

Innovation and Technology Support Programme

Application Form (Platform Research Projects)

General

1. Please read the '**Guide to Filling in the Application Forms for the Innovation and Technology Support Programme (ITSP)**' ("**Guide**") before completing this form. (Please use ITF Form 2.10 for Seed projects.)
2. Applications should be submitted by the lead applicant (an R&D Centre or a designated local public research institute). Applications submitted by individuals will not be accepted.
3. If an applicant wishes to apply for more than one project (as in the case of cluster projects), it should complete one form in respect of each project.
4. Please complete this form in either Chinese or English (with the exception of certain sections for the purpose of uploading to the Innovation and Technology Commission (ITC) webpage in future as necessary).
5. Please attach annex(es) if space provided in the form is insufficient. Other information in support of the application, e.g. diagrams, photos, etc., is welcomed. Where necessary, ITC will require the lead applicant to produce the originals of the supporting documents for verification.
6. All information provided in the form will be used for processing the application and for related purposes, e.g. project monitoring, statistical analysis, etc. It may be disclosed to other bureaux/departments of the Government of the Hong Kong Special Administrative Region ("the Government") or third parties, if such disclosure is necessary.
7. Applications must be submitted to the Innovation and Technology Fund (ITF) Secretariat (ITSP Section) electronically through the Innovation and Technology Commission Funding Administrative System II (<https://itcfas.itf.gov.hk/>).

8. In the event of any inconsistency between this form and the Guide mentioned in paragraph 1 above on the one hand, and the agreement to be signed between the Government and the lead applicant in relation to the approved project on the other, the latter will prevail.
9. This form is divided into the following sections: -

| | |
|--------|---------------------------------|
| Part A | The Applicant |
| Part B | The Project |
| Part C | Assessments |
| Part D | Attachments for the Application |
| Part E | Declaration |

| | |
|--------------------------------|---------------------------------------------------------------------------------------|
| Project Title | (Chi) 兒童弱視及雙眼立體視覺訓練目鏡 |
| | (Eng) Children goggle for amblyopia (lazy eyes) and binocular vision training |
| Lead Applicant ^{Note} | (Chi) 香港應用科技研究院有限公司 |
| | (Eng) The Hong Kong Applied Science and Technology Research Institute Company Limited |

Note:

- The lead applicant must either be:
 - an R&D Centre; or
 - a designated local public research institute (viz. local universities, self-financing degree-awarding institutions registered under the Post-Secondary Colleges Ordinance (Cap. 320), Hong Kong Productivity Council, Vocational Training Council, Clothing Industry Training Authority and Hong Kong Institute of Biotechnology).
- For projects under the technology areas of the R&D Centres, the lead applicant must be the relevant R&D Centre.

Part A The Applicant

I. Information on Lead Applicant

The lead applicant should fill in this form and provide all necessary information with the consent of parties concerned.

Lead Applicant

- R&D Centre[^]**
- Automotive Platforms and Application Systems R&D Centre (APAS)
 - Hong Kong Applied Science and Technology Research Institute (ASTRI), designated as the R&D Centre for Information and Communications Technologies
 - Logistics and Supply Chain MultiTech R&D Centre (LSCM)
 - Nano and Advanced Materials Institute (NAMI)
 - Hong Kong Research Institute of Textiles and Apparel (HKRITA)
 - Local university*/self-financing degree-awarding institutions registered under the Post-Secondary Colleges Ordinance (Cap. 320) (please specify):

- Designated Local Public Research Institute[^]**
- Hong Kong Productivity Council (HKPC)
 - Vocational Training Council (VTC)
 - Clothing Industry Training Authority (CITA)
 - Hong Kong Institute of Biotechnology (HKIB)

[^] Please select (by putting in '✓') where appropriate.

