

**Algorithmic Trading Competition**  
Sponsored by Trading Technologies, Chicago, IL  
September 2016-January 2017

**Introduction.** Trading Technologies (TT) is a Chicago-based software company specializing in the development of analytic and algorithmic tools for electronic trading on commodity and other exchanges. For the last two years, TT has hosted an algorithmic trading competition, called the Algo(rithm) Showcase. Teams of students, supported by faculty and TT staff, develop algorithms in TT's graphical-interface Algorithm Design Lab (ADL) software. The teams run their algorithms at predetermined dates and times—about once or twice per week—in October and November. Select teams are then invited to attend the Algo Showcase in January at TT headquarters in Chicago. There, teams present a 10-minute summary to an audience of TT staff and representatives of several Chicago-area trading firms. These experts are provided with detailed summaries of each team's performance as well as individual resumes. This panel then judged teams in three categories: algorithm design, presentation, and risk-adjusted returns. The event concluded with a networking reception.

In February and September 2016, TT representatives led by TT Campus Liaison Leo Murphy came to campus. Hosted jointly by College faculty Gerhard Glomm (Economics) and Kevin Pilgrim (Mathematics), Informatics faculty Esfandiar Haghverdi, and Finance faculty Ken Weakley, the visit featured hands-on computer lab sessions in which students tried simulated trading. At the start of the Fall '16 term, a call-out went to undergraduate and graduate students in all three schools inviting students to the session and to apply for spots on the team. Student interest was high; over three dozen students attended the lab sessions. Prof. Haghverdi, teaching our senior-level Mathematical Finance M451 course that term, took the lead in selecting a preliminary cohort from which to form the official team of five. Students were selected based on academic performance, interest in the subject, and ability to function on a team, as judged from course performance, essays, and resumes. Prof. Haghverdi led weekly evening training sessions designed to help students acquire the needed background and get to know one another.

A core group of especially dedicated students comprised our team. Their first attempt at developing an algorithm proved too complex for implementation in the ADL software. Persevering, they developed a second algorithm. This one drew upon a theoretical arbitrage strategy discussed in the Math Finance course, was far simpler and easy to implement in ADL, and worked well. On January 13, 2017, jointly supported financially by the four participating departments, they travelled to Chicago to present their algorithm. Participating were teams from Case Western U., Illinois Institute of Technology, IUB, Johns Hopkins, and Wisconsin.

Our team's hard work over the past term earned them an award for best risk-adjusted return. Here, in their own words, are their reflections on the experience.



*left to right*

Team members Muhammad Shehryar, Stefan Boyadjiev, Stephen Moors, Joseph Lim, and Pik-Mai Hui. The IU team was assisted by Finance majors sophomore Francisco Espinosa and junior Trevor Spencer.

**Stefan Boyadjiev**  
**School of Informatics and Computing**  
**Informatics with Business Cognate**  
**Senior**  
**Sofia, Bulgaria**

The Trading Technologies Algo Showcase in Chicago was an outstanding experience that acquainted me with the complex world of quantitative finance and trading. Coming from an Informatics and Entrepreneurship background I didn't think that I would ever have to deal with finance. However, with my excellent teammates, brilliant professors, and prospective future jobs the opportunity was too good to miss.

In the beginning our team was struggling in finding a common language, since we all came from very different professional fields of study, each with its own terminology. We had tight schedules, a huge learning curve, and occasional mistakes in our trading strategies that often made us wonder whether we should quit this competition. However, our perseverance and passion to learn, combined with the guidance from our professors, made us walk the extra mile, resulting in our strategy winning the award for best risk-adjusted returns.

Besides obtaining knowledge and putting something worthwhile on a resume to stand out, I would highly advise prospective students to attend the TT and similar competitions because of the bonding experience. By working together all night, traveling for hours, and sharing the moment of triumph you will strengthen your relationship with some tremendous individuals. Also, you get invaluable face-to-face time with your professors during which they can share the

knowledge that can rarely be found outside the classroom. After the event I am blessed to call my professors true friends and mentors.

We started as a group of individuals with some curiosity about trading. Now we have independent study sessions during which we learn about successful trading strategies and sophisticated algorithms while preparing for future competitions.

**Pik-Mai Hui**  
**School of Informatics and Computing**  
**Informatics/Complex Systems**  
**PhD student**  
**Hong Kong**

The TT Trading Chicago Showcase is definitely a worthwhile experience. Even during the presentation of other schools and the networking session I was learning. For me, a PhD student in Informatics, it has been always about learning.

