

Hong Kong Diploma of Secondary Education Examination 2025
DESIGN AND APPLIED TECHNOLOGY
SBA Project – Suggested Contextual Challenges

Candidates are required to choose ONE contextual challenge from the following and complete the SBA project:

1. A robot that collects table tennis balls

Context:

Table tennis players often have to collect a large number of table tennis balls from the table tennis court during training to allow the players to continue to practise. We hope to use a robot to save manpower and improve the efficiency of collecting table tennis balls.

Design Problem:

Design and make a robot that collects table tennis balls. This robot must satisfy the following requirements:

- (a) It should be applicable to the setting of general table tennis courts, with a size of 8 m × 16 m;
- (b) When no one is inside the table tennis court, the player can activate the robot to start the process for collecting table tennis balls automatically within the designated area. During the collecting process, the robot does not require any manual control, and it can collect at least 30 table tennis balls within a reasonable time as well as show the number of table tennis balls collected;
- (c) During the entirety of the collecting process, the environment of the court cannot be changed, and the fixed objects or equipment in the table tennis court, such as table tennis table and barriers, cannot be moved. Also, it is assumed that there is no one in the designated area during the process;
- (d) It should consist of a detachable basket which holds the collected table tennis balls and which can be conveniently detached from the robot. Moreover, the design of the basket should allow players to take out the balls from the basket easily to continue practising;
- (e) The overall dimensions of the robot should not be larger than 400 mm × 400 mm × 400 mm for storage.

(The size of the table tennis balls to be collected must meet the requirements of international competitions.)

2. A smart rubbish bin for disposal of face masks

Context:

In public places such as hospitals and clinics, there are rubbish bins specifically set up for disposing of face masks. When the rubbish bin is open, there is a risk the exposed masks will cause hygiene problems. Therefore, not only is clearing the face masks laborious and time-consuming, but it will also increase the cleaner's risk of contracting an infectious disease.

Design Problem:

Design and make a smart rubbish bin for hospitals or clinics to collect used face masks to improve the hygiene situation. The smart rubbish bin must meet the following requirements:

- (a) It should use stored electrical energy so that it can be used conveniently in different places;
- (b) When a person is about to dispose of the mask, the lid of the rubbish bin will automatically open. After the person has disposed of the face mask, the lid of the rubbish bin will automatically close. When the lid is open, the face masks in the rubbish bin should not be exposed, so as to reduce the risk of spreading an infectious disease;
- (c) It can sense if it is full. When it is full, it will automatically compress the face masks in the rubbish bag and seal the rubbish bag to prevent users or cleaners from touching the face masks;
- (d) It can signal to users when the rubbish bin is full, and let cleaners know when to remove the sealed rubbish bag;
- (e) The overall dimensions should not be larger than 350 mm × 350 mm × 700 mm.

3. An integrated manual apple peeler and cutter for children

Context:

Children may not have mastered the skills of peeling and cutting apples nor have the safety awareness to use such cutting tools at home. We hope to have an integrated, manual apple peeler and cutter, not powered by electricity, which allows children to easily and safely peel and cut apples by themselves, without the help of adults.

Design Problem:

Design and make an integrated and manually-operated apple peeler and cutter suitable for children aged six to twelve. The device must meet the following requirements:

- (a) It must have structural features to enhance its safety for users, and yet be simple and easy to operate;
- (b) The children are able to fix apples of different sizes in the device. For the sake of safety and hygiene, the entire peeling and cutting process must be completed within the device, without the need for the children to touch the apple during the process. Size of cut apple pieces should be suitable for easy consumption by children;
- (c) It should allow children to clearly see the entire peeling and cutting process, increasing the fun of use;
- (d) It should allow easy cleaning;
- (e) The overall dimensions should not be larger than 250 mm × 250 mm × 300 mm.

(Applicable to apples with a diameter of not less than 70 mm)

Notes for submission:

- Candidates should submit the following two items:
 - a working physical model/prototype, or a virtual 3D model plus a partial working physical model;
 - an A4 or A3 size portfolio.
- ‘Prototype’ refers to all working solutions including products, models and systems that are sufficiently developed to be tested and evaluated. A final prototype could be a highly finished product made as ‘proof of concept’ prior to manufacture, a scaled working model or a functioning system where a full-sized product would be impractical.
- The physical model/prototype produced by the candidates as the final solution for the project should be able to perform proper testing and evaluation in the environment it is intended for. The main body of the final physical model/prototype should be made from raw materials and not be directly built using commercially available kits. However, commercially available mechanical components, control components and programming devices are permitted. Solely using computer modelling and simulation in lieu of physical model/prototype are not considered as appropriate alternatives in this regard.
- For details of the requirements and assessment criteria of this subject applicable to the SBA projects starting from 2021 HKDSE, please refer to:
http://www.hkeaa.edu.hk/DocLibrary/SBA/HKDSE/DAT-2021-Draft_Assess_Criteria-0318-E.pdf

Remarks:

The HKDSE Examination Regulations stipulate that a candidate may be liable to disqualification from part or the whole of the Examination or suffer a mark or grade penalty for breaching the regulations. For details, please refer to the SBA Teachers' Handbook for Design and Applied Technology:

http://www.hkeaa.edu.hk/en/sba/sub_info_sba/dse_subject.html?10