thought-provoking questions. They make you think very hard, twist and struggle with the question, and maybe go back to something you read in 7th grade to find an answer. To some extent, answering the difficult questions is similar to riding a roller coaster or tasting some very spicy foreign novelty—there is always that slice of uneasiness but you want to come back because you really like it.

In fact, the judges have left some long-term impacts on me. For example, I became very interested in certain areas of astronomy after a judge asked me a question about the origin and the future of our universe. For that one, after I babbled out the most important things I knew about the universe, my judge commented, "Some of what you said is true; some is not." That inspired me to want to correct the information I thought I knew to be true.

At the same time, I realized many new things about myself through judging. For instance, I learned that even though I often have the big pictures of how things might work, I still lack the necessary details to back up my statements. This realization has prompted me to pay attention to details whenever I learn, in addition to getting to know the big pictures.

Another aspect of Intel STS that I enjoyed was the opportunity we had to interact with the judges outside of the "prosecution rooms." There are plenty of opportunities to talk at dinner and in different events throughout the week. Discussions with judges are not about what you presented, we talked about many other topics besides science, including college, economics, politics, and even personal life experiences. If not for the fact that they were judges, I would have called them my buddies.

Dinner with Intel Fellows

The Intel Fellows and Intel Senior Fellows represent the highest levels of technical achievement within Intel. Tonight we had the privilege of hearing a presentation by and talking to some Intel Fellows and Senior Fellows.

Justin Rattner, an Intel Senior Fellow and the Vice President and Chief Technology Officer (CTO) of Intel, showcased the newest technology Intel is developing, including multi-core processors. The dual-core processor is currently in production and will be ready out on the market. Right now, Intel is actively working on the better and faster 2/4-core processors and the miniaturization of processors from 65-nm to the newer 45-nm designs. By increasing engineering accuracy, they can put more transistors per unit area and also reduce heat. It was fascinating to learn about Intel's latest progress from the people who are making it happen.

I loved the opportunity to interact with the people who work at Intel. They gave me a different perspective about science research happening at the corporate level. Until then, the only scientists I had interacted with were in academia. Indeed, corporations are vital in the world, as they are the ones who bring scientific innovations from the lab benches to society.

Sitting by our table was Gene Meieran, an Intel Senior Fellow. Over the irresistible cuisine at a D.C. steakhouse, he talked about his role at Intel, how he heard about the company, and its future development.

Sunday, March 9

Project Presentation

On this third day of judging, we presented our research projects to the STS judges. This round of judging is supposedly easier than the previous two, as we are now on familiar ground with our own projects, and many of us have presented them before at other competitions.

However, after the judging, I found that the questions posed to me were tougher than the ones I received in other competitions. STS judges seem to have a sharper eye; they can detect the most insignificant deficiencies (but no deficiencies are insignificant in research, really) and ask you to explain them squarely.

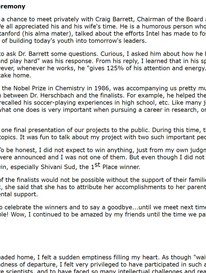
But as I said before, the judging was actually very fun. Yes, the questions were tough, but at the same time, I loved being challenged and thinking over my studies rigorously. After all, my goal in research is to think about my experimental design and results critically, find possible shortcomings, and try to figure out ways to improve them. To this end, the judges have certainly helped me.

Public Viewing

In the afternoon, the exhibit hall was open to the public. I loved talking about my project and answering whatever questions came up. In fact, some of the questions I received sparked some new inspirations about my studies!

The exhibit hall in the National Academy of Sciences was packed, yes packed, with literally hundreds of people, ranging from babies in their strollers to professional scientists from the NIH. Some of them came from nearby states, but others have traveled hundreds of miles from other states, just to see us 40 finalists. I felt privileged to be part of the process of spreading scientific knowledge and awareness to the public. I believe that, by presenting our projects, we 40 people are showing the public the importance of science education and investment in youth.

When the high school lower classmen and even middle school students asked me about my research experiences and how I became an Intel STS finalist, I was very glad to give them some advice. "You can do it!" I would tell them, "Just keep trying." I even exchanged email addresses with some people.



By the end of the day, after standing in high heels for seven hours and explaining my project without pause, my feet were sore, my back ached, and my throat hurt badly.

But no matter how tired we were, we still had plenty of energy left for fun! Tonight we went bowling at a bowling place not far from downtown Washington. I absolutely enjoyed it. I was not good at bowling, but I got some of the better bowlers to share their tips with me, so I got much better by the end. This bowling event was one of the many opportunities we had at STS to talk with our fellow finalists about our interests, life experiences, and ideologies. In fact, I love my STS class. We have many different characters, ranging across the political spectrum from very conservative to extremely liberal, knowing that we are state-of-the-art musicians, recruited athletes, artists, political activists, and the list goes on. I am proud to be part of my class.

Ahh, what a day!