When our team first formed, the interaction painted a very intriguing picture. Coming from a diverse set of backgrounds, we all had our own terminologies to describe the same thing. We started explaining terminologies and thinking to each other, agreeing and disagreeing with certain points, and drafting strategies. This processing of knowledge sharing in an interdisciplinary team is fascinating.

I came from a background of Computer Science and Mathematics. During a discussion, my job seemed to be digesting individual ideas and rephrasing them such that all teammates follow. Interestingly, I asked less and less questions as the competition approached the end. Not only did my teammates get better at explaining technical content to general audience, I realized I also built my foundation to understand them better.

We take this competition as a start towards a bigger goal. We now have a self-organizing study session where we go through materials on algorithmic trading and practice them on an online platform. Participating in this competition is not an end, but a start.

**Joseph Lim**  
**The College and Kelley School of Business**  
**Applied Mathematics and Finance**  
**Junior**  
**Dix Hills, NY**

The beginning stages of this competition was a lot of hard work and it called for grit and determination to learn and perform. As trading began, we learned faster and faster and ultimately created a winning algorithm. The final trip to Chicago was amazing. We got the opportunity to bond with the directors of multiple depts. of IUB and get even closer to team

members! I can truly say, each member of the team is not just a member, but rather a friend. This competition opened the door for summer internships and research positions and sparked the interest in all of us for potential career paths in algorithmic trading. This semester we will be taking another step forward and compete in the CME Group Trading Challenge and potentially, the UChicago Midwest Trading Competition.

**Stephen Moors**  
**The College**  
**Economics and Liberal Arts & Management Program**  
**Junior**  
**Evansville, IN**

How can one maximize return while mitigating risk?

This is the problem our team works with every day. There is no singular correct answer, but through implementing a multidisciplinary approach across Indiana University's departments and schools, we are able to develop and execute strategies that address the risk vs return problem. Being a member of the team motivated me to successfully apply theoretical knowledge I have learned in the classroom to commodity futures markets. Additionally, my membership has allowed me to gain skills outside of my respective field, such as coding, through collaborating with students that have differing academic and professional backgrounds. My participation on the algorithmic trading team has not only strengthened my knowledge of financial markets but also has pushed me to be a better critical thinker, teammate, and problem solver.

**Muhammad Shehryar**  
**Kelley School of Business**  
**Finance**  
**Senior**  
**Dubai, United Arab Emirates**

The Trading Technologies Algorithmic Trading Showcase was a fulfilling learning experience in that it exposed me to the "non-Finance" caveats of developing and deploying an automated trading system. Fortunately, I was in the company of talented peers from different departments at IU, who jointly facilitated a peer-to-peer learning approach. I found the university's support in our efforts more than adequate; a computer lab was reserved for our use and, indeed, enabled intense brainstorming sessions that guided our progress. Despite using a seemingly simplistic programming platform (ADL), my eyes were opened to implementation issues that proved detrimental to our trading algorithm. That being said, the tenacity and perseverance of my teammates were the real "value drivers" (in Finance speak) in securing our Best Risk-Adjusted Returns presentation. Perhaps more importantly, the excursion to Chicago was a unique opportunity to bond with insightful--and astonishingly fun!--professors too. I am

grateful for the comfortable accommodation, delicious dinner, and mutually caring attitude of our professors and the team. I wholly expect to recall the shared laughs--especially with the professors--later in life. Finally, the collective ambition of the team and the professors involved in establishing a university-wide platform to facilitate such activities (and the associated research) is a robust encouragement to us students in our persistent hunger for experiences that bolster our competitive edge in the labour market and beyond. A memorable experience if there ever was one!

**Trevor Spencer**  
**Kelley School of Business**  
**Finance**  
**Junior**  
**Bloomington, IN**

I think the main thing that I took away from this experience was the interactions outside of the Kelley School of Business, with students in different departments. Being surrounded by Kelley students is great, but I definitely appreciate the fact that I got to work with students in informatics, math, econ, and physics and see this task from their point of view. Also, having experience in financial markets, it was interesting to see what new-comers thought about the competition and how they attacked the challenge from a different frame of mind than someone who already has industry knowledge. Ultimately, I've made friends and colleagues that I will keep in touch with and draw upon, and my network has expanded into a whole new area. I was surprised and delighted to find other students as interested in trading (not investing, pure trading!) as I am, and I would have never guessed to look outside the business school, but that's where most of them come from. No matter what I do in the future, I feel like I've got a new group of bright, driven people to draw upon and I'm looking forward to competing again next year. The competition itself was fun, but it really took a backseat to meeting these people that I can continue to run with long after the competition is over.