



香港大學

THE UNIVERSITY OF HONG KONG



HKU iGEM Team 2017

Learning Report



HKU iGEM Team 2017

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Hynes Convention Center, November 9 - 13, Boston



The International Genetically Engineered Machine (iGEM) Competition is a multifaceted competition encouraging students to not only gain valuable experience in research work but also to understand how the research product is able to impact society as a whole. This competition has provided us a unique opportunity to design and execute our own experiments, receive input from and disseminate knowledge to the general public about the significance of our project and present our findings to an international panel of judges at the Giant Jamboree.



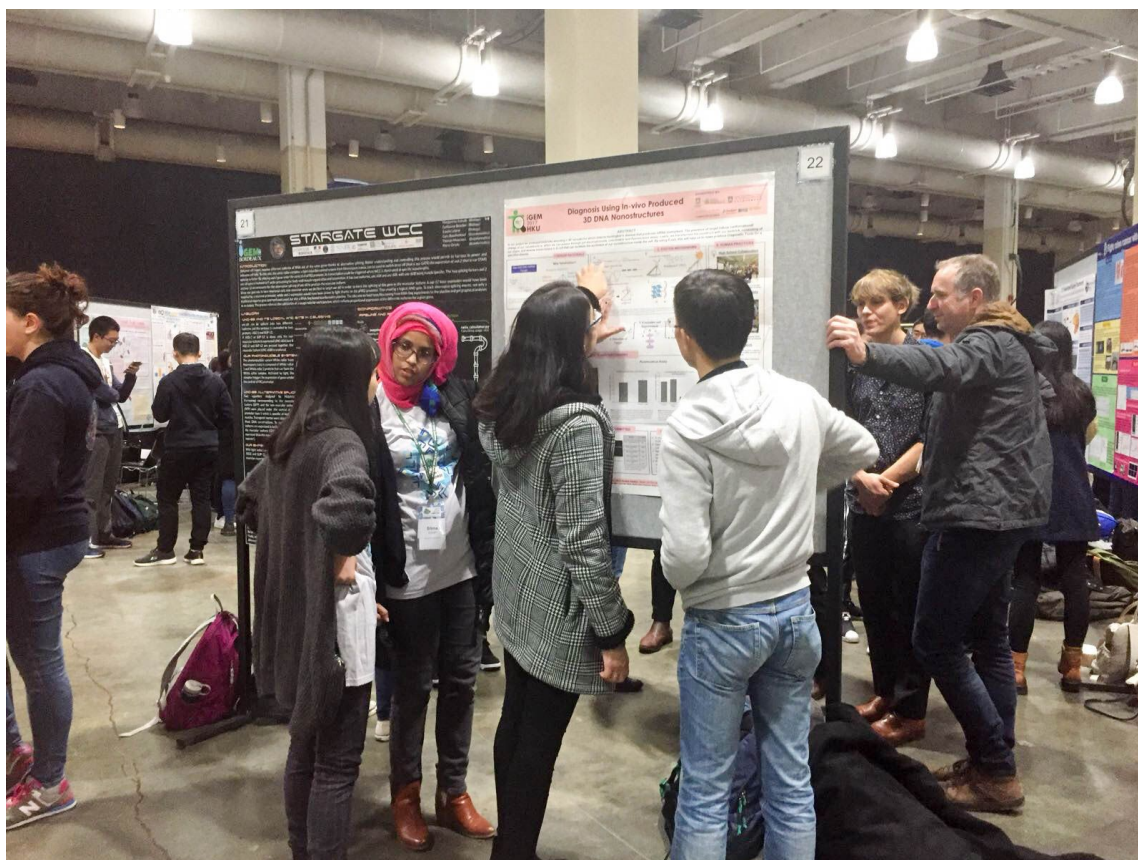
Team photo taken at Hynes Convention Centre, where the Giant Jamboree was held.