* Including all University Grants Committee (UGC)-funded institutions

Key Contact Person(s) Assigned by the Lead Applicant ^{Note}

1. Project Coordinator – on technical matters

| | | |
|-----------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Name | (Chi) | 陳大文 博士 |
| | (Eng) | Dr Tai-man CHAN |
| Post Title | R&D Director | |
| Department/Unit | Intelligent Sensing Technology System | |
| Address | (Chi) | 香港新界沙田科學園科技大道西 2 號 6 座 3 樓 |
| | (Eng) | 5/F, Photonics Centre, 2 Science Park West Avenue, Hong Kong Science Park, Shatin, New Territories, Hong Kong |
| Tel | 852-3406 2983 | Fax 852-3406 2801 |
| E-mail | tmchan@astri.org | |

2. Administrative Coordinator – on administrative matters

| | | |
|------------|-----------------------------------------------------------------|-------------------|
| Name | Dr Chi-nan LEE | |
| Post Title | Vice President, Intelligent Sensing Technology System | |
| Address | 5/F, Photonics Centre, 2 Science Park West Avenue, Hong Kong | |
| | Science Park, Shatin, New Territories, Hong Kong | |
| Tel | 852-3406 2549 | Fax 852-3641 1018 |
| E-mail | cnlee@astri.org | |

Note: Please provide details of two key contact persons, one to be responsible for overseeing the carrying out of the R&D project (e.g. technical matters) and the other

to be responsible for handling administrative matters. The lead applicant may choose to designate one person to be in charge of both.

II. Information on Sponsor(s)/Supporting Party(ies)

Sponsor(s)/Supporting Party(ies) ^{Note}

| | | Name | Contact Person (Position, Department/Unit, Tel No, Fax No and E-mail) |
|-----------------|-----------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------|
| In Hong Kong | Government departments/ public bodies (官) | Children Hospital | Dr Alice Ho, Head, Ophthalmology Department (Tel: 8888 8888 Email: xxxxxxxxx) |
| | Companies/ industry or trade associations (產) | (1) ABC (HK) Ltd | Dr Grace Chow, CEO (Tel: 7666 7665 Email: xxxxxxxxx) |
| | | (2) XYZ Industries Ltd | Mr Wong Wing Ping, CTO (Tel: 7666 7664 Email: xxxxxxxxx) |
| | | KLM Electronics | Miss Lisa Lau, Head, Electronic Department (Tel: 7777 7777 Email: xxxxxxxxx) |
| | Local universities (學) | Hong Kong University | Prof Charles Cheung, Chair, Engineering Department (Tel: 7666 7777 |

| | Name | Contact Person (Position, Department/Unit, Tel No, Fax No and E-mail) |
|--|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Email: xxxxxxxxx) |
| | Other research institutes (研) | |
| | Others (e.g. charitable trusts or prominent personalities in the field) | (1) HK Eye Foundation (Tel: 7666 7667 Email: xxxxxxxxx) (2) Jockey Club Charitable Trust Ms Jane Tse, CFO (Tel: 7666 7666 Email: xxxxxxxxx) |

*Note: Please indicate (by putting in *) where the supporting party(ies) is/are the implementing organisation(s) of the project and provide supporting documents.*

| | | Name | Contact Person (Position, Department/Unit, Tel No, Fax No and E-mail) |
|-------------------------|----------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------|
| Outside Hong Kong | Government departments/ public bodies (官) | | |
| | Companies/ industry or trade associations (產) | | |
| | Universities (學) | Lund University Denmark | Prof Lars MacDonald, Director, Eye Research Institute (Tel: +46 50 0000000 Email: xxxxxxxxx) |
| | Other research institutes (研) | | |
| | Others (e.g. charitable trusts or prominent personalities in the field) | | |

Note: Please provide supporting documents.

Supporting/reference document(s) is/are attached.

