THE 53RD JOINT SCHOOL SCIENCE EXHIBITION

第五十三屆聯校科學展覽

科學激發無限想像
CREATING WORKPLACE

工作場所超越理想
IMAGINING SCIENCE

The 53rd Joint School Science Exhibition Preparation Committee

The 53rd Joint School Science
Exhibition Preparation Committee

PRESENTS

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EDITOR'S NOTE

Things went hard this year. The cancellation of the Joint School Science Exhibition was truly a difficult decision. Nevertheless, the enlightenment of students' scientific minds is maintained. The 53rd Joint School Science Exhibition Preparation Committee had still provided a platform for these elite students to exchange their innovative ideas.

I am delighted to be a part of the 53rd J.S.S.E.P.C. as the Publication Secretary this year. Working with my fellow executive committees is a grateful and precious opportunity for me to step out of my comfort zone, and definitely an unforgettable and invaluable experience which gave me an opportunity to make a difference in my life.

I would like to express my sincere gratitude to my fellow secretaries, Omega and Jessie for cooperating with me, and their remarkable efforts to the Preparation Committee. I am nowhere near the word "perfect". In fact, many mistakes were made along the journey. But my fellow executive committees were never reluctant to help me out, which drove me to always try harder to achieve my goals.

I believe the beauty of science will continue to inspire a new group of innovative and creative secondary students. Hereby, I invite you, the readers, to join us in the 54th Joint School Science Exhibition, we wish to see you there.

Joey Lai
Publication Secretary
The 53rd Joint School Science Exhibition
Preparation Committee

Dr. CM Cheng, JP

Director of the Hong Kong Observatory
Chairman of the Hong Kong Meteorological Society

The Joint School Science Exhibition (JSSE) is arguably the best-known and pioneering STEM-themed exhibition in Hong Kong. For over 52 years, JSSE has showcased countless innovative ideas and applications in the use of science and technology. I am particularly delighted to see the use of innovation for the betterment of our society. This is a vision shared by the Hong Kong Observatory.

Science brings advancement to our community. Central to this is innovation, a skill that creates new ideas from the old. Through innovation, new values are added to old ones. Sometimes, innovation makes what was considered impossible a possibility. JSSE is definitely a valuable platform to promote innovation in science, to arouse public interest in science, and to make the impossible a possibility.

This year's theme of JSSE is workplace. This comes at a time when the COVID-19 pandemic is affecting every walks of life. The workplace is no exception. It is a great challenge to maintain productivity in the workplace during the pandemic. Thus, this year's theme comes at the right time. I believe the present JSSE will inject a lot of innovative ideas to improve our working environment, thus enhancing productivity in the workplace.
Back in 2011, I was invited to deliver a talk at the 45th JSSE on the role of innovation in disaster risk reduction. I also acted as an advisor for the 48th JSSE. I must say that I was very impressed by the dedication and passion of the JSSE Preparation Committee. At this time of COVID-19 pandemic, it must have been extra difficult for the current JSSE Preparation Committee to prepare for the exhibition. The diligence and perseverance of the Preparation Committee are highly commended. Your hard work shall pay off and much appreciated. Wish every success in organizing the exhibition!

Professor Christopher Chao

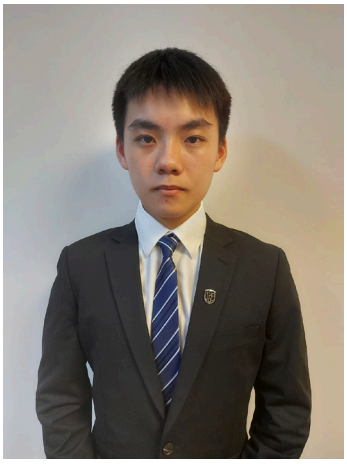
Dean of Engineering, The University of Hong Kong

STEM education is being promoted as a key emphasis in education in Hong Kong and many other parts of the world. It is essential for students' lifelong learning and whole-person development. The Joint School Science Exhibition (J.S.S.E.) is one of the largest platforms in Hong Kong for secondary school students to put science into practice and showcase their innovative ideas for improving daily life over the years. This annual event not only arouses public interest in science, but also encourages the exchange of scientific knowledge among the youngsters all over the world. This year marks the 53rd edition of the event. Under the theme of "Workplace", I look forward to seeing many innovative inventions by the talented youngsters for raising productivity, enhancing safety and reducing utilisation of resources in the workplaces.

"The value of an idea lies in the using of it." This famous quote by Thomas A. Edison always reminds me the importance of actualising ideas. There are lots of ideas floating around. But if there is no action taken, they are just imaginations. By using technology and scientific knowledge, we invent, design and create. More importantly, we make improvements along the way as we learn from failure and uncover new possibilities to arrive at great solutions.

Doubtless to say, practical hands-on and experiential learning activities are indispensable in engineering education as what we are doing in HKU nowadays. The Tam Wing Fan Innovation Wing of HKU Faculty of Engineering, a new iconic landmark and one of the largest maker spaces in Asia, provides an open environment to foster interdisciplinary innovations among students and teachers in Engineering and Technology. With its full operation in 2020, our students, also the future engineers, will have more opportunities to expand imagination and realise ideas in this state-of-the-art facility.

2020 is a challenging year. The outbreak of the COVID-19 poses significant challenges throughout the world and Hong Kong is no exception. I would like to express my heartfelt gratitude to the Executive Committee of the 53rd Joint School Science Exhibition Preparation Committee for their efforts in making this year's event possible. They have done an excellent job in delivering this Exhibition during this hard time. I wish the Exhibition every success and hope everyone will enjoy the innovative projects by our young generation.



Mr. Marcus Chung

Chairperson
The 53rd Joint School Science Exhibition Preparation Committee

Humans, born to be inquisitive are eager to discover the truth of the world and what lies beyond it. That is the reason why we develop science, to fulfill our inborn curiosity and solve all kinds of problems. We, the 53rd Joint School Science Exhibition Preparation Committee (the J.S.S.E.P.C.) believe that science is the future of the world and for humanity.

In an attempt to arouse public interest in science, the J.S.S.E.P.C. has organized the annual science exhibition, the Joint School Science Exhibition (the J.S.S.E.). This year, we set the theme as "Workplace", hoping that project holders can design a product, to raise productivity, enhance safety and reduce utilisation of resources. Project holders can perform their talent in science with the aid of STEM education. Meanwhile, we are glad to have 25 local secondary schools, 3 teams of university delegates from the City University of Hong Kong and the University of Hong Kong, as well as representatives from the Innovation and Technology Commission, our Associated Organization, to participate in this joyful event.

It is my greatest honour to be the Chairperson of the 53rd J.S.S.E.P.C.. In this joint-school association, I am leading the whole Preparation Committee to work tightly, together with all my executive committee members. Unfortunately, we have come across obstacles caused by the current coronavirus, yet we still persisted in brainstorming plans for the Exhibition. Thus, I would like to take this opportunity to thank all of you, especially my fellow executive committee members. All of the hard work and dedication to the J.S.S.E. have made our working progress more efficient. It is difficult to hold a series of events successfully without your help. At the same time, I would like to express my gratitude to our sponsors, advisory board, supervisors and all supporting organizations. Their valuable advice and support throughout the year is definitely the icing on the cake. In addition, the endeavour of the project holders can hardly be neglected. I believe the cancellation of the J.S.S.E. is disappointing news for all of you undoubtedly. I truly understand the feeling/feel the same but the consistency on completing the product and making this effort on this Exhibition is definitely admirable and impressive.

Although the 53rd J.S.S.E. has been cancelled due to the epidemic, I still believe that all participants would have an unforgettable experience. I hope all of them can uphold the passion on the field of science and put science knowledge into practice, creating a more outstanding environment for our future and I wish the best for the 54th J.S.S.E..

Mr. Ethan Wong

Vice Chairperson
The 53rd Joint School Science Exhibition Preparation Committee

What is science? A British naturalist Charles Darwin once said "Science consists in grouping facts so that general laws or conclusions may be drawn from them". Over the past years humans have been pursuing science. With the aid of science, scientists have kept on developing and discovering new facts as well as fascinating inventions which improved our daily life.

I participated in the 51st Joint School Science Exhibition (the J.S.S.E.) as a project holder when I was a form three student. During the exhibition, I have met a lot of project holders, a group of students fascinated by science. All of their products were very well-designed.. Project holders, including me, have also visited other booths. With this incredible chance, I got familiar with new friends who suggested that I joined the 52nd Joint School Science Exhibition Preparation Committee (the J.S.S.E.P.C.) in the following year. As one of the committee members, I visited all the project holder's booths and was amazed by the products. They must have spent so much time and effort on designing and making it. Because of all those great memories and experiences in the J.S.S.E., I decided to be a member of the executive committees.

This year, I am truly honoured to be the Vice Chairperson of the 53rd Joint School Science Exhibition Preparation Committee (the J.S.S.E.P.C.). I have never thought of being the Vice Chairperson. The J.S.S.E.P.C. is a very special joint school committee as all of the members in the committee are secondary four to five students who help to organize a competition and activities for local secondary school students. Over the past few months, the whole committee put most of their effort and time in different events. Some may say that the outbreak of Covid-19 has interrupted most of our plans; however, it fosters our committee members to make hay while the sun shines, to think more contingency plans for the events. Unfortunately, for public health reasons, we still have to cancel the 53rd J.S.S.E.. Still, I want to take this opportunity to thank all the committee members that paid their hard work into our association, and all the project holders who have put their great effort into the preparation work.

I wish the best for the 54th J.S.S.E.P.C.. I sincerely hope that the J.S.S.E. can keep serving as a platform for local students to exchange scientific knowledge. Not only to foster the interest in science but also to put science into practice. Hope this practice can help inspire you to design your own product while improving human life. Last but not least, I wish all project holders will not give up their passion in science in spite of the cancellation of the J.S.S.E.. Hope to see you all next year.

INTRODUCTION OF THE J.S.S.E.P.C.

The annual Joint School Science Exhibition (hereinafter the J.S.S.E. or the Exhibition) is organised by the Joint School Science Exhibition Preparation Committee (hereinafter the J.S.S.E.P.C.) is a registered (in accordance with the provisions of Section 5A of the Societies Ordinance) and charitable organisation in Hong Kong. It solely comprises students from more than 150 local secondary schools who are passionate for science. It aims at arousing the public's interest in science, encouraging scientific research, promoting cooperation among secondary schools and fostering the exchange of scientific knowledge. For the past fifty-two years, the Joint School Science Exhibition has been held successively and successfully, where participating schools have showcased their innovative inventions.

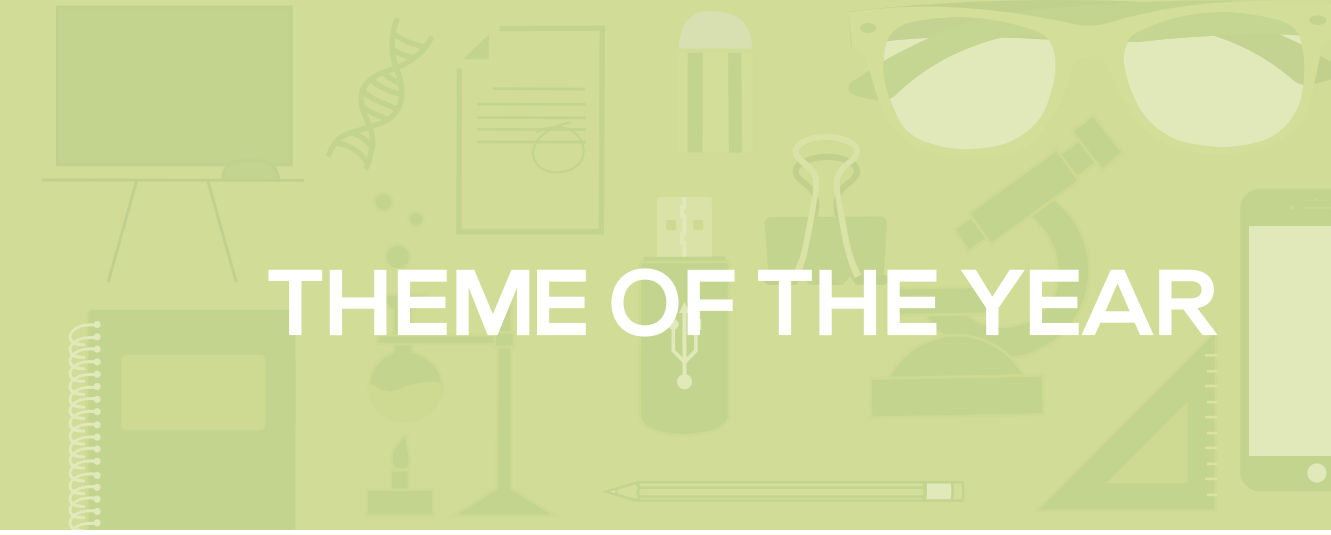
The J.S.S.E. was founded by Professor Payne, Dean of Department of Chemistry of the University of Hong Kong in 1968. It was a pioneer of joint school events in Hong Kong, with ten participating schools at first. At its 10th anniversary, the J.S.S.E.P.C. was officially registered as a non-profit making organisation and the number of member schools exceeded twenty. Furthermore, Governor Sir Maclehose was invited as the Guest of Honour at the opening ceremony of that year's exhibition. These achievements made the 10th J.S.S.E. one of the most memorable exhibitions in our history. In addition, since the 23rd J.S.S.E., delegates from overseas institutions and local universities have been invited to participate in the Exhibition so as to promote academic and cultural exchange between students from different nations.