This year's iGEM Giant Jamboree was held in Boston, USA from 9th November to 13th November, 2017. Although it was in the midst of our crucial stage of the semester, attending the Giant Jamboree was an exceptional, once in a lifetime experience. It was the best place to see and gain practical knowledge about all the theories we see in textbooks in classes, as well as to explore our true interests. A massive gathering of students from all over the world, it was where we were able to reflect on our strengths and weaknesses as individuals, as a team and as undergraduate students at the University of Hong Kong (HKU). At the end we were able to successfully achieve a Bronze medal for our time and effort during the past year.

1. The Laboratory Component - Disease Diagnosis Using DNA Nanostructure

Scientific research comprised a major aspect of the iGEM competition. With the guidance of Dr. Julian A. Tanner and numerous advisors from the School of Biomedical Sciences at the University of Hong Kong, we designed a two-dimensional DNA nanostructure that can be modified to detect specific diseases. The detection of a Huntington's disease biomarker, the Hsa-miR-34b miRNA, was used as a proof-of-concept for the specific diagnosis of Huntington's disease. On binding to the Huntington's disease biomarker, our two-dimensional structure was designed to initiate a structural change, resulting in the formation of a three-dimensional DNA tetrahedron from the two-dimensional nanostructure. This also resulted in the formation of a G-quadruplex, which was able to generate a detectable fluorescence signal through a fluorescence assay.

Experimental results were able to show the successful formation of the DNA nanostructure, as well as the effective detection of our specific target. Comparing our design to that of HKU iGEM 2016, we were able to improve disease detection using a different detection mechanism in our DNA nanostructure and amplify the absolute detection signal obtained.



Our team members presenting our project to judges and other delegates at the Giant Jamboree booth.

All of these successes were not without hard work. A lot of effort was put into gaining knowledge of the research field through reading a plethora of research articles and learning the software necessary to help us design our DNA nanostructure. Numerous ideas were proposed and tested in the laboratory over the whole summer, resulting in both successes and failures. Through this experience, we were able to build up the persistence and problem-solving skills vital to potentially becoming a good researcher in future, as well as improve our hard laboratory skills and teamwork skills. This was invaluable in helping us develop an in-depth understanding of the complete research process in a way that we may otherwise not have been able to gain in our undergraduate degree.

2. Outside the Laboratory - Human Practices

In this competition, another major aspect was the Human Practices, which was able to add a community element to the team's work. To understand the end user's demands, we conducted a marketing research and spread it among doctors within our connection. Although we were able to achieve satisfactory and useful results, we hope that in future, we hope to gather more support to reach a larger demographic and collect potentially more extensive data.