Monday, March 10

Prime-time Panel

We had an opportunity to listen to a presentation by a panel of scientists and talk about the 2007-2008 International Polar Year, which is a collaborative international effort researching and spreading awareness about the polar regions. The panel consists of three distinguished scientists, including the President of the National Academy of Sciences (NAS), Ralph Cicerone.

The ensuing conversation after the presentation was very engaging and interesting. I felt totally immersed in the crisis the world is facing, and the urgency for all nations to collaborate and take immediate action. The panel also talked a little bit about the role the National Academy plays on policy-making in this country. It serves as a bridge between the science community and the government. Hmm, I just wish that I could be elected to NAS one day!

We felt very exhausted every night after days packed with activities. But somehow, we still managed to free up some energy to get together and have some fun. Some nights we watched movies, played computer games (Halo was the favorite), or simply met up in someone's room and talked about life. Other times we solved math problems together, bragged about each other's computer specs, checked out the latest news from *Scientific American*, and discussed programming or building computers. This list goes on and on. I felt that everything became more interesting when we worked together, knowing that we all shared a common interest in love science and that we all have similar interests and goals.

Indeed, everything is just different at Intel STS. The other night, we were watching *Legally Blonde*. Despite the fact that I was very tired and I had seen this movie a couple of times already, I sat in with my fellow STS-ers and was just glued to the couch—not because I loved the movie more than I did sleep, but just because I was enjoying the magical feeling of just laughing and shouting together so much. Things are simply different when we do everything together at STS.

Tuesday, March 11

Adventure on the Hill

Today, we finished had a chance to visit Capitol Hill and meet some elected officials. Michael Jacobson, Intel Public Affairs Manager in California and Texas, guided us around Capitol Hill to meet different elected officials, including several senators and representatives. It was very cool to meet those TV figures in real life.

During lunch, Mr. Jacobson talked about the political ladder in Capitol Hill, what different people do to influence policy-making, the big role of money in all types of elections, etc. Even though I already knew much of what Mr. Jacobson said, reading it in textbooks is not nearly the same as hearing it from him. It was a fascinating lesson taught in such a vivid way that the information was automatically inked into my mind, and I absorbed everything eagerly but carefully.

I also learned the "Washington walk": nothing in big steps and looking straight ahead. Hahaha. I truly inhaled the political atmosphere that I read so much about in politics books. It felt very solemn and it was such an honor just to be inside the Senate office building.

Final Presentation and Awards Ceremony

Before the awards ceremony, we had a chance to meet privately with Craig Barrett, Chairman of the Board at the Intel Corporation, and his wife, Barbara. We all appreciated his and his wife's time. He is a humorous person, who, in the middle of trying to convince us why to go to Stanford (its alma mater), talked about how Intel has made to foster education around the world and the importance of building today's youth into tomorrow's leaders.

After his brief talk, we had a chance to ask Dr. Barrett some questions. Curious, I asked him about how he balances time between work and play. "Work hard and play hard" was his response. Then he added that he tries to spend time with his family, he loves to travel around the world. However, whenever he works, he "gives 125% of his attention and energy." That was another valuable message for me to take home.

Dr. Dudley Herschbach, the winner of the Nobel Prize in Chemistry in 1986, was accompanying us pretty much the entire week. I loved the personal interaction between Dr. Herschbach and the finalists. For example, he helped the boys fix their ties, talked with us about his career, recalled his soccer-playing days in high school, etc. Like many judges told me, Dr. Herschbach said that loving what one does is very important when pursuing a career in research, or in any other field.

Before the awards ceremony, we had one final presentation of our projects to the public. During this time, the U.S. Secretary of Education, Margaret Spellings, and Craig Barrett both came by to talk about my project and related topics. It was fun to talk about my project with two such important people. By that time, I could recite my project in my sleep.

Finally, the awards ceremony came. To be honest, I did not expect to win anything, just from my own judgment of how I had performed. After a nerve-wracking wait, the top ten winners were announced one by one. All ten were announced and I was not one of them. But even though I did not win, I was perfectly content just being one of the top 40 in the nation. And I was really happy for the people who did win, especially Shivani Sud, the 1st Place winner.

Without a doubt, the success of any of the finalists would not be possible without the support of their families, friends, teachers, and mentors. I talked to Shivani about what she thinks led to her success. Without hesitation, she said that she has to attribute her accomplishments to her parents' support throughout her research—not only driving her back and forth to her lab, but also their encouragement and mental support.

There was a mixer on the last night to celebrate the winners and to say a goodbye...until we meet next time. I was surprised to uncover some really remarkable dance skills among some of who I thought were the nerdiest people! Wow, I continued to be amazed by my friends until the time we parted.

Wednesday, March 12

The Departure

The instant I stepped on the plane headed home, I felt a sudden emptiness filling my heart. As though "wait, a part of me is missing; where are the other 39 people who were around me for such a long time?". But amidst the sadness of departure, I felt very privileged to have participated in such an amazing competition; to have been among such an ingenious and hard-working group of passionate current and former scientists, and to have faced so many intellectual challenges and realized how little I know about this world. Exactly those experiences made me feel confident that college is going to be just as exciting, and that a career in science will be challenging and rewarding.