With the unfailing support of sponsors, corporate partners, member schools, supporting bodies in the education sector and the public, the J.S.S.E. continues to attract a great number of visitors every year with its achievements widely recognised in the society. Stepped into its 53rd anniversary, the J.S.S.E.P.C. will continue to adhere to the four major aims, to work together with each supporting unit and forge ahead.

一年一度的聯校科學展覽由聯校科學展覽籌備委員會舉辦。它是個經政府註冊（根據香港社團條例第 5A 條註冊）的慈善組織。它是由來自全港多於一百五十間中學、並對科學有熱誠的學生所組成，旨在引起大眾對科學的興趣、鼓勵科學研究、提倡學校之間的合作和促進科學知識交流。在過去的五十二年以來，聯校科學展覽籌備委員會已經連續成功舉辦多屆聯校科學展覽， 展出了無數具有創意的科學產品。

聯校科學展覽由時任香港大學化學系的彭德勵教授於一九六八年創辦，是香港聯校活動的先驅。第一屆科學展覽由十間中學聯合舉辦。直到第十屆，聯校科學展覽籌備委員會正式註冊成為非牟利團體，而主辦學校躍升至二十餘間。當年更有幸邀請到時任港督麥理浩爵士為該屆展覽主持開幕儀式。自第二十三屆聯校科展，籌委會每年都會邀請外地院校及本地大專院校的代表參展，以推動不同國家的學術及文化交流。

有賴贊助商、各合作單位、會員學校教育界和大眾的鼎力支持，聯校科學展覽每年都吸引了大量參觀者，而其成就亦得到廣泛認同。踏入第五十三個年頭，聯校科學展覽籌備委員會將繼續堅守四大宗旨，與各單位攜手合作，向前邁進。



THEME OF THE YEAR

工作場所
Workplace

科學激發無限想像，工作場所超越理想
Creating workplace, imagining science

In recent years, society has benefited from the rapid development of science and technology, especially in workplaces, where people perform their jobs in their daily lives. With the majority of our time spent in workplaces apart from our homes, a workplace with advanced technologies can definitely improve our quality of work. Besides, adverse factors in workplaces may not only harm one's physical and mental health, but may also reduce their motivation towards work and block the path of improvement.

Hence, the 53rd Joint School Science Exhibition Preparation Committee has decided to use "Workplace" as the theme of the year, hoping that people can have a better surrounding for their work. Students are expected to design an innovative invention that can raise productivity, enhance safety and reduce utilisation of resources. We can ensure that these ingenious ideas can help the public improve their working environment and create a better workplace.

近年來，迅速的科技發展促使社會進步，尤其是人們固定的工作場所。工作場所是我們每天工作的地方。每天離家出外上班，我們都花耗長時間在不同工作場所中，所以一個較優質的環境才能改善我們的工作素質。然而，很多工作場所上的不良因素會損害人們的身心健康、降低工作意欲，或減慢工作進度。

有鑑於此，第五十三屆聯校科學展覽籌備委員會決定以「工作場所」作為本年度的主題，希望大眾能夠為自己的事業建立更先進的工作場所，並且以提升工作效率，提高工作安全性及減少使用資源為切入點，從而設計創新的發明。我們相信這些巧妙的想法可以幫助大眾改善工作環境，從而創造一個更好的工作場所。

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SALESIAN ENGLISH SCHOOL	慈幼英文學校
SHATIN COLLEGE	沙田學院
SHA TIN GOVERNMENT SECONDARY SCHOOL	沙田官立中學
SHATIN TSUNG TSIN SECONDARY SCHOOL	沙田崇真中學
SHUN TAK FRATERNAL ASSOCAITION YUNG YAU COLLEGE	順德聯誼總會翁祐中學
SING YIN SECONDARY SCHOOL	聖言中學
SMKMCF MA KO PAN MEMORIAL COLLEGE	馬錦明慈善基金馬可賓紀念中學
SOUTH TUEN MUN GOVERNMENT SECONDARY SCHOOL	南屯門官立中學
ST. BONAVENTURE COLLEGE AND HIGH SCHOOL	聖文德書院
ST. CATHARINE'S SCHOOL FOR GIRLS, KWUN TONG	聖傑靈女子中學
ST. FRANCIS' CANOSSIAN COLLEGE	嘉諾撒聖方濟各書院
ST. FRANCIS XAVIER'S COLLEGE	聖芳濟書院
ST. FRANCIS XAVIER'S SCHOOL, TSUEN WAN	荃灣聖芳濟中學
ST. JOAN OF ARC SECONDARY SCHOOL	聖貞德中學
ST. JOSEPH'S ANGLO-CHINESE SCHOOL	聖若瑟英文中學
ST. JOSEPH'S COLLEGE	聖若瑟書院
ST. LOUIS SCHOOL	聖類斯中學
ST. MARK'S SCHOOL	聖馬可中學
ST. MARY'S CANOSSIAN COLLEGE	嘉諾撒聖瑪利書院
ST. PAUL'S CO-EDUCATIONAL COLLEGE	聖保羅男女中學
ST. PAUL'S COLLEGE	聖保羅書院
ST. PAUL'S CONVENT SCHOOL	聖保祿學校
ST. PAUL'S SCHOOL (LAM TIN)	藍田聖保祿中學
ST. PAUL'S SECONDARY SCHOOL	聖保祿中學
ST. ROSE OF LIMA'S COLLEGE	聖保祿中學
ST. STEPHEN'S COLLEGE	聖士提反書院
ST. STEPHEN'S GIRLS' COLLEGE	聖士提反女子中學
ST.TERESA SECONDARY SCHOOL	德蘭中學
STEWARDS POOI KEI COLLEGE	香港神託會培基書院
TACK CHING GIRLS' SECONDARY SCHOOL	德貞女子中學
TAI PO SAM YUK SECONDARY SCHOOL	德貞女子中學
TOI SHAN ASSOCIATION COLLEGE	台山商會中學
THE Y.W.C.A. HIOE TJO YOENG COLLEGE	基督教女青年會丘佐榮中學
TRUE LIGHT GIRLS' COLLEGE	真光女書院
TRUE LIGHT MIDDLE SCHOOL OF HONG KONG	香港真光中學
TSANG PIK SHAN SECONDARY SCHOOL	曾璧山中學
TSUEN WAN GOVERNMENT SECONDARY SCHOOL	荃灣官立中學
TSUEN WAN PUBLIC HO CHUEN YIU MEMORIAL COLLEGE	荃灣公立何傳耀紀念中學
TSUNG TSIN COLLEGE	崇真書院
TUNG CHUNG CATHOLIC SECONDARY SCHOOL	東涌天主教學校
TWGHS LO KON TING MEMORIAL COLLEGE	東華三院盧幹庭紀念中學
TWGHS SUN HOI DIRECTORS' COLLEGE	東華三院辛亥年總理中學
TWGHS WONG FUT NAM COLLEGE	東華三院黃笏南中學
WA YING COLLEGE	華英中學
WAH YAN COLLEGE, HONG KONG	香港華仁書院
WAH YAN COLLEGE, KOWLOON	九龍華仁書院
WEST ISLAND SCHOOL	西島中學
YCH LAW CHAN CHOR SI COLLEGE	仁濟醫院羅陳楚思中學
YCH LAN CHI PAT MEMORIAL SECONDARY SCHOOL	仁濟醫院靚次伯紀念中學
YEW CHUNG INTERNATIONAL SCHOOL	耀中國際學校
YING WA COLLEGE	英華書院
YING WA GIRLS' SCHOOL	英華女學校
YLPMSAA TANG SIU TONG SECONDARY SCHOOL	元朗公立中學校友會鄧兆棠中學
YUEN LONG PUBLIC SECONDARY SCHOOL	元朗公立中學

INTRODUCTION OF PROJECTS

展品簡介

STEM@CityU

COLLEGE OF SCIENCE, CITY UNIVERSITY OF HONG KONG

香港城市大學理學院

Category: Physics, Mathematics and Chemistry
類別：物理學、數學及化學

Person in Charge: Janice Lam

Teacher Advisor: Ms. Janice Lam

The College of Science from City University of Hong Kong will be showing demonstrations and posters in the fields of Chemistry, Mathematics and Physics.

Magnetic Levitation
A demonstration of magnetic forces, the interaction between magnetism and electricity and the basic technology behind maglev trains.

The Untold Secret of Thickeners in Cosmetics
Thickeners, also known as thickening agents, are not just substances to increase the viscosity of liquids but are the soul in a wide range of cosmetic products that we use every day. In this exhibition, not only will the working principle of thickeners be discussed and illustrated, but also their versatile applications, which may blow your mind.

香港城市大學的理學院將會演示化學、數學及物理學的示範及海報。

磁懸浮
我們將展示磁力、磁性與電力之間的相互作用及磁浮列車背後基本技術

化妝品中增稠劑不為人知的秘密
增稠劑不僅是增加液體粘度的物質，而且是我們每天使用的各種化妝品中的靈魂。 在展覽中，我們不僅會討論和說明增稠劑的運作原理，而且還會討論增稠劑的多種用途，這可能會讓您大吃一驚。

Chinese Chess Robot With AI Recognition

DEPARTMENT OF ELECTRICAL ENGINEERING, CITY UNIVERSITY OF HONG KONG

香港城市大學機械工程學系

Category: Electronic Engineering
類別：電子工程學

Person in Charge:
Ng Chin Pang and Leung Ho Tung

Teacher Advisor: Prof. Ray Cheung

Our project is to create a machine combining AI that can play Chinese chess physically. Any player can play as usual. Only each time they finish their move, a click on a button will allow the machine to do its next move.

We will need a robot to perform all the moves for pieces. It can be a robotic arm or any machine that can pick up and put down the pieces. But before the moves, we need to photo capture the game board for the information of pieces placement and each piece type. To identify the types and colors will be using AI photo recognition and use the data to create a digital map to calculate the best next move by algorithm.

We like to use the RaspberryPI only, but we are using a laptop to finish the project instead. Mainly because the RaspberryPI 3 b+ we have for the use of this project does not have enough computational power to run all the AI process and calculations for the move prediction. It will either cause each move to require an unacceptable amount of time to perform or in the worst case it will completely halt during the process.

我們的項目是創造一種結合人工智能，而且能下棋的機器。任何玩家都可以照常玩。每次完成移動時，單擊按鈕便可令機器進行下一步移動。

我們需要一個機器人來執行所有動作。不論機械臂，抑或任何能夠撿拾和放下棋子的機器均可。在移動之前，我們需要拍攝遊戲版，以獲取棋子位置資料及棋子類型的信息。為了識別棋子類型和顏色，將使用人工智能照片識別並使用數據創建數碼地圖，以通過演算法計算最佳下一步。

我們只使用 RaspberryPI，但本次我們將使用筆記本電腦來完成此項目。主要是因為我們為該項目使用的 RaspberryPI 3b + 沒有足夠的計算能力來運行所有 AI 過程和用於步法預測的計算。這將導致每次移動都需要花費過長的時間來執行，甚至於最壞的情況下，它將在該過程中完全停頓。

Synthetic Biology and applications

THE UNIVERSITY OF HONG KONG
香港大學

Category: Synthetic Biology
類別：合成生物學

Person in Charge: Li Wing Ho Peter

Teacher Advisor: Mr. Ng Tsz Chun

Synthetic biology is a multidisciplinary field. It is a combination of several fields such as Biology, Chemistry, Engineering, Biotechnology, Bioinformatics, Molecular Biology and Molecular Genomics. It is a tool for understanding fundamental of biological system. It involves design and production of biological elements and systems to produce tools, materials, organisms, and devices that meet human needs.

Last year, we utilized the approach of synthetic biology to develop a novel cancer therapeutic which involves genetically engineered Salmonella bacteria, which are able to target and colonize solid tumors, served as live bacterial vaccines to deliver chemotherapeutic agents and artificial microRNA to down-regulate the stemness properties of the cancer populations. The strategy aims to lower the level of drug resistance of the tumor against chemo- drugs to prevent cancer relapse.

Variations inherently exist in a population of cells. No matter of they are cancer cells or bacteria. When selection pressure exists, a more resistant population remains. In the light of it, we are currently working on a project that aims to maintain certain cell characteristics and not lost via selection, as well as to eliminate cell population via pushing it to the opposite side by negative selection. This would produce evolutionary hap and so to enhance treatment. To achieve the aims, genome editing tools CRISPR and Cre-loxP are used as a combined strategy to first insert a complete cassette into the bacterial genome, followed by introducing randomness into the gene sequence. The state of art of this project is for every generation of bacteria, there will be a different phenotype to it. Therefore, a particular phenotype will not dominate the population.

The HKU iGEM Team 2020 is working to merge the afore mentioned genome editing tools to modify bacterial genome to control the direction of cell population evolution. To learn more about our experimental designs and project achievements, you are welcomed to visit our exhibition booth and chat with us.