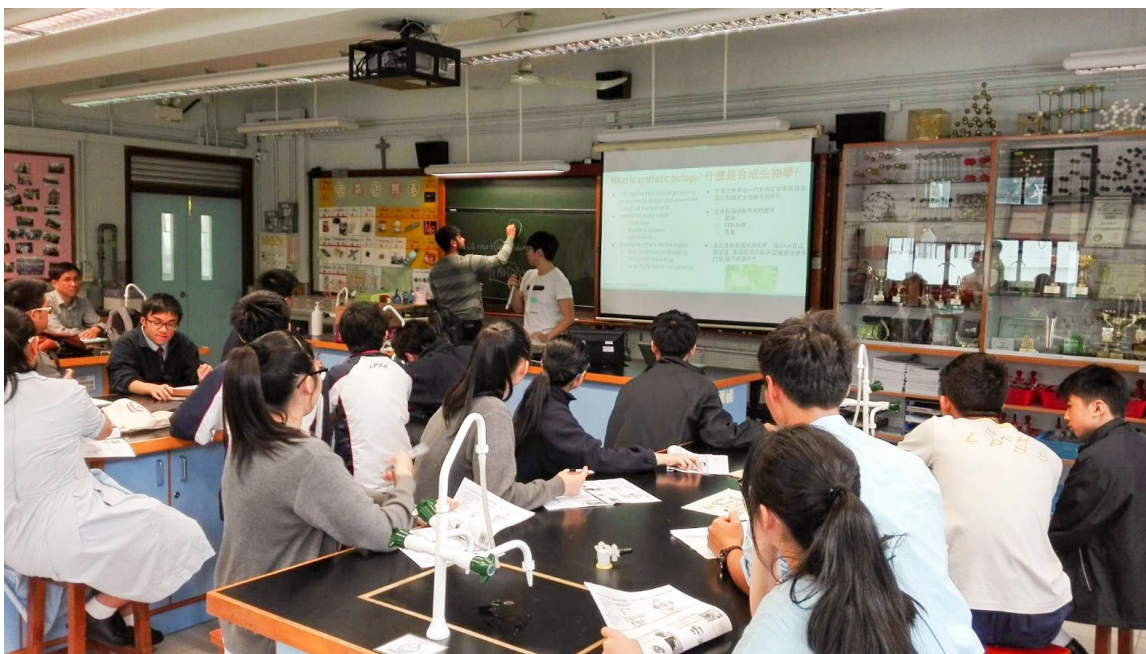


Photo taken at our highschool workshop with S.K.H. Li Ping Secondary School.



Our meeting with S.K.H. Li Ping Secondary School students and iGEM team members. Here we exchanged thoughts about joining this competition and how we could help the high school team.

We also mentored a local high school called S.K.H. Li Ping Secondary School, which was inspired to set up an iGEM team and even attend the Giant Jamboree in Boston. We were both honoured and grateful to play a part in enhancing the knowledge and interest of the students in the field of Science.



Our team leader, Yash, giving the opening speech at the Biosafety Sharing Session.



Group photo taken with the delegates of the Biosafety Sharing Session.

We further reached out to the other university and high school teams in Hong Kong, as well as a university team from Shenzhen to have a conversation about Biosafety, which is one of the main focuses of the competition and is of immense importance in terms of laboratory social responsibility. During the Biosafety Sharing Session, we were delighted to have the co-founder of DIYBIO HK, a citizen science organisation, to share their thoughts and experiences with us. The opportunity to hear from an industry expert and the project experiences of the other iGEM teams indeed added a lot of ideas and motivations to our project.



Our student leader, Yash, explaining DNA nanotechnology to Mrs Law, Chairman of the Board of Directors of the Hong Kong Science and Technology Parks Corporation.



Closing ceremony of the Joint School Science Exhibition.

To showcase our project, we joined the Joint School Science Exhibition (JSSE) as a delegate university team. During the exhibition, we were able to talk to and present our project to a number of prestigious guests. Apart from that, we were also able to spread understanding and awareness of the fields of synthetic biology and DNA nanotechnology to the public.

The Human Practices inspired us to think about efforts for the betterment of the society, linking the scientific knowledge gained in the laboratory to the community. We felt that we were able to make a direct impact through mentoring a high school, and the sense of satisfaction we gained definitely motivated us to promote the love of science to the next generation. Moreover, having the chance to enhance scientific understanding of the general public through the JSSE, we were able to see how people can be intrigued by synthetic biology. The significance and impact we saw provided us with further motivation for our project and human practices work.

The experience of communicating with externals both at the JSSE and the Biosafety Sharing Session also taught us an invaluable lesson in elements not limited to science. Further, through the presentation sessions at the Biosafety Sharing Session and the Giant Jamboree, we learnt how sharing can add value to our work. We are forever grateful to all the new friends we have made and the intellectual conversations that happened over the course.

3. Words of Thank You

Competing in the iGEM Giant Jamboree with over 350 teams worldwide whilst living the “American Dream” and winning the Bronze Award for HKU was truly an honoring experience. This has only been possible through the hard work and dedication of the 17 diligent members of the HKU iGEM Team 2017, the unlimited and constant support of our primary investigators, academic advisors and laboratory technicians. We were aided tremendously by the generous donations of the University of Hong Kong (HKU) CEDARS, the School of Biomedical Sciences, the Faculty of Science, the Li Ka Shing Faculty of Medicine and our sponsoring companies - Integrated DNA Technologies, Pacific Blossom (HK) Ltd., Ricardo Lee & Law Associates Office and Snapgene.