Part B The Project

I. Key Project Details

| | |
|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 1. Project Title : | Children goggle for amblyopia (lazy eyes) and binocular vision training |
| 2. Total Project Cost (HK\$'000): | 16,546.578 |
| Amount of Industry Sponsorship (HK\$'000): | 2,520.000 |
| Percentage of Industry Sponsorship vs. Total Project Cost (%): | 15.23% |
| Amount of Other Sources of Financial Contribution (HK\$'000): | 450.000 |
| Percentage of Total Financial Contribution vs. Total Project Cost (%): | 2.72% |
| Amount of ITF Funding Sought (HK\$'000): | 13,576.578 |

Note:

1. For the differences between industry sponsorship and other sources of financial contribution, please refer to Part B.I(D) of the Guide.
2. All projects require industry sponsorship from at least one private company to cover at least 10% of the total project cost within the project period. The company should not be related to the lead applicant (except where the lead applicant is a local university) in terms of ownership or management. For projects undertaken by local universities, sponsorship from a related company may be accepted subject to the conditions set out under Part B.I(D)1 of the Guide. It can either be in cash or in-kind or a combination of both. The Intellectual Property (IP) rights generated from the project shall be owned by the lead applicant, viz. an R&D Centre or the relevant designated local public research institute as the case may be.
3. For projects initiated by Government bureaux/departments and statutory bodies of Hong Kong, in case the lead applicant wishes to seek waiver of the industry sponsorship requirement, it should provide justifications and supporting information in an annex to this application, with a letter of support from the relevant bureau/department or statutory body (please make reference to Part B.I(D)5 of the Guide.)
4. For further details concerning the IP rights arrangement, please refer to Part C.VI of the Guide.

3. Schedule of the Project Period

Commencement Date (dd/mm/yyyy): 01 / 03 / 2020

Completion Date (dd/mm/yyyy): 31 / 08 / 2021

Duration of the Project Period (no. of months, max. 24 months): 18

4. Related Information

(a) Whether previous research has been done in relation to the proposed R&D work?

Yes.

Please list previous projects and funding obtained, e.g. ITF, UGC/Research Grants Council (RGC) (in particular the Areas of Excellence (AoE) Scheme, Theme-based Research Scheme (TRS) and Collaborative Research Fund (CRF) which may have good potential for migration to mid-stream/downstream research), Environment and Conservation Fund (ECF), etc.

| Project Reference No | Project Particulars | Funding Obtained |
|------------------------------|--------------------------------------------------------------------------------------------|------------------|
| ARD/048 (ITSP Seed project) | Feasibility Study on An Amblyopia Treatment System (ATS): Training Equipment and Procedure | 1,996,200 |
| RGC funded research (XXXXXX) | Amblyopia Neuroscientific Investigation | 650,000 |

RGC funded research (“Amblyopia Neuroscientific Investigation” 2009-10) by Prof Cheung, and an ITF ASTRI seed project (ARD/048).

Please see Annex 1 “Technical background” for more information.

No.

(b) Has there been/will there be any attempt to seek funding support for this project from sources other than the ITF?

Yes. (Please provide details.)

No.

II. Brief Description of Project Proposal

1. Technology Area[^]

- Advanced Manufacturing/Process Development
- Automotive Parts and Accessories
- Biotechnology
- Chinese Medicine
- Electronics
- Energy
- Environmental Protection
- Information and Communication Technologies
- Logistics and Supply Chain Management
- Nanotechnology and Materials Science
- Testing and Certification
- Textiles/Clothing/Footwear
- Others (please specify) _____

[^] Please select ONLY ONE (by putting in '√') where appropriate. The application will be assigned to the corresponding Technology Subgroup in the ITF Research Projects Assessment Panel for consideration according to the selected Technology Area.

Please note that project proposals falling under the technology areas of the R&D Centres should be submitted via the appropriate Centre.

2. Industrial Sector *(This information is collected for statistical purpose)^*

- Banking/Financial Market/Fund Management/Insurance
- Biotechnology
- Chinese Medicine
- Construction
- Electrical and Electronics
- Energy
- Environmental
- Food and Beverage
- General (Cross Sectors)
- Import and Export Trade
- Information Technology
- Logistics and Communication Technologies
- Manufacturing Engineering
- Materials
- Medical Equipment
- Precision Engineering
- Printing and Publishing
- Professional Services
- Real Estate/Property Management
- Telecommunications
- Testing and Certification
- Textiles/Clothing/Footwear
- Tourism
- Transportation
- Wholesale and Retail
- Others (please specify) _____

^ Please select (by putting in '√') where appropriate.