合成生物學是一個多學科的研究領域。它是由生物學、化學、工程學、生物技術、生物信息學、分子生物學和分子基因組學等多個領域的結合。它是一個用來了解生物學系統基礎的工具。它涉及生物元素和系統的設計和生產，以製做滿足人類需求的工具、材料、生物和設備。

去年，我們利用合成生物學的方法開發了一種新型的癌症治療藥物，其中涉及可靶向和定殖實體瘤的基因改造的沙門氏菌，可以作為活細菌疫苗提供化學治療劑和人工 microRNA，從而下調癌症種群的幹細胞特性。該策略旨在降低腫瘤對化學藥物的耐藥性，以防止癌症復發。

不論是癌細胞抑或細菌，細胞種群必定存在變異。當有進化壓力，生存能力較強的種群則能夠生存。有鑑於此，我們目前正在致力於一個項目，該項目旨在保留細胞特徵並且不會因進化而丟失，以及通過陰性選擇，推離到另一邊從而消除細胞種群以消除細胞數量。這將提供進化的機會，從而增強治療效果。為了實現此目標，基因組編輯工具 CRISPR 和 Cre–loxP 將用作組合策略，把完整的基因盒插入細菌基因組，然後將隨機引入基因序列。本項目針對每一代的細菌，同時提供不同的表現型。故此，某特定的表現型不會於種群中維持顯性。

香港大學 iGEM 團隊 2020 正在努力合併上述基因組編輯工具，以修改細菌基因組以控制細胞種群進化的方向。要了解有關我們實驗設計和項目成就的更多信息，歡迎您訪問我們的展位並與我們聊天。

Air Con PRO Infra-red Air Conditioner
這個 Office 不太冷

BELILIOS PUBLIC SCHOOL
庇理羅士女子中學

Yeung Yeuk Yee 楊若禕
Shek Ching Shui 石靖雪
Ng Yuk Wing 吳彧穎
Sze Hoi Ching 施凱晴

The name of our product is 'Air Con PRO'. Initially, most of the offices in Hong Kong use central air-conditioning systems. However, around 2/3 people think the temperature is too cold or too hot, even 90% of the people think this situation is affecting their working quality. Therefore, we hope to improve the air conditioner in order to enhance the quality of the working environment.

'Air conditioner' is the major material we used, so it is included in our title name. We improved the air conditioner to a higher level. Thus, we called the product 'professional' air conditioner. In order to make it easier to remember and show the momentum of our product, we shortened the title name as 'Air Con PRO'.

We will apply the theory of infra-red in running this product. Infra-red is electromagnetic radiation (EMR) with wavelengths longer than those of visible light. Infra-red radiation is emitted or absorbed by molecules when they change their rotational-vibrational movements. Hotter object emits large amounts of infra-red radiation. After emitting the infra-red radiation, the object cools down. Therefore, it can detect our body temperature.

Our product can adjust the room temperature to a comfortable one, so as to maintain the productivity of office workers. As a result, their daily work will be improved. Besides, we hope that by letting all offices to use our product, the greenhouse gas emissions will be gradually reduced, thereby reducing the overall trend of global warming.

However, our product also has its shortcomings, for example, this system is not 100% fully automatic and it must be opened and closed manually.

我們產品的名字是「這個 Office 不太冷」。大部分香港 的辦公室是使用了中央冷氣。有三分之二的工作人士覺得 中央冷氣溫度過於太熱或太冷，甚至有九成的工作人士認為這樣降低了他們的工作效率。

Office 是辦公室的英文，office 是使用這個產品主要的工作場所，所以這個字包含了在我們的產品名字中。'這個'是以第一人稱的手法，以一個在辦公室裏工作的人的語法，說明這個產品對他們的實用性。「不太冷」是研究這個產品的目的。由原本冷氣溫度太冷，降低了他們的工作效率，到有一個自動調整合適的溫度令他們可以專心工作，從而提高他們的工作效率。所以，這是我們選擇產品名字的原因。

我們將在運行該產品時應用紅外線理論。紅外是波長比可見光長的電磁輻射 (EMR)。 當分子改變其旋轉振動運動時，它們會發射或吸收紅外輻射。較熱的物體會發出大量的紅外輻射，於是人體的氣溫就會被紅外線偵測。

而我們希望我們的產品可以將室溫調節到舒適的溫度，從而保持上班族的生產效率，這樣他們的日常工作就會得到改善。而且我們也希望透過讓所有辦公室都使用我們的產品，令到溫室氣體的排放量將逐漸減少，從而減緩全球變暖的趨勢。

當然我們這個產品也有不足之處，例如這個系統不是 100% 全自動的，必須靠人手打開和關閉的。

Air exhaust system

空氣排氣系統

CCC KEI YUEN COLLEGE

中華基督教會基元中學

Li Yee Tung 李綺潼
Yeung Po Ying 楊寶盈
Tang Wan Yi 鄧韻怡
Leung Yan Ting 梁欣婷

Our air exhaust system helps for the busy citizens who are always work in low density environment . As the result of infecting disease easily , our system can attain to improve citizens ' health and work.

In order to improve the workplace environment for workers, we choose to removing carbon dioxide and allow the air to circulate by the system. Therefore, citizens can increase their work efficiency. Moreover, the system turns on UV light to filter bacteria at the same time so workplace bacteria can be killed and decrease the chance of infection.

The air pollution is rampant in densely populated districts. Generally, air conditioners and room air circulator fan do not filter the air while functioning. The air is riddled with the pollutants like dust and PM2.5, affecting the respiratory system of human beings. With the outbreak of COVID-19, people place much emphasis of indoor circulation in order to suffering from this airborne disease.

When the carbon dioxide sensor is placed at the corner of office room, the carbon dioxide detects the concentration of carbon dioxide and the air exhaust system will turn on. UV light will turn on and then kill bacteria. Lastly exhaust fan also turns on and carbon dioxide will be soon removed outside after that.

我們設計的空氣排氣系統為工作繁忙的都市人而設，長期處於密集環境底下工作容易患病，而展品能達到改善都市人健康和工作效率。

為了改善都市人的工作環境，透過空氣排氣系統，排走空氣的二氧化碳並使室內空氣流通，提升都市人的工作效率，並同時開啟系統的紫外光燈過濾細菌，減少室內細菌傳播及降低患病機會。

在人口密集的地區空氣污染嚴重，一般的冷氣機或抽氣扇換氣時並無進行過濾，空氣充斥塵埃、懸浮粒子等，吸入後會影響人的呼吸系統。今年的新冠肺炎發生全球爆發，空氣為其中一個傳播途徑，室內的換氣系統值得關注。

當在辦公室牆角放置二氧化碳感應器，感應器感應二氧化碳濃度時，排氣系統開啟，同時紫外燈開啟並把細菌殺滅，另外抽氣扇開啟令二氧化碳排走，令系統成功啟動。

Papercycle

紙再生

GOOD HOPE SCHOOL

德望學校

Chu Lui Sum Kristen 朱蕾心
Wong Tsz Yi Jenny 王子怡
Fu Ka Yung 符嘉容
Yung Miyu 翁美優

The problem of paper waste is one that is still prevalent in the modern workplace– the average office worker uses around 10000 sheets of paper every year. 'Papercycle', a combination of the words 'paper' and 'recycle', adheres to the rationale of our group that aims to create a workplace where, even as we move towards a paperless, electronic society, we can reduce the waste produced by unnecessary documents and transform them into items that can be used daily. Instead of disposing waste paper via methods such as transporting it to landfills or non-local recycling factories in the mainland, carbon footprint as well as capital can be reduced if paper can be recycled locally, without the heavy industrial processes involved when dealing with traditional paper recycling.

The scientific principle behind 'papercycle' is simple – we cut down the steps involved in what traditional paper recycling does, which involves processes such as deinking, flotation, etc, and shrink it down into a reasonable size that can be fitted into an office. Due to the types of paper collected in an office, which is to say A4 paper and cardboard, mostly, products can be made into not only new paper but also items such as mugs, envelopes, business cards, and so on.

在現代工作環境中，紙類廢品乃一大難題——平均每位職員每年都會消耗大約 10000 張紙。而我們的產品則可以完美地解決這項問題。產品名'Papercycle'糅合了英文單詞中的'紙'及'回收'二字，充分地帶出了本組的意向：即便在現今已逐漸走向電子化的辦公環境中，我們仍可以透過把紙本文件產生的廢物重新轉換為全新的日用品，把廢物產量壓縮至零。如此一來，少了把大量廢紙運往堆填區或非本地回收廠進行處理的運輸及重工業程序，企業不但可透過減少碳足跡而建立正面形象，更可省下大筆資金。

'Papercycle'的運作原理其實十分簡單——我們的機器簡化了傳統紙類回收再造的工序（如：脫墨，浮選等）並把規模限制於可放置於辦公室內的合理尺寸中。由於辦公室內會出現各式種類的紙張，如紙皮，卡紙。彩紙等，'Papercycle'可製作的產品也趨於多樣化，除了列印紙外更可製作如杯子，信封，名片等多種產品。

VIP Guide

HOI PING CHAMBER OF COMMERCE SECONDARY SCHOOL

旅港開平商會中學

Siu Otho 蕭翱
Chan Chun Lam Anson 陳俊霖
Wong Hoi Wing 黃凱穎
Huang Wang Ki 黃泓琪

In the past few years, there have been several inventions designed over the world to support visually-impaired people and improve the quality of their lives. Unfortunately, most of them are limited in their capabilities and are rarely found in Hong Kong. Indeed, the costs of their inventions are usually high and not affordable by them. Therefore, the common tools of navigation for visually impaired people are white canes and guide dogs. However, White canes and dogs are limited to gather sufficient information about the surrounding environment and dangerous acts that may occur, which can be prevented by a normal person.

To combine the technology of various sensors and microcontrollers in the VIP Guide, we believe that our invention not only provides safety in navigation but also offers a better opportunity for visually impaired people in the working place.

過往數年，全球都有許多發明去改善視障人士的生活素質。可是，已經面世的產品在不同方面都未能盡善盡美，而且有關產品在香港並不常見。無可厚非，這些發明成本一向偏高，導致最終的價格也並非常人能負擔，所以有需要人士只能夠使用最基礎的設備，如白手仗、導盲犬等等。與此同時，他們還是沒法有效地避免意外的發生，只因他們終究沒法得知路面情況。

基於我們這個發明所採納的技術和配件，我們深信這不單單能提供一個安全的導航，還有更多在工作上的機會也會因此而到來。

Pen Friend

「筆友」

HOMANTIN GOVERNMENT SECONDARY SCHOOL

何文田官立中學

Kelvin Ho Ka Him 何家謙
Ivan Chu Wai Lok 朱煒樂
Marco Yeung Ho Hin 楊灝軒
Abigail Xian Man Yau 冼敏柔

In a busy city like Hong Kong, productivity plays a significant role in the workplace. One can enhance their productivity by strict time management and eliminating distractions. It might be neglected by the majority that a slight change in the workspace may increase the productivity of a person. Therefore, we have designed Pen Friend, to raise people's awareness of the effects of working conditions and their habits in the workplace.

Multiple studies have pointed out the fact that several factors, namely temperature, noise level, and light intensity, affect productivity. In order to remind people effects of unfavourable working environment, devices including temperature sensor, sound sensor and photoresistor are installed inside the pen stand, to collect data of the surroundings.

In addition, we would like to emphasize the importance of resting in order to increase productivity because adequate rest during work could help to restore a person's alertness and reduce mental fatigue. Our Pen Friend measures the time elapsed during work and reminds the user to take rest regularly. These reminders will be signalled to the user via an RGB light bulb. Since productivity can be increased in many ways that do not require much effort, why do we not make the most out of it? Therefore, here we bring Pen Friend – Your Productivity Maker.

在香港這個人人皆為工作而奔波的城市中，工作效率是了極為重要的一環。在工作間，我們自然期望提升我們的生產力，因而謹慎地管理我們的作息時間及消除身邊分散他們注意力的事物。事實上，我們只要在工作環境或作息習慣上做一些很小而且簡單的改變，已經能大幅提升工作者的工作效率。為了幫助這些工作者及提升社會大眾對生產力的關注度，我們設計了「筆友」。

不少研究均指出很多工作環境的狀況都可能會影響工作者的生產力，包括環境溫度、噪音強弱、光線充足與否。為了提醒使用者四周環境可能不利於他們的工作效率，我們裝置的筆座中設有溫度計、分貝儀及光敏電阻，以收集有關四周環境狀態的數據，然後我們的裝置將會利用這些資料再進行進一步的分析並向使用者提出改善建議。

此外，我們亦希望籍設計「筆友」去強調休息的重要性，以提升工作者的工作效率。藉着提醒使用者在工作是作出適當的休息，有助使用者時刻保持警覺性最高的狀態，並有助緩解因繁重工作而產生的疲勞。而我們的設計就會記錄及計算使用者的工作時間並透過 RGB 提示燈提醒使用者在適當時候小休一會。其實工作者的生產力可透過一些簡單、輕鬆的方法提升，那為何不盡我們所能去提升我們的工作效率？所以，我們便製作了「筆友」，希望它能成爲令你更有效率地工作的好朋友。

Paper Revival Adventure

「紙張的奇妙冒險」

HONG KONG CHINESE WOMEN'S CLUB COLLEGE

香港中國婦女會中學

Ku Ching Yiu 顧靖堯
Cheng Man Pan 鄭文彬
Tong Chun Wa 湯振華
Chow Chun Ngai 周俊毅

The theme of the competition this year is "Creating Workplace, Imagining Science". In workplace such as offices, workers waste a lot of paper every day. Very often, only one side, or just a small area, of a sheet is used before disposal. This is an ineffective habit that usually go unnoticed. Our product, "Paper Revival Adventure", aims to minimize wastage in offices due to ineffective use of paper, and to alleviate the associated negative impacts.