Intel STS has left many long-term influences on me, from the way I learn and manage my time, to how I see the world. For instance, I began checking out the online version of Scientific American quite often after I met someone who does that every night before she goes to sleep. All in all, there are just so many inspiring things I experienced at STS. They made me realize how much more I still need to learn and grow.

"You have to love the things you do, this is the key toward accomplishments in any field." Dr. Vera Rubin, a renowned astronomer who discovered significant evidence for the existence of dark matter, and one of the distinguished judges, told me this during a lunch at Intel STS. "Find something you like and stick to it," she added. Thinking about her words, I realized that indeed, passion about research is probably the primary driving force that has kept me and my fellow finalists going all along. There will always be challenges, no matter what area of research I go into, but it is always important to love what I do and not give up.

Afterwards

I still stay in touch with the other finalists. In fact, we have met on many other occasions, such as at scholarship interviews, other science competitions, and even on college visits. Besides, with the modern communication technologies, there is always phone, email, Facebook, and instant messaging. So whenever I feel nostalgic or have a technical question, I know there is someone out there who is able to help me.

As I said before, I am very amazed at how talented my friends are. Here, I will take some time to briefly introduce some of my fellow finalists.

Jeremy Blum

Jeremy Blum is a savvy techie from Armonk, New York. As if afraid to miss out on any technological advances, Jeremy subscribes to many different magazines, such as *Wired*, *Popular Science*, and *PC Magazine*.

Jeremy does a lot of hands-on work, including building computers! He buys different computer components and puts together functional computers in his spare time. So far, Jeremy has built some machines all by himself, including a mineral-oil-cooled computer. Besides building, Jeremy also programs. The computer languages he knows best are Java and MATLAB. In addition to working with his computers and programs, Jeremy makes videos in the professional level. Between his talents, he has founded multiple businesses with his buddies.

This may seem a bit overwhelming for a high school senior, especially given his heavy work load associated with school. So what keeps him going through all these activities? "Curiosity," he said. Jeremy loves to find out how things work before using them, either by looking them up or by asking someone.

Like all of us, Jeremy does not do everything alone. He drew much of his support from his mentor, a professor at the University of New Brunswick in Canada, who provided him with much assistance in his research and studies. At the same time, Jeremy's physics teacher also taught him much knowledge all across the board, while patiently answering his questions.

Feel free to visit http://ultimatecomputer.net/ or http://jeremyblum.com/ to learn more about Jeremy.

Nathan Hipsman

Nathan did his project at the Research Science Institute (RSI), which is a summer program for which students are selected from all over the country to participate in research at MIT. Even though participation in such a program could help you find a lab and a mentor, it is by no means the only way to do good research. I did not participate in one, and I believe that the majority of outstanding research projects are not conducted in such research programs.

In his spare time, Nathan enjoys playing golf, and his piano skills have won him top competitions. Besides taking a million AP classes in high school, Nathan also supplements his curriculum with rigorous classes from a nearby university (Georgia Institute of Technology)—taking classes from a nearby university is something I found rather common among the finalists. Well, one important factor that makes us finalists is that we tend to reach out beyond what is given and the conventional. The key is to never stop looking when the obvious answer is "no."

I am meeting so many ridiculously intelligent, motivated, and inspiring people all the time here at Intel STS. This is probably one of the most rewarding parts of participating in this competition.

Yihe Dong

Philip is a guy of few words. Even though I did not suspect his superb abilities from the beginning, the more I talked to him, the more amazed I became by his many accomplishments.

He finished as 2nd Place team winner (with his sister) at the national level of The Siemens Westinghouse Competition in Math, Science, and Technology, was the gold medalist for the U.S.A. Math Talent Search, made his way to the top 20 in the U.S. National Chemistry Olympiad, was top scorer in his state on the AMC, and the list goes on and on. When I took a closer look at his activities, I realized that his talents and interests cover juke and math.

And besides all that, he also plays violin in his school's orchestra, was the President of the math club, and more.

In my mind, there is a subtle difference between winning many recognitions and having an ingenious mind. While the former can be an indication of the latter, it certainly does not guarantee it. For Philip, his accomplishments are no doubt a reflection or understatement of his ingenuity. For example, we were trying to solve some math problems together, but it turned out to be much harder than teachers thought, because he would think of a solution before I could even grasp the problem.

Philip's philosophy did not surprise me: "Stay curious."

I only have space to write about three fellow finalists, but everyone at Intel STS is incredibly talented in their own area of specialty, and well-rounded at the same time. I was very inspired and have learned so much from my friends.

Yihe Dong enjoys research and writing. She has received 1st Place and Best of Category Awards at the 2007 Intel International Science and Engineering Fair (ISEF), and a 1st Place Award at the 2008 ISEF. Yihe is a finalist at the 2008 Intel Science Talent Search (STS). She is very grateful to her research mentors at the University of Georgia and the dedicated staff at Science Buddies for making her dreams reachable. Yihe is a member of the Princeton class of 2012.

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