With innovative technology that facilitates paper recycling, not only does our product, "Paper Revival Adventure", reduce paper use and thereby save resources in offices, it also has significant implications on environmental protection. While trees have been one of Earth's best defences against rising greenhouse gases, much deforestation is done to feed the offices' huge appetite for paper products. The processes of paper production release greenhouse gases into the atmosphere, which intensifies global warming. Therefore, by cutting down paper use in offices, these environmental problems could be eased.

"Paper Revival Adventure" could achieve this goal by identifying reusable sheets and separating them from non-reusable ones. Our product consists of mainly two parts: an array of colour sensors, and a specially designed programme. The colour sensors will first scan through the waste paper. Then, based on the colour detected on the page, our programme decides whether the sheets are reusable. Lastly, sheets are sorted into different trays according to their reusability, so that office workers can take the reusable sheets and make full use of them.

今年比賽主題是「科學激發無線想像 工作場所超越理想」。現時全球暖化的問題日益嚴重，不知你們有沒有想過解決方法呢？ 樹木可以吸收溫室氣體，是解決全球暖化的重要元素。可是，人們卻為了要製造紙張，每年則要砍伐大量樹木，令到全球暖化問題每況愈下。

「紙張的奇妙冒險」是一部能識別已完全使用紙張和可重用紙張的機器。我們使用顏色感應器來感應紙張上的顏色，然後利用程式計算紙張的使用率，再根據用家對可用紙張的要求，把他們分為全新、可重用和不可重用，再判斷可重用性。

大部分都市人上班經常只使用紙張的其中一面，甚至只用了紙張的一小部分，便將整張紙張丟棄。此舉為全香港甚至地球的紙張使用量徒增不少壓力。

因此，我們希望這部機器能夠從都市人工作的地方做起，把這些被浪費的紙張抽選，然後讓其能夠被循環再用，以減少辦公室內紙張的使用量；並且通過這部機器，宣揚以及傳遞給各位綠化環境的意識，以及喚起各位對環保議題的關注。

Shade Glass Film

遮陽玻璃膜

HONG KONG TANG KING PO COLLEGE

香港鄧鏡波書院

Lam Chun Kit 藍俊傑
Pang Yue Hang 彭宇恆
Wong Cheuk Him 黃卓謙
Yang Ho Wang 楊浩泓

The reason for making the product is to reduce the damage to human body caused by glass fragments after a car accident. In society, every driver is guaranteed to take protective measures because he does not know that accidents will occur during his life. The driver is protected from puddle reflections, reducing the chance of being harassed and distracted while driving, thereby reducing the occurrence of car accidents.

The product details are as follows: we use the inner layer of the original car glass window, the middle layer of transparent maltose, and the outer layer is a rotatable polarizer (see the picture on page 4). The refractive index of transparent maltose is 1.65, and the refractive index of glass is about 1.5. When light enters, it will generate total internal reflection, thereby relatively reducing the entrance of light. Polarizers have been added to prevent drivers from being reflected by puddles on the ground, thereby affecting driving safety.

In the production process and techniques, we apply transparent maltose on the rotatable polarizer, which must be evenly coated, and the amount should be appropriate. Too much or insufficient transparent maltose will have a certain effect on the refractive index, and then it is closely attached to the original factory on the car glass window.

Theoretically, when an automobile accident occurs, the glass in all directions will break quickly. At this time, we used a "non-Newtonian fluid" inside the glass membrane. "Non-Newtonian fluid" is a substance. The greater the strength, the harder the body. Therefore, the glass film can be used to prevent glass fragments from flying to people in the vehicle. During driving, especially after rain, the puddles on the sidewalk will reflect sunlight to the eyes. The sun is too violent, causing distraction and causing a car accident. Therefore, we added a "polarizer" to the front to reduce entry into the car.

The principle of the polarizer is to be able to play the role of polarization. The polarizer can control the transmission of light. Natural light is omnidirectional and divergent from all angles. However, after passing through the polarizer, you can control the transmission of the light beam in a specified direction. Other beams parallel to the polarization angle will be absorbed, leaving only the beams perpendicular to the polarization angle.

The principle of non-Newtonian fluid is that the friction force acting on the trace elements of the liquid is related to the past movement state of the liquid in addition to the current movement state, that is, the liquid has a memory effect. Therefore, the viscosity of the fluid will change due to pressure or speed. The greater the pressure, the viscosity will increase and even become a temporary solid. Therefore, when a non-Newtonian fluid is strongly beaten, the viscosity of the contact surface increases due to high pressure.

In order to reduce the scattering of glass fragments generated when the car hits, it is recommended to attach the sun visor glass film to the original car glass to ensure the safety of the driver and passengers. Our products will be used for car windows. Mainly to block sunlight, reduce the temperature in the car, and reduce the mortality in traffic accidents.

Every year, more than 100 people are killed in local traffic accidents, and more than 2,000 are seriously injured. The main reason is driver fatigue, which is much more serious than drunk driving. In particular, professional drivers are exposed to sunlight and road materials to form binoculars that have been exposed to sunlight for a long time. In addition, many people in the car accident were cut by the window glass and later died of bacterial infection.

In a sense, our products enable everyone to expand their thinking. Don't think that the glass membrane is just solid. Where appropriate, you can add liquid to it. It also reduces the chance of being harassed and distracted while driving, thereby reducing the possibility of a car accident.

製作產品的理由是為了減少車禍以後玻璃碎片對人體的傷害。在社會中，保障每一個開車人士，因為不知道生命時候會發生意外所以要做好保護措施。讓司機免受水窪反光，減少開車被騷擾和分心的機會，從而減少車禍的出現。

產品明細如下：我們利用原廠汽車玻璃窗內層，中層透明麥芽糖，外層為可轉動的偏光片（見頁4附圖）。透明麥芽糖的折射率是1.65，玻璃是1.5左右。當光線進入時會產生全內反射，相對減少光線進入。加入偏光片，讓駕駛者不被地上水窪的反光，影響駕駛安全。

製作流程及技巧，我們把透明麥芽糖塗抹在可轉動的偏光片上，必須注要平均塗抹，份量也要恰當，過多或不足的透明麥芽糖對折射率有一定影響，然後再把它緊緊貼在原廠汽車玻璃窗上。

理論方面，當汽車發生意外後，四面八方的玻璃會迅速爆開。這時我們便採用到我們在玻璃膜裡面的"非牛頓流體"。"非牛頓流體"是一種物質當受力越大，本體便會越堅硬。所以可以在玻璃膜那裡杜絕玻璃碎片飛向車內的人員。而在駕駛過程中，特別是在剛下完雨，路面上會用一些水窪反射太陽光進入眼睛和太陽太過猛烈，導致自己分心引發車禍。所以我們在最前面增加了"偏光片"可以減少進入車內。

偏光片的原理就是能夠起到偏振作用。偏光片可以控制光線的透過，自然光是全方位，全角度的發散，但當透過偏光片之後，可以控制指定方向的光束透過，其他與偏振角度平行的光束則會被吸收掉，只剩下與偏振角度相垂直的光束。

非牛頓流體的原理是作用於液體微元上的摩擦力除與目前的運動狀態外還與液體過去的運動狀態有關，也就是說，此種液體有記憶效應。所以流體的黏度會因為受到的壓力或速度而變化，壓力越大，黏度會增加，甚至成為暫時性的固體。因此當用力搥打非牛頓流體時，接觸面因為壓力大而黏度增加。

為了減低汽車撞擊時所產生的玻璃碎屑散開，建議在原廠的汽車玻璃上貼上遮陽玻璃膜，保障駕駛者和乘客的生命安全。我們的產品是會運用在車窗上面。主要是阻擋陽光，減低車內溫度，及減少交通車禍中的死亡率。

每年本地交通車禍中喪生的人數約百多名，而重傷的人數則有兩千多名，主因駕駛者疲累引致，遠比酒駕嚴重。尤其職業駕駛者被陽光照射及道路地面物料反射，形成雙目長期被陽光侵害。另外，車禍中不少人被車窗玻璃割傷，其後被細菌感染死亡。

意義上，我們的產品可以讓大家拓展思想，不要認為玻璃膜只是固體，在適當的情況下，可添加液體進去。並減少開車被騷擾和分心的機會，從而減少車禍的出現。

Clerk's facial expression detector

悉心「揭」「累」

KIANGSU-CHEKIANG COLLEGE (SHATIN)

沙田蘇漸公學

Lam Ngai Chit 林毅哲
Wong Chun Hin 黃振軒
Wu Ka Long 胡嘉朗
Yeung Lok Ching 楊樂澄

Hong Kong is notorious for its prolonged and tedious working hours. We focus on improving the working conditions of office clerks in this project.

The core of our prototype is to develop a human facial expression detecting system. It is an artificial intelligence system, which constantly monitors the facial expression of the clerks. Based on a sequence of facial expressions captured, the working performance of the clerks will be assessed individually by the AI system. If a clerk is classified as being exhausted, and have a decline in productivity, a list of actions will be recommended for the clerk. Shortly, such actions help the office clerks to restore their productivity. In the end, the average productivity of all the office clerks in the organization are enhanced throughout their working hours.

Our prototype deployed various AI framework and libraries, for example, Open CV and TensorFlow. In short, the AI system captures the facial expression of the clerk first. Second, it undergoes graphical pre-processing, followed by graphic segmentation. The feature of the facial expression is then extracted and classified to identify the corresponding degree of tiredness.

We hope that our prototype can improve the office clerks' heath as well as their overall performance in their working places.

香港生活節奏急速忙亂，最為聲名狼藉的無疑是冗長的工時且乏味的工作。因此我們聚焦於此，望為員工提出有效的解決方案。

人臉表情辨識是原型的核心。儀器運用了人工智能的技術，它以規定頻率測量員工的臉部表情，再根據記錄加以分析和處理，判斷出其工作表現和疲倦程度。

我們的產品結合了各種技術，如 Python, Open CV 及 Tensorflow。運作過程主要分為三大程序。第一，在輸入資料方面，員工的臉部改變會被鏡頭識別，以拍攝收取，並儲存於資料庫。第二，在處理過程方面，資料會被程式加以分析和理解，根據經驗和資料判斷出員工是否已達到「疲倦」的水平。第三，在輸出訊息方面，若結果顯示員工的疲倦程度超過特定水平，系統會在螢幕顯示訊息。系統先會指出該職員的工作效率有下降趨勢，再提出一系列的建議，以恢復其工作效率。長遠而言，此方法能助職員維持工作效率，滿足他們要長期高度專注集中來完成龐大工作量的需要。如情況屬工作效率平穩、未見下跌的趨勢，系統會規律性地重複頭兩項的工序，以確保員工的狀態。

我們衷心希望我們的產品能被認可並應用，同時保持職員的工作效率和其健康。

Elevator UV disinfection light
升降機紫外線消毒燈

KOWLOON TRUE LIGHT SCHOOL
九龍真光中學

Choi Wai Yiu 蔡惠瑤
Pang Ming San 彭銘辛
Wong Tsz Wing 汪梓穎
Wong Ying Sin 黃映善

Due to the COVID-19 pandemic, the importance of public hygiene has come to our attention that not only do cleaners only clean the surface of the button roughly, but the safety of the elevator users are also not secured. Therefore, we could lower the workload of the cleaner and protect their personal safety.

The materials include infrared human body detector and UV disinfection light which kills bacterial ranging from the flu virus to infectious disease with sterilization rate up to 90%. It prevents users from contacting or infecting these viruses and reduce the risk of disease transmission, to protect the safety of users.

Our product utilizes sustainable kinetic energy which is normally wasted in our daily use, and transfer it to electric energy. The electric energy will be used for the operation of the Infrared human detector and UV disinfection light.

It takes turns to clean all the elevators in the working place and first sensing the presence of human being in the elevator. Then, locking the elevator to protect people from the harmful UV light, the UV light irradiates the air in the elevator for 30 minutes.

近期新型冠狀病毒肆虐，公眾地方成為病毒傳播的重要渠道，因此清潔工人的工作壓力大增。為 減輕清潔工人工作及安全，加上很多清潔人員都只簡單用酒精等去擦拭按鈕，未能達到全面清潔 ，令市民未能得到保障。透過本項目以紫外線自動消毒升降機，能夠減低清潔工人的工作壓力及 健康擔憂。本項目中，我們利用動能推動發電器去發電而產生電力使消毒燈運作。而本項目包含了可持續發展的動能發電 , 節省能源，將那些消耗了的動能轉換成電能，將電力輸出至紫外線消毒燈消毒器。升降機紫外線消毒燈材料包括紅外線人體檢測器、紫外線消毒燈 UVC。而消毒燈可以消毒及殺菌 (殺菌率高達九成)，避免使用者接觸或感染這些病毒及細菌，亦減低疾病傳染的風險，保障使用者的安全。在非繁忙時段方面，感應器感應升降機沒有人或保安人員檢查內裏沒有人，使用紫外線消毒燈消毒器，鎖起升降機 (因紫外線燈具備一定的危險性)，照射升降機內空氣大約 30 分鐘。我們運用了轉換為電能的發電機產生的電能幾乎消耗掉了消費者使用的所有電能。

Mr. Call

「解憂 Call 臺員」

LINGNAN SECONDARY SCHOOL

嶺南中學

Li Xinting 黎欣婷
Wang Loksze 王樂詩
Wang Junyuan 王俊源
Lee Ho Yi 李可怡

School teachers prefer to have a quiet work environment in the staff room so they can concentrate on their work. Yet a number of teachers are constantly disturbed by the noise of the ringing of unanswered phone calls. To reduce the noise of ringing phones, a device named Mr. Call is designed to ensure teachers' phones ring only if the teachers are at their desk. It is hoped that a quiet and calm work space can be created for teachers and thus their productivity at work is enhanced.

The device involves an Arduino board, a passive infrared sensor, a desk phone, batteries, wires, an LED light and a buzzer. It is designed to have two major parts in the device. The first part consists of the passive infrared sensor. If the sensor detects a person, an electric signal is sent to the Arduino board which forms one of the components of a series circuit. The Arduino board is the key component of the other part of the device. When there is an incoming call, an electric signal is sent from the desk phone to the Arduino board. The series circuit is complete if the Arduino board receives signals from both the infrared sensor and the desk phone. This results in the ringing of the buzzer and light emitted from the LED. In this sense, the buzzer rings and the LED emits light only if the teacher is near the phone and an incoming call is detected.

The device can be widely used in the workplace because of its numerous strengths such as the simple design and low development cost. Also the device is small-sized, lightweight and easy to operate. However, the device may be wrongly activated if the infrared sensor detects a person walking past the desk. Lastly the device can be improved if a message is sent automatically to the teacher's smartphone when the Arduino board receives an electric signal from the desk phone while the teacher is away.

學校的老師希望有一個安靜的環境可以專心工作，但是，他們經常會被未被接聽的電話響聲滋擾。我們希望此產品能有效地減少聲響對老師的滋擾，提升工作環境的素質及老師的工作效率。

我們設計的裝置是由一塊 Arduino 板、紅外線感應器、座枱電話、電源、電線、LED 燈和峰鳴器以串聯的方法接駁。當有兩個信號同時輸入，裝置才能運作。產生信號第一部分是紅外線感應器，當它感受到有人在座位時，信號便會傳到 Arduino 板上。產生信號的另一部分來自座枱電話，當有人致電老師時，信號便由電話傳到 Arduino 板。設定 Arduino 板同時收到兩個信號後，才會輸出信號使 LED 燈亮起和使峰鳴器響起，老師看到 LED 燈亮起和聽到響聲後，便會接聽電話。

這個設計不但設計簡單，而且成本低、容易操作和細小輕巧，可以在教員室或辦工室內廣泛使用。可是，我們目前仍然需要提升這個設計的準確性，假如電話附近放著一些熱的物件，或者有其他老師走過，紅外線感應器便無法辨認該老師是否真正在座位上了。最後，我們希望能進一步優化這個設計，假如有人找老師而老師不在座位上，這個系統可以發送一個留言信息到老師的智能電話，待老師有空再回覆和跟進。

MUNSANG COLLEGE

民生書院

Wong Chun Man 黃雋旻
Tam Choi Lam 譚彩琳
Tong Kai Kwan 唐啟鈞
Tong Ying Wai 湯英瀜

FIAS

千「鈞」頂

"To save those who save us"

Tasked with rescue missions in difficult and treacherous conditions day in day out, where accidents are frequent, firefighters and rescue team members easily have the most perilous job of all. To ensure their safety, and after reviewing current protective gear as well as conducting experiments, we have developed the Force-reducing, Impact-time-increasing, Attire of Safety--FIAS--which consists of an advanced cushioning complex being implanted in firefighter suits, rescue team uniforms and helmets for maximum collision protection.

Only last year as many as 37 firefighter deaths in the USA and Australia can be prevented had they had superior protective gear, which is unacceptable. It gets even worse when we consider the fatality rate worldwide. However, the chance of injury due to collision (e.g. falling objects) has never been in the equation. Don't people who defend our lives and property deserve protection as well?

Our product aims to provide maximum protection for minimum extra weight and at only 15% extra cost, which is achieved by implanting a complex of commonplace fluids -- cornstarch, silicone oil and xanthan gum solution. The gear can now protect important body parts from impact, resulting in a higher chance of survival and more time to call for help.

We have a dream, when one day, those who save us can do so without fear. May that dream come true.

「保護拯救我們的人」

「安全」，一向都是任何行動的首要條件。正因為生命無價，我們才要拯救、珍惜、和保護它。 然而，消防員與及拯救隊，每天都在冒著生命危險，拯救我們的生命。

以消防員為例，「火」確實是對消防員眼前最大的威脅，而消防制服主要亦是為了對抗「火」的威脅而設。對四周潛在的危險，卻沒有充足的保護。當火場的天花下榻，消防員隨時被掉落的石屎擊中，他們卻只得一頂頭盔和一件防火衣可以用作保護，這樣的安全裝備是足夠嗎？「視死若生者，烈士之勇也」，但這不代表他們要無謂犧牲。於 2019 年，於美國及澳洲已經有超過 37 名消防員因相關的意外而殉職，如果將全世界納入統計範圍的話，殉職人數必定會增至一個不能接受數字。

「撞擊」從來未被納入常規保護服的保護考慮之一，而我們利用常見的物品，設計出一個名為 FIAS 保護裝置，填補現有防護裝備的不足，FIAS 只增加約 15% 的成本，就能達至極佳的保護效果。改裝現有的制服並不困難，只須於頭盔和保護衣的適當位置內加裝 FIAS，就能保護他們的重要部位，為他們爭取足夠時間來尋求支援，從火場中安全撤退。

只有好好保護深入危難的拯救人員，才能拯救更多的人，這就是我們設計 FIAS 的目標。

Coodian

霜機

Since 2014, the number of heatstroke related work injury cases has increased rapidly. In order to prevent construction workers from suffering heatstroke and related diseases, we have designed the Coodian system which allows them to work safely under the unbearable high temperature in Hong Kong, thus ensuring the workplace safety in the construction site.

In this year exhibition, our booth showcases the prototype of the first generation Coodian Protective Cloth. The purpose of which is to lower and stabilise body temperature in a hot environment without impairing workers' mobility significantly. The Coodian Protective Cloth is formed of 5 layers, including a permeable membrane design, water film, electronic device, chemical layer and the layered fabric, whereas various vital sign sensors are also installed, including a core temperature sensor, heart rate sensor, blood pressure and blood glucose sensor.

In addition, a 3D printed model of a construction site is placed in the centre of the booth to show how data collected from different sensors is transmitted and processed in a systematic manner. The model further provides explanation on how data will be used to analyse the body condition of each individual construction worker, which includes the estimation of the tendency of having an occurrence of certain heat-related diseases and the complications under unfavourable outdoor environment. With the advanced monitory and cooling system, it is positive that we can ensure the wearers of the Coodian Protective Cloth work under a healthy condition anytime, thus enhancing the overall workplace safety without impairing their mobility significantly.

2014 年至今，中暑工傷個案直線上升，標誌著熱相關併發症成為建築工人的一大工作隱患。炎炎夏日，熱浪滾滾，為避免建築工人暑意上腦，不慎暈厥，我們設計出 coodian 系統以監控工人的身體狀況，旨在及時提供針對性強的救護措施，如即時降溫等，以保障工人工作環境的安全。

攤位展示著系統的核心，降溫背心的樣本。以傳統建築工人安全背心為原型設計的它由半透膜表層，儲水層，電子儀器，反應層及底層共五層組成，亦囊括測量體溫，血壓，心跳數等的感應器以及用於警示作用的雙色燈與蜂鳴器。降溫背心各部分通過 Arduino 板連接，通過接受信號開啟閥門觸發降溫反應以做到及時降溫中暑工人的身體。此外，攤位亦有以 3D 打印的形式構建出的工地模型，用以顯示各感應器之間信息交換、處理的流程，以及如何運用收集到的資料，數據化工人的病癥特點以推算工人的身體狀況及病因，對症下藥，旨在及時預防熱相關疾病的發生。基於我們不能通過展示實驗以直接驗證理論，故攤位設有海報，以細緻講解產品背後的理念及原理。

PLK VICWOOD K.T. CHONG SIXTH FORM COLLEGE

保良局莊啟程預科書院

Chan Oi Ying 陳藹盈
Wong Kit Ho 黃杰豪
Chung Man Hei 鍾文希
Lau Chuck Lam Charleen 劉卓霖

Chairish

「惜座」

QUEEN'S COLLEGE

皇仁書院

Wong Wai Chiu Wesley 黃暐朝
Chung Chi Piu 仲智鑣
Chung Chi Lun 仲智麟
Chan Ching Him Bosco 陳政謙

Chairish is a posture correcting product that aims to facilitate a better seating posture for the working population and alleviate the impacts of prolonged sitting on our health. Nowadays, health issues such as herniated disks, vertebral sciatica, hunchback, aching shoulders and backaches are more common than ever, this is due to prolonged sitting in workplaces (proven in our survey). Chairish helps reduce pressure on the spine by keeping the back inclination at 120 degrees, which is proven to reduce spinal disk pressure and prevents herniated disks and vertebral sciatica. The upper part of our design is inspired by hunchback straps, but instead of tight and inconvenient elastic straps, we chose buckles to provide convenient usage. We also included another strap to pull the shoulders against the backrest of the chair to reduce slouching and keep the back relaxed. Making use of the chair's structure, we are able to secure the user with flexible straps and a posture seating cushion to provide enough force and help maintain an ideal posture. By improving designs on hunchback straps and posture seating cushions, Chairish has an effective design that provides both comfort and flexibility, and when workers have better health, they tend to have a better working incentive. Cherish your back with Chairish now.

「惜座」的原意是為了改善並提供一個最佳的坐姿予上班一族，並且減低長時間坐卧工作為我們身體帶來的影響。今時今日， 椎間盤突出、坐骨神經受損、 駝背、肩酸膊痛等椎骨問題前所未有的普遍，而這些問題的成因很大程度是源於長時間坐卧工作 (從我們作出的研究調查指出)。「惜座」 其中的功能是把我們的坐姿傾斜保持在 120 度，從而減低施在脊椎骨上的壓力，並且預防椎間盤突出及坐骨神經受損。「惜座」分為上半部及下半部，上半部的靈感源於市面上的駝背矯正帶，但我們在調查中發現很多用者均表明駝背矯正帶過份緊貼而且配戴上不方便。於是，我們將過緊的橡筋帶改為可以自行調校鬆緊的扣帶，改善了使用上的不便。 另外，背後另加一條扣帶將上半部扣着椅背減少向前傾以及放鬆用者的肩膀。利用椅子本身的堅硬度，我們運用了扣帶固定坐姿矯正墊，提供足夠的支持，讓用者可以保持良好的坐姿。從現有的產品獲取靈感，「惜座」把舒適， 坐姿矯正的高效能及靈活使用度集於一身，當工作帶來的健康問題減少了，工作效率自然會提升。從今天起用「惜座」愛惜你的脊骨。

OffiCerebo

辦事寶

ROSARYHILL SECONDARY SCHOOL

玫瑰崗中學

Chen Chun Hang 陳駿恆
Li De Xiong 李德兄
Lin Run Xing 林潤興

Hello! We are Rosarian. This year, we are glad to introduce our JSSE product "OffiCerebo". Our product acts as the brain of the workplace. This aims at providing a hygienic environment and enhancing working efficiency. Meanwhile, we modified "Chairopractor" and integrate with "OffiCerebo" as a whole smart workplace. We hope that our product can bring technology to the working place in order to promote the working efficiency and good habit in office including proper sitting posture and water replenishment.

大家好！我們代表玫瑰崗中學的學生，今年聯校科展的產品取名為「辦事寶」，英文為「OffiCerebro」，此名取自—「Office」和「Cerebro」，寓意產品是辦公室的大腦，將科技融入辦公室，由工作效率至身體健康都照顧周到。「辦事寶」作為智能工作間的一部份，主要針對在辦公室的衛生問題和員工久坐不喝水的壞習慣，再加上本校改良產品「脊椅」，整套「辦事寶」便能全方面提供員工一個安全、健康的工作間。

Synergistic Office System (S.O.S.)

「職場：識 · 友 · 易」

SALESIAN ENGLISH SCHOOL

慈幼英文學校

Wong Long Yin 黃朗賢
Chan Hoi Shing 陳海城
Wong Leung Yiu 黃良堯
Ng Chak Yu 吳澤宇

Nowadays, most people work for about eight hours in the office every day. However, a poor working atmosphere causes people to work at low efficiency and result in people not being motivated to work, especially for companies that lack team building plans or with poor cohesion between colleagues. Even for companies with good working environment, staff may always be wasting time on daily workplace routine, like looking for colleagues to work with in the office, or deciding where to have lunch. New staffs may also find it difficult to integrate into the workplace, which might take a lot of time and also create tension and inconvenience among existing colleagues. All these will surely waste a lot of time and thus affect the working efficiency of staffs in the company.

Our team aims at increasing the synergy between colleagues in the workplace. We designed an intelligent office system called "Synergistic Office System (S.O.S.)", which can help companies in organising team-building activities, and helping new staffs to blend in, and making daily-routine work more efficient, thus create stronger cohesion between staffs and increase productivity. Our system includes an app with the following components: (1) Tracking system: Locates staffs in the office, which shorten time for finding a person for delivering important messages or documents in the office. (2) Pairing-up system: Allows staffs to get access on job titles and selected particulars of colleagues nearby, which encourages them to seek help or start conversations with the right colleagues. (3) Team-building activities selecting system (TBASS): Suggests team building activities for staffs to vote on, and reminds them of organising the events. (4) Restaurant selecting system: Suggests restaurants near the office with their description and allow staffs to vote for and comment on their choice for lunch.

人們一天大約花費八小時在辦工室工作，但未如理想的工作氛圍卻往往令工作效率卻停滯於低位，而這問題於員工間缺乏凝聚力的公司尤其明顯。就算工作環境良好的公司，員工也會經常於不同的常規和例行公事上浪費時間，例如於辦公室內尋找專案負責人討論業務，甚至為選擇午膳地點而大費周章討論等。新入職同事亦往往需時融入陌生的工作環境中，過程中亦容易和團隊間產生不協調和磨擦。這些情況也會使員工浪費寶貴的工作時間，從而降低團隊整體的工作效率。

我們希望提升公司內同僚間的凝聚力，提升團隊間的協調能力及合作，同時減少浪費不必要的時間，從而提升工作效率及提升生產力。因此，我們設計了一個智能辦公室系統 —「職場：識 · 友 · 易」，來協助公司建立更有效的工作效率和氛圍。這個系統主要由包括以下四個部分的應用程式組成：(1) 追蹤系統： 讓員工尋找同事於工作場所內的位置，方便同事間的工務交流。(2) 「識 · 友」系統： 讓員工了解附近同事的基本資料和工作崗位，方便交流和互相合作。(3) 團隊建立活動選擇系統：讓員工定期投選適合的活動，協助工作團隊舉辦團隊建立活動，增強凝聚力。(4) 餐廳選擇系統： 列舉工作場所附近的食肆及其資料，方便員工間投選午膳和聚餐地點，節省選擇和討論時間

'Helmet for Delivery Cyclists' (HFDC)

外賣單車頭盔

S.K.H. LAM KAU MOW SECONDARY SCHOOL

聖公會林裘謀中學

Law Ching Yiu 羅靖瑤
Hong Yuk Sing 康旭升
Lee Tsz Lam 李芷霖
Yip Yan Hei 葉昕晞

There is a fast growth in the food delivery industry in Hong Kong recently. However, specialized equipment for delivery cyclists are lacking. Our design – 'Helmet for Delivery Cyclists' (HFDC) is dedicated to enhance their safety and productivity. There are four innovative features in HFDC: Turn signals, GPS voice navigation, Crash prevention system and Retroreflector.

Turn Signals can indicate the turn direction the bike is about to take. This signal can be turned on automatically and it is shown on the helmet. Upon receiving the message, other road users will pay extra attention to avoid hitting the driver.

GPS Voice Navigation suggests a suitable route to the driver, whose hands are not free to operate their phones. Voice instructions are broadcasted by the speaker inside the helmet. This feature allows cyclists to concentrate on their riding. As a result, safety and efficiency are both enhanced.

Crash Prevention System uses ultrasonic sensors to check the distance between cyclists and the nearby cars. The system alerts users of approaching high speed objects. Cyclists can quickly respond and prevent accidents.

Retroreflector protects the cyclists at night and in low visibility conditions by reflecting light back to the rear car drivers. With this design, the car drivers can easily spot the bike and avoid the accidents .

雖然近年來網上外賣發展迅速，外賣單車手仍然缺乏專用的設備。 因此，我們設計了外賣單車頭盔 Helmet for Delivery Cyclists（簡稱 HFDC），以保障單車手的安全和提升他們的工作效率。

HFDC 具有四個創新功能：轉向信號燈，GPS 語音導航，防撞系統和後向反射器。

轉向信號燈可以向其他道路使用者清楚地告知他們單車前進的方向。信號燈可自動或人手控制亮起，將轉向信號顯示在頭盔上，以便汽車駕駛員注意到單車，避免發生意外。

GPS 語音導航利用內置連接到手機的耳機為單車手提供語音導航指令，讓單車手得以專心留意路面狀態，以保障他們的安全，亦縮短他們用作導航的時間，從而提升他們的工作效率。

防撞系統利用超聲波測量單車與附近車輛的距離。當有高速物體接近時，系統會向單車手發出警示，令他們可以作出即時反應，從而保護自己免受危險。 後向反射器將光反射回後方駕駛員，讓他們能在夜間和低能見度條件下注意到騎單車的人。

Safety Dangerous Goods Store

不再危險的危險倉

S.K.H. LI PING SECONDARY SCHOOL

聖公會李炳中學

Wong Hoi Chun 黃凱駿
Yang Shan Shan 楊姍姍
Lam Cho Yi 林楚怡
Pun Cheuk Nam 潘卓楠

A number of experiments are conducted in the school laboratory. Some of them involve using dangerous chemicals which can be toxic, flammable and harmful. Moreover, a considerable amount of oxidizing agents and explosives are stored in the store room. In 2019, there were some cases of burglary in which dangerous chemicals were stolen. This can pose a significant threat to society. Therefore, a surveillance system of dangerous chemicals is designed to tackle the problem. We are members of the scientific research team of SKH Li Ping Secondary School. We have designed a real-time monitoring system to keep track of the storage of chemicals in the store room. This device serves three purposes. First, it can be a real-time detector to monitor the storage of chemicals in the store room. IT technicians will be notified if there is any problem. Second, the system can detect any problematic situation regarding the storage of chemicals. If there is any unauthorized removal, the incidence will be reported to the authority. Last but not least, the system serves as an electronic inventory system so that the manpower of monitoring the storage can be saved.

我們在學校實驗室進行很多科學實驗。其中一些涉及使用一些危險的化學品如有毒的、易燃的、氧化性和有害的。而且，大量的氧化物和爆炸品存放在儲藏室內。在 2019 年，就有一些關於危險化學品的失竊案發生。這對社會安全構成重大威脅。所以，我們有需要發展一套管理系統去解決問題。我們是李炳中學學校科研組的成員。我們設計了一個實時的監察系統去跟進化學品的儲存情況。這個儀器有三個用途：第一，這能實時監察化學品的情況。有任何異常的話，系統會立即報告實驗室技術員。第二，系統能偵測和報告任何異常的化學品存放情況。如有遺失，管理員會收到通知。第三，這系統會扮演一個自動計算存量的角色，以節省監測存量的人力。

T-fingers

特斯拉手套

SKH BISHOP MOK SAU TSENG SECONDARY SCHOOL

聖公會莫壽增會督中學

Cheung Man Ki 張文麒
Tam Ka Lok 談家樂
Lee Yan Tao 李恩陶
Tong Chun 唐峻

'T-fingers' is specially designed to protect the fingers and increase the efficiency of hand-work. It targets at jobs that require hand protection.

For example, logistics staff have to wear gloves all day for their job. It is extremely uncomfortable and lowers the efficiency. The special design of 'T-fingers' let our hands 'breathe', which is better than the original gloves.

Another example is kitchen. Kitchen is considered as one of the most dangerous workplaces. Kitchen staff may easily get hurt from cuts and burns. But with the help of 'T-fingers', the risk of getting injured in the kitchen could be lowered.

The design includes finger cots, the strings, the generator itself and the monitor. The finger cots are the key to protect us from being cut, the generator together with the finger cot will be able to provide energy .The energy is then used to power the monitor .The monitor displays time for users which helps them prioritize their work. It would be easier to keep track of time while enhancing their working efficiency.

We chose silicon gel for making the finger cots for several reasons. It can withstand cuts and the high temperature. Besides, silicon gel is elastic in nature which enables smooth movements of fingers. Waterproof, high resistance against abrasion and corrosion are also significant. About generating electricity, rolling axis and the full-wave bridge rectifier will transfer and maximise the energy produced by finger movement into electricity.

「T–fingers」旨在保護使用者手指，並提高員工效率。對於部份工種，如物流業員工、廚師而言，他們需對雙手進行安全並可靠的保護措施，但坊間慣常使用的手套卻欠缺靈活性，而且容易令使用者感到侷促不適。「T–fingers」的特別設計能讓使用者在舒適的情況下得到周全保護，不但減低受傷風險，亦能夠增加工作效率。

「T–fingers」共分為 4 部分：「手指頭套」、「拉線」、「發電機」及「電子屏幕」。堅韌且保護性強的手指頭套能有效保護手指免被割傷或燙傷；而拉線能連結手指及手背上的發電裝置，將手指的動能傳送至發電裝置，然後由發電裝置轉變成電能。電流隨後透過電路為電子屏幕供電，並提供計時功能。

我們選擇以矽膠作為手指頭套，原因在於矽膠能承受 220℃高溫且具備上佳的吸震及耐磨能力。而矽膠高彈性、耐磨等特點更令其成為手指頭套的優良材料。而我們以滾動軸及全波橋式整流器，令能量得到最佳的轉換效率，提升裝置的整體效能。

M.A.G Mat

「智能消毒氈」

ST. FRANCIS XAVIER'S SCHOOL, TSUEN WAN

荃灣聖芳濟中學

Chan Yat Long, Sunny 陳溢朗
Leung Yu Hin, Jason 梁宇軒
Wong King Fung, Oscar 王境鋒
Chan Chun Yin, Daniel 陳駿賢

The product will be innovated for dealing with some health or hygiene concerns in the office by cleaning the personal and the public belongings. This is a combination of the top new sterilizing technologies including photocatalyst, UV light and silver ions solution disinfection process. For the sterilizing theory of photocatalyst, it catalyses the process of killing bacteria by light because the products produced by the photocatalyst could inhibit the growth of bacteria by triggering the chemical reaction-oxidation and reduction. Secondly, the disinfecting theory of silver ions is mainly due to the electrostatic attraction between the positive charged silver ions and the negative charged bacterial organelles or enzymes. Third, the disinfecting theory of UV light is because it has a property to break down or destroy the structure of bacterial DNA.

Moreover, the product is smart which could be easily controlled or monitored by the user through their mobile phone and they can switch to different mode to process different functions such as atomizing the perfumed oil and adjusting the intensities of disinfecting mode. At the same time, the user could check the environmental conditions through the App.

解決辦公室中的某些健康或衛生問題是本產品的理念。本產品結合光觸媒、紫外線和銀離子溶液的頂級新型消毒技術的。對於光催化劑的滅菌理論，它催化光殺死細菌的過程，是因為光催化劑產生的產物可以通過觸發化學反應 – 氧化和還原而抑制細菌的生長。其次，銀離子的消毒原理主要是由於帶正電的銀離子與帶負電的細菌細胞器或酶之間的靜電吸引。第三，紫外線消毒理論是因為它具有分解或破壞細菌 DNA 結構的特性。

此外，該為智能產品，用戶可以通過手機輕鬆地對其進行控製或監視，並且他們可以切換到不同的模式來處理不同的功能，例如霧化香精油和調整消毒模式的強度。同時，用戶可以通過該應用檢查環境條件。

UV Raze

ST. JOSEPH'S COLLEGE

聖若瑟書院

Chong Chin Wo Regis 莊展和
Chan Long Hei Neon 陳朗熙
Li Ho Charles 李灝
Yuan Kun Lin 袁崑霖

In 2003, the severe SARS swept through HK, killing 299 people. In 2020, the catastrophic COVID-19 calamity killed hundreds of thousands worldwide. As people became more aware of the dangers of viruses and diseases, they seek a more hygienic lifestyle, using hand sanitizers frequently, and not touching odd objects on the street, as if they had Midas Touch.

It is during these pandemics, had people realized the dangers lurking in the workplace, and hence the trend of "working-at-home" began. The workplace, is where people spend their days; their sense of belonging is second only to that towards their homes; hence it is of prominence to ensure the workplace is safe, snug, sanitized and satisfactory, in order to guarantee workers' health and safety.

UV Raze is a versatile and modular sterilization system. It utilizes the peculiar photocatalytic properties of titanium dioxide when irradiated by UV light to kill micro-organisms or viruses. UV Raze is versatile, as it can be applied in various cleaning products; and modular, as it exists as individual modules that can be put together to form a single sterilization system, or used individually as distinct disinfecting devices.

On top of that, UV Raze is less hazardous than common chemicals used for cleaning. It is also a dry product, unlike alcohol or bleach. Contemporary cleaning commodities will harm the user, either due to prolonged exposure or direct contact, however, these safety concerns are alleviated with the use of UV Raze, which does not expose the user to any risk such as exposure to harmful components.

自 03 年「沙士」一役，港人防疫意識大增，以至 20 年「新冠肺炎」疫症期間，本港死傷與邊城大國九死一傷的情況相比，相差遠矣。其實有賴各位熱心市民，責無旁貸，齊心抗疫。疫情期間，市民足不出戶，出則萬事小心，提心吊膽。碰到街上的公用物件後立刻消毒，享受家裏的舒適自在前務必洗手。

在此同時，人們發現群聚有助病毒散播，而工作場所則是群聚地方之一。爲避免大規模病毒傳播，「在家工作」潮流誕生。對於眾多人來説，工作場所就是第二個家。工作場所是「打工仔」的家園，自然要好好保護，確保地方清潔衛生，一塵不染，以保障員工健康和安全。

UV Raze 是個靈活百變的清潔消毒產品。它以「模塊」的形式組成，所以能夠當作單一個體使用（如：個人消毒器），或按裝在較大型的清潔平面上「如：拖把」。UV Raze 顧名思義，利用紫外綫（UV），激活具有光催化能力的二氧化鈦（titanium dioxide TiO2）。受紫外綫激活的二氧化鈦會釋放極具氧化能力的 Hydroxyl radicals（•OH），從而殺死微生物和病毒。而且，運用 UV Raze 較常見清潔用品安全，因爲 UV Raze 是固體產品，用家不會直接接觸到有害液體或物質，相當安全。

Workealance

夠鐘飲水啦

ST. MARK'S SCHOOL

聖馬可中學

Au Kam Yiu 區鑑堯
Cheung Ka Ching 張嘉晴
Kam Lok Hang 金樂恆
Wong Ka Yin 黃珈諺

During the school suspension period, all of us have an experience of working in front of the computers for the whole day. All of us including workers in the offices may be too concentrated in their work and forget to consume water in a regular basis. As water is crucial to our human body, we have decided to build a system that can remind the workers to intake water so as to develop a good habit of drinking water regularly.

Messages from the external environment will lower our concentration, hence leading to lower working efficiency when working. In an endeavour to remind the users to drink water, the light on our wristband will change to different colours to represent the suggested amount of water consumption. It will not produce any sound so that it will not disturb the workers from work.

Meanwhile, we planned to install a RFID reader on the water dispensers. When a user is wearing the wristband that contains a RFID tag located near the water dispenser, the touch shield will show the username. After selecting the corresponding username, the water consumption will be measured through water flow sensor and the data will be sent to the database. Users do to manually control the process so it will be more convenient.

Mentioned above, the users can realize how much water they should consume in the next hour through the change of light colour. For reference, the touch shield will show the water consumption and the amount of water each time they take.

在停課期間，我們得以體驗整天被困在電腦桌前工作的生活。失去了規律的休息，容易忘記時間、忘記讓雙眼休息，甚至忘記喝水。有鑑於水的重要性，我們設計出一個提醒上班族喝水的系統，希望可以幫助他們建立良好的生活習慣。

我們注意到市面上的一些類似的產品，卻認為它們對辦公室而言，未必是最佳的選擇。我們思索各個系統的利弊，再綜合自己的經驗，設計了一個以不打擾用戶工作、方便操作以及保證用戶的攝水量為首要目標的系統。

在不打擾用戶工作方面，在工作時，不停彈出的訊息會分散專注力，有礙工作效率。因此，我們選擇使用手帶上的訊號燈提醒用戶喝水。燈會隨着用戶的情況轉換顏色，而沒有訊號聲。

在操作的便利性方面，我們在水機上裝有觸控顯示屏和 RFID 讀卡器。當用戶攜同裝有電子標籤的手帶靠近水機時，用戶便能選取所屬帳戶。盛水量會被水流感應器偵測，無需用戶手動記錄。

為保證用戶的攝水量，手帶將因應情況亮起不同顏色的燈作為識別。此外，觸控顯示屏也會顯示當次的盛水量以及剩餘的每日攝水量。

Colloidal Silver Ion Hand Sanitizer

銀離子搓手液

ST. PAUL'S COLLEGE

聖保羅書院

Lee Jasper Yee Jing 李以正
Ng Truman Toby 伍敦文
Yu Ho Wun 余灝垣
Wong Yat Long 黃一朗

The Colloidal Silver Ion Hand Sanitizer is a silver-ion-based disinfectant. We have designed it primarily to aid in personal hygiene and cleaning hands in particular, which is the body part most likely to transfer pathogens from the surroundings into our bodies. Our model seeks to complement, not replace, the traditional alcohol-based hand sanitizers with a more reusable product. This is especially targeted towards the recent coronavirus outbreak in Hong Kong. Workplaces, being shared enclosed spaces where diseases can be spread easily, are especially full of "pathogen hotspots".

The sanitizer relies on the oligodynamic effect: biologically active metal ions irreversibly damage key enzyme systems on the membrane of the virus, causing a conformational change in its structure and effectively destroying its ability to infect host cells and reproduce. From literature, we concluded that silver ions are very effective at killing viruses even at low concentrations. Silver nitrate (with low toxicity and high availability) is chosen as the active ingredient of our product, which is applied to the hands by means of a microfibre cloth. As silver ions do not evaporate, they will stay on the skin and continue killing pathogens for a period of time, effectively making our product more long-lasting than traditional sanitizers.

本成品稱為銀離子搓手液，是以銀離子為主要成份的消毒劑。我們設計此產品，最主要希望幫助大眾保持個人衛生，尤其是雙手清潔，因為手部是最容易傳播病原體的身體部位。本產品是為酒精搓手液使用者提供另一可重用及更環保的選擇，而非完全取代現有的酒精搓手液。本產品尤其適用於今年受新型冠狀病毒影響的香港。本港很多工作場所都是多人共用，而且屬於密封空間，使病毒傳播變得更容易，其中更充滿了病原體熱點。

銀離子搓手液利用了寡動力效應：具有生物活性的金屬離子能對病毒主要酵素系統的膜進行不能逆轉地的破壞，由此徹底改變病毒的結構並使宿主細胞不能再繁殖。 參考了不少文獻後，我們總結出銀離子在低濃度時也能十分有效地殺滅病毒。硝酸銀是常見的低毒性化學品，所以我們選擇了以其作為本產品的主要原材料，然後利用超細纖維布把銀離子塗到手上。由於銀離子不會輕易揮發，它們會留在皮膚表面較長時間殺滅病原體，令我們的產品比傳統酒精搓手液更持久地防止病原體傳播。

Posture Observation and Correction System (P.O.C.S.)

博思

ST. PETER'S SECONDARY SCHOOL

聖伯多祿中學

Wong Tsz Hin 黃子軒
Wu Lok Hei Terence 胡樂熙
Chan Ho Tin 陳昊天
Yuen Ho Wah 袁浩瑋

The P.O.C.S. is a posture correction unit which will monitor the users' posture, which in our case is lifting postures, and correct any deficiencies to hopefully reduce accidents and injuries which stemmed from incorrect postures.

By using P.O.C.S., we can reduce industrial accidents during lifting and transporting cargo; encourage a healthy posture during such actions; reduce revenue for medical fees due to such accidents, and promote the use of digital sensors.

The system is designed to identify the identity of the worker by face recognition. Then, both gyroscope to measure the degree of acceleration on different axes and QR code scanning system would be applied to determine whether the lifting posture is correct or not.

If the posture in delivering goods is inappropriate, this system not only would give a real-time audio signal to the worker, but the data would also be saved in Google drive automatically. With the use of Internet of Things (IoT) technology, the employer could access and manipulate the data for analysis continuously. Based on the data, the employer could promote a 'Work Safe Behaviour Scheme'. Under this scheme, the employer could recognize those workers are excellence in practicing work safe manners by presenting them an award as a kind of encouragement. It is sure that their safety awareness and attitudes could be strengthened, the working environment could be improved and a better workplace could be created in the long run.

博思一個會偵測使用者姿勢的系統，若使用者姿勢與正確姿勢不符，則會自動記錄並提醒，在這次比賽中，我們希望此裝置能減少因錯誤搬運姿勢而帶來的意外及工傷。

通過博思，我們可以減少搬運貨物期間的工業意外、鼓勵僱員注意搬運姿勢、減少工傷帶來之開支及勞動力損失和提倡智能辦公處所。

博思會先以面容識別僱員身份，其後分別以三軸陀螺儀測量不同軸數之加速度及二維條碼掃描系統，以判定僱員搬運姿勢恰當與否。

如姿勢不當，不單僱員會收到即時提醒，僱主亦可隨時閱覽不同僱員之紀錄。因這些數據會通過物聯網技術傳送，除即時以聲效提醒僱員外，亦會長期紀錄於雲端裝置上。根據這些數據，僱主可設立各類「職安健計劃」，找出重視職業安全的僱員，並加以獎勵，僱主願意設立獎賞，因我們相信此裝置可大幅降低因搬運姿勢不當而導致的勞動力損失。當僱主可與僱員分享因博思而節省之工傷開支，則當可提升僱員之安全意識及態度，長遠更可建立更安全及有效率之工作環境。

Site's Buddy

「工程小助手」

TSUEN WAN GOVERNMENT SECONDARY SCHOOL

荃灣官立中學

Chan Tsz Yan 陳芷茵
Luk Ka Ying 陸家盈
Yu Chun Kwan 余駿君
Chan Ching Wai 陳澄慧

"Site's Buddy" is a modified helmet that consists of several features that help to enhance the comfortability and protection of the helmet, hence reducing the chance that workers get injured while they are working at the construction site. As we all know, the construction site is a relatively dangerous workplace. Workers may be struck by falling particles, or suffer from heatstroke if the weather is too hot. However, a normal plastic helmet may not be safe enough to protect them from all possible threats. Through rounds of experiments, it has been found out that some chemicals and materials can be used in modifying an ordinary helmet. For example, by mixing citric acid with sodium bicarbonate, the endothermic reaction can act as a cooling pack; a gel-like cooling pack can be also made from cornstarch. Besides, to make the helmet to be more fit to the user's head, a suitable amount of memory foam will be attached to different parts in the helmet. Moreover, a body temperature warner is made to monitor the body temperature of the worker, thus reminding them to rest if their body temperature is higher than normal, preventing them from suffering heatstroke. Not only can the features enhance safety, but they can also allow workers to work in a more comfortable condition, making the construction site a more suitable and safer place to work in. It is hoped that "Site's Buddy" can play an effective role in protecting the workers during working and be more user-friendly, just like what a friend or buddy will do.

「工程小助手」是一個經過改良的工程用頭盔。它包含了幾個加強頭盔舒適度和保護特點，包括頭盔內存放記憶綿以貼合地盤工人的頭形，避免頭盔容易鬆脫的情況，藉以減少地盤工人在工作時受傷的機會。我們並且在頭盔內加入微型電腦板去檢測地盤工人的體溫，並於超過三十八度之時響起，加以提醒工作者要去立即作休息及喝下充足的水分，減低中暑的機會，從而令地盤的危險性降低。眾所周知，地盤比其他的工作場所更為危險。例如：工人有機會被掉下來的硬物擊倒，或因過熱而中暑。正是如此，足夠的保護能有效減低他們的工作風險，對他們十分重要。然而，現時的塑膠頭盔未能有效確保他們絕對的安全。因此，這產品運用了不同的化學品和物料，改良現時的頭盔，包括體溫監測器、冷凍包等等。我們製作了兩款冷凍包，皆是用無毒物料製作。第一款是用檸檬酸和蘇打粉的吸熱反應製作，先混合檸檬酸和水，再加入蘇打粉，但其維持時間較短，亦會產生二氧化碳。第二款我們利用水、食鹽和粟粉製作，先混合水和粟粉，加熱其餘水再加入食鹽，最後混合兩種混合物，放入冰格四至六小時，惟其製作時間較長。這不但能保障用家的安全，還能讓用家擁有更舒適的工作環境，令地盤變為更適合和更安全的工作場所。我們希望，「工程小助手」既可以有效保障工人的安全，又可以更易於使用，達到伴隨用家的作用。

COZY air purifier

「COZY 空氣淨化器」

TSUEN WAN PUBLIC HO CHUEN YIU MEMORIAL COLLEGE

荃灣公立何傳耀紀念中學

Yung Wing Chun 翁榮俊
Yu Chun Him 俞俊謙
Yeung Sze Yan 楊詩欣
Tam Hei Man 譚希文

Hong Kong citizens have been raising their awareness of their personal hygiene due to the pandemic. Since the rapid development of society, the air has been treated as a threat to humans' health. Good quality of air is essential in constructing an ideal working environment. To deal with the problems, we are going to introduce a not complicated biological air purifier. We make several changes to the existing air purifier on the market in order to make user friendly and easy to be used. Air appears in anywhere. Good indoor air quality safeguards people's health and also gives a comfortable environment. In contrast, poor indoor air quality jeopardizes people's health as well as productivity. Not only can we help workers maintaining good health by using our designed air purifier, but we also try to make the model of our air purifier less costly and easier to operate. The air purifier on the market is somehow expensive, not environmentally friendly, complicated, and hard to use. To achieve a utopia that everyone can make a DIY air purifier by just adding a few chemicals, we introduce our COZY air purifier.

To achieve this, using ClO2 gas for sterilization is a trending approach. ClO2 kills bacteria by oxidation, which is the process in which an electron is taken away from a molecule. Taking away electrons disrupts important cellular structures of bacteria. It can disrupt the cell wall of bacteria,n the membrane stops functioning, no transport of molecules is possible. To produce ClO2 gas, we tend to use the Acid-Chlorite method. This method is the simplest and easiest to operate generation chemistry. By using only two feeds and balancing the amounts of sodium chlorite and hypochlorous acid, we can achieve the theoretical conversion of sodium chlorite to chlorine dioxide is only 80%. The chemical equation is shown as the following: 5NaClO2+4HCl–> 4ClO2+5NaCl+2H2O.

After the chemical reaction takes place, we then need to extract dissolved ClO2 gas from water by thermal and vacuum degasification. The higher the temperature of a liquid, the lower its ability to dissolve gas. By heating the solution to 40-60°C and reducing the pressure by using a vacuum chamber, the gas pressure inside will be lower and it will be difficult for gas molecules to dissolve, the solubility of chlorine dioxide in water will be reduced from estimated 3g/L to around 1.1-1.6g/L. After that, Stirring the water can enhance the efficiency of the process. Once the ClO2 gas was extracted, the air purifier can start to operate.

COVID–19 大流行使香港市民提高了對個人衛生的認識。因爲社會的迅速發展，空氣污染一直被視為對人類健康的威脅。良好的空氣質素對於構建理想的工作環境至關重要。為了解決這些問題，我們將引入一個不複雜的空氣淨化器模型，以減少個人與周圍細菌或病毒之間的接觸。 我們對市場上現有的空氣淨化器進行了改善，使其易於使用。良好的室內空氣質量不僅可以保護人們的健康，而且還可以提供舒適的環境。相反，室內空氣質量差會危害人們的健康和生產力。為了給員工提供更好的工作環境，我們設計了一個更便宜，更易於操作的模型。市場上的空氣淨化器價格昂貴，不環保，複雜且難以使用。為了令每個人都可以簡單地自製造空氣淨化器，我們引入了 COZY 空氣淨化器。

為此，我們使用二氧化氯氣體滅菌，二氧化氯通過氧化殺死細菌，氧化是從分子中帶走電子的過程。帶走電子會破壞細菌的重要細胞結構。它可以破壞細菌的細胞壁，然後細胞膜停止運行，無法進行分子運輸。為了生產二氧化氯氣體，我們傾向於使用酸性亞氯酸鹽方法。該方法是最簡單，最容易操作的生成化學方法。通過僅使用兩種進料並平衡亞氯酸鈉和次氯酸的量，就可以實現亞氯酸鈉向二氧化氯的理論轉化率為 80%。化學方程式如下：5NaClO2 + 4HCl—> 4ClO2 + 5NaCl + 2H2O。

化學反應發生後，我們需要通過熱和真空脫氣從水中提取溶解的 ClO2 氣體。液體的溫度越高，其溶解氣體的能力越低。通過將溶液加熱到 40–60° C 並通過使用真空室降低壓力，內部的氣 壓將降低，並且氣體分子將難以溶解，二氧化氯在水中的溶解度將從估算的 3g / L 下降至約 1.1–1.6g / L。 之後，攪拌水可以提高該過程的效率。 一旦提取出 ClO2 氣體，空氣淨化器即可開始運行。

STRUCTURE

架構

EXECUTIVE COMMITTEE 執行委員

From left to right: Kitty Lo, Ron Yip, Charlotte Ng, Shanis Fan, Marcus Chung, Ethan Wong, Omega Chan, Jessie Siao, Joey Lai, Kitty Ho

Chairperson	主席	Marcus Chung	鍾嘉朗
Vice Chairperson	副主席	Ethan Wong	王皓泓
Internal Secretary	內務秘書	Omega Chan	陳彥嘉
External Secretary	外務秘書	Jessie Siao	蕭雪晴
Publication Secretary	印務秘書	Joey Lai	黎文儀
Treasurer	司庫	Kitty Ho	何卓函
General Affairs Department Director	常務部主管	Shanis Fan	范芷惠
Liaison Department Director	連絡部主管	Charlotte Ng	吳心怡
Project Affairs Department Director	展品事務部主管	Ron Yip	葉朗睿
Public Relations Department Director	公共關係部主管	Kitty Lo	羅曉君

GENERAL AFFAIRS DEPARTMENT 常務部

Director	Shanis Fan	
Treasurer	Kitty Ho	
Vice Directors	Vanessa Leung	Yoyo Yu
Officials	Aaron Ng	Helen Wan
	Adrian Lau	Helios Chiu
	Alex Lee	Isaac Lam
	Amy Leung	Isabella Law
	Ashley Ko	Judy Lee
	Cecilia Yuen	Louis Sze
	Charmmy Cheng	Patrick Ngai
	Chris Chan	Susie Lee
	Coco Wong	Veronica Chan
	Fiona Wong	Victor Chan
	Gray Lam	Vivian Cheung

4th row Victor Chan, Louis Sze, Chris Chan, Issac Lam, Gray Lam, Vivian Cheung
3rd row Isabella Law, Cecilia Yuen, Ashley Ko, Vanessa Leung, Yoyo Yu
2nd row Susie Lee, Amy Leung, Charmmy Cheung, Helen Wan
1st row Shanis Fan, Kitty Ho

LIAISON DEPARTMENT 連絡部

Director	Charlotte Ng	
Internal Secretary	Omega Chan	
Vice Directors	Bennie Leung	Rachel Lau
Officials	Adela Yung	Hyman Lin
	Adrian Chong	Isaac Lee
	Athena Lee	Jacky Cheung
	Bobo Ho	Jenny Thai
	Candy Chan	Jenny Wang
	Candy Wu	Jimmy Wong
	Carina Chu	Joey Yang
	Chezkel Hui	Joshua Ling
	Eunice Ho	Michelle Chan
	Fanny Ha	Nathan Ng
	George Ngai	Pocahontas Cheng
	Gordon Ng	Sally Yip

4th row George Ngai, Jacky Cheung, Bennie Leung, Hyman Lin, Gordon Ng
3rd row Adela Yung, Michelle Chan, Rachel Lau, Fanny Ha, Candy Chan
2nd row Pocahontas Cheng, Bobo Ho, Sally Yip
1st row Charlotte Ng, Omega Chan

PROJECT AFFAIRS DEPARTMENT 展品事務部

4th row Adrian Wong, Howard Zhang, Mark Tsang, Ben Hon, Timothy Yuen, Douglas Tang, Kevin Wan
3rd row Kelly Law, Celia Leung, Sunny Kwok, Candy Chiu, Sandy Zhang
2nd row Joey Ng, Amber Tang, Sonia Li, Windy Chen, Ashley Ngan
1st row Ron Yip, Jessie Siao

Director	Ron Yip	
External Secretary	Jessie Siao	
Vice Directors	Adrian Wong	Sunny Kwok
Officials	Amber Tang Andy Chung Ashley Ngan Ben Hon Candy Chiu Celia Leung Dominic Wan Douglas Tang Fiona Chui Gloria Leung Harry Sun	Hebe Chee Howard Zhang Joey Ng Kelly Law Mark Tsang Ryan Chan Sandy Zhang Sonia Li Timothy Yuen Windy Chen Yoyo Wong

PUBLIC RELATIONS DEPARTMENT 公共關係部

3rd row Alvin Kwok, John Yim, Eric Cheuk, Loren Mak, Marco Chan, Jacky Le
2nd row Yuki Chong, Natalie Leung, Crystal Chan, Edith Or, Esther Mak, Melody Kwong
1st row Kitty Lo, Joey Lai

Director	Kitty Lo	
Publication Secretary	Joey Lai	
Vice Directors	Edith Or	Eric Cheuk
Department Publication Secretary	Heidi Tang	
Officials	Addison Lam Adrian Li Amy Lau Angus Fung Crystal Chan Daniel Kwan Esther Mak Jacky Le John Yim Loren Mak	Marco Chan Melody Kwong Natalie Leung Queenie Wong Rosanna Wong Stephanie Pui Sue Wong William Liu Yuki Chong

PAST EVENTS

活動回顧

PREPARATION COMMITTEE GATHERING

籌備委員會聚會

The Preparation Committee Gathering was held on 27 December 2019 in Tuen Mun. The Preparation Committee members had a great time taking part in a series of team building games and barbecue. This helps strengthen the bonding and deepen members' understanding between each other. It has definitely been a joyful experience!

籌備委員會聚會於二零二零年十二月二十七日在屯門舉行。在這快樂時光，籌備委員參與了一系列的團體遊戲，以及進行了燒烤活動。這次聚會無疑地加強了各委員之間的聯繫，並增進彼此的友誼和互相的了解，是一個輕鬆愉快的日子。

PROPOSAL COMPETITION

計劃書設計比賽

The Proposal Competition began in January 2020. An adjudicating panel which comprises professors and professionals from different fields was invited to select teams to exhibit their products in the 53rd J.S.S.E..

計劃書設計比賽於二零二零年一月開始。比賽將由來自多個領域的教授和專業人士組成評審團評分。評審團從中選出優秀隊伍，於第五十三屆聯校科學展覽展出其作品。

PROJECT HOLDERS' SEMINAR

展品負責人研討會

The Project Holders' Seminar was successfully held on 23 January 2020 in the Hong Kong Science Museum. During the seminar, the J.S.S.E.P.C. and J.S.S.E. were introduced to the Project Holders from different participating schools. Details of the Proposal Competition such as regulations, marking criteria as well as guidance on the preparation work were also announced.

展品負責人研討會於二零二零年一月二十三日在香港科學館順利舉行。講者向來自不同學校的展品負責人介紹聯校科學展覽籌備委員會及聯校科學展覽。此外，研討會中亦公佈了計劃書設計比賽的詳情，例如比賽規則、評分準則及準備工作的指引等。

PROPOSAL INTERVIEWING SCHEME

計劃書面試計劃

Project Holders were interviewed by adjudicators in April 2020 through an online platform. During the interview session, Project Holders were required to present their proposals and answer questions raised by the adjudicators. This offers the adjudicators an in-depth understanding of their proposals, ensuring objectiveness on the results of the Proposal Competition as well as the selection of teams for the 53rd J.S.S.E. Only those whose scores exceed a certain standard in the Proposal Interviewing Scheme are given the nod to enter the Exhibition.

展品負責人於二零二零年四月與評判以網上形式會面。在面試的過程中，展品負責人須向評判介紹其計劃書，並回答評判提出的問題。此計劃能使評判對其計劃書的構思更為了解，並確保計劃書設計比賽的結果和隊伍選拔的客觀性。在計劃書面試計劃中得分超過一定標準者方能得到參加聯校科學展覽的資格。

PRIMARY SCHOOL COLOURING COMPETITION

小學生填色比賽 ––「突破科學無界限 塗出工作新天地」

Junior Division Champion
初小組（小一至小三）冠軍

Senior Division Champion
高小組（小四至小六）冠軍

Bearing the annual theme "Workplace", the Colouring Competition is held to encourage primary school students to express their passion for science through colouring and drawing. Participants are required to paint and decorate the sheet of sketch to bring out the theme " Creating workplace, imagining science".

是次比賽是以小學生為對象，皆在配合本年度聯校科學展覽的主題「工作場所」，鼓勵小學生以填色及繪畫表達對科學的熱誠。參賽者須在填色紙上添上色彩並加以任何裝飾，對應主題「科學激發無限想像，工作場所超越理想」。

ACKNOWLEDGEMENT

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Good Hope School
Hoi Ping Chamber of Commerce Secondary School
Homantin Government Secondary School
Hong Kong Chinese Women's Club College
Hong Kong Tang King Po College
Kiangsu-Chekiang College (Shatin)
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Lingnan Secondary School
PLK Vicwood K.T. Chong Sixth Form College
Queen's College
Rosaryhill Secondary School
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St. Joseph's College
St. Mark's School
St. Paul's College
Tsuen Wan Government Secondary School
Tsuen Wan Public Ho Chuen Yiu Memorial College

創 新 科 技 署
Innovation and
Technology Commission

創新科技署

香港特別行政區政府轄下的創新科技署（創科署）成立於 2000 年，肩負引領香港成為以知識為本的世界級經濟體系的使命。

為了完成使命，創科署會：

- 推動和支援應用研究及發展與科技轉移及應用
- 培養社會的創新科技風氣，促進科技創業活動
- 協助提供基礎設施和發展人力資源，以支援創新及科技
- 制定、發展和推行政府的政策、計劃及措施，以推動創新及科技
- 推廣國際承認的標準和合格評定服務，為香港的科技發展和國際貿易建立穩固的基礎
- 培訓能幹和進取的員工，致力提升香港的科技水平

Innovation and Technology Commission

Established in 2000, the Innovation and Technology Commission (ITC) of the Hong Kong Special Administrative Region Government has a mission to spearhead Hong Kong's drive to become a world-class, knowledge-based economy.

To this end, ITC will:

- promote and support applied research and development, and technology transfer and application
- foster an innovation and technology culture in the community, and promote technological entrepreneurship
- facilitate the provision of infrastructure and development of human resources to support innovation and technology
- formulate, develop and implement the Government's policies, programmes and measures to promote innovation and technology
- promote internationally accepted standards and conformity assessment services to underpin technological development and international trade
- develop high calibre and motivated staff to contribute to Hong Kong's technological advancement

ROUTE TO PROFESSIONAL ENGINEER

HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會

http://www.hkie.org.hk/sap/rtpe.html

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