3. Project Summary (no more than 200 words)

(Please provide a summary of the project objectives, R&D methodology involved, impact and benefits, etc.)

(Chi)

本項目目的是要促進有視力問題的兒童接受視覺訓練。我們計劃開發配備弱視和協視訓練軟件的獨立式目鏡儀器。該目鏡會具有協視控制及光學變焦功能，現時市場上的電子目鏡沒有同類功能。

由大學開發的高精密度顯示器訓練模式經修改後，會用於備有彩色顯示屏的目鏡。我們會優化選定硬件平台的影像轉換演算法。標準目鏡設計會增設光學變焦及觀看角度調較功能。我們會加入感應鏡頭，以便自動控制訓練模式和個別調整功能，也會加入無線通信模塊，以供下載視頻作娛樂用途和上載訓練數據作臨牀跟進用途。

這種新開發的目鏡體積輕巧，具有多項功能，可讓兒童安坐家中接受視覺訓練，改善兩類普遍的視力問題，即弱視及協視。這項科技有助改善本港兒童的視力。目鏡平台亦可為中風康復者及長者等有其他醫療需要的人士提供視覺訓練。

(Eng)

The objective of this project is to promote children training for visual problems. We plan to develop a stand-alone goggle device with amblyopia and binocular vision training software. The goggles will be equipped with binocular control and optical zoom which cannot be found in any of the electronic goggles in the market.

Training patterns developed in universities for high precision monitors will be adapted to goggles with color display. We will optimize the image transformation algorithm for the selected hardware platform. Standard goggle design will be enhanced with optical zoom and viewing angle adjustment. We will add a sensing camera for automatic control of training patterns and individual adjustments. Wireless communication module will be included for downloading video for entertainment and uploading training data for clinical follow-up.

The developed lightweight, adaptive goggles will allow the children to receive eye training at home for the two common visual problems: amblyopia and binocular vision. This technology could help improve the eyesight of children in Hong Kong. The goggle platform could also be used to provide training for other healthcare needs such as stroke recovery patients and the elderly.

4. Project Deliverables (no more than 300 words)

(Please provide a brief description of the R&D output in both qualitative and quantitative terms and the timeframe required for achieving it.)

- 1) Design documents of the goggle in the following aspects. The target weight and power consumption are 400 g and 4W respectively
 - a. Electronic
 - b. Mechanical
 - c. Optical(in 4 months from project commencement date)

- 2) Software with efficient algorithm for the following medical treatment
 - a. Amblyopia treatment
 - b. Binocular vision training(in 6 months from project commencement date)

- 3) Building of 20 sets of goggle prototypes for vision training with
 - a. Binocular-control system
 - b. Optical-zoom function(in 12 months from project commencement date)

- 4) Field trial of goggle prototypes at the Children Hospital with user feedbacks.
(in 18 months from project commencement date)

5. Wider Total Effect

Please provide details on whether this project is related to other projects (ITF or non-ITF; previous or on-going) to create synergy and a wider total effect – concept of cluster projects, e.g. three different projects to combat water pollution at a certain location.

There was a completed seed project (12 Feb -11 Aug 2015) on the feasibility of pattern transformation and eye image processing. Potential related projects in the future include using the goggle platform to provide training for other healthcare needs such as stroke recovery patients and the elderly.

6. Location of R&D work

Please provide details on the geographical location(s) where the R&D work will be undertaken: local vs. outside Hong Kong; in R&D Centres/universities/ Science Park, etc.

| Location | Name/Place of Research Institute(s) | Percentage of R&D work to be Undertaken ^{Note} | Percentage of R&D Expenditure (i.e. net of overheads) to be Spent ^{Note} |
|-------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|
| Local | The Hong Kong Applied Science and Technology Research Institute Company Limited, Hong Kong | 90% | 85% |
| | HKU, Hong Kong | 10% | 15% |
| Outside Hong Kong | | | |

Note: The majority of the R&D work of the project should be conducted within the territory of Hong Kong. However, given the close ties between Hong Kong and the Mainland, up to 50% of the R&D work of a project can be conducted (and relevant expenditure incurred) in the Mainland. Where certain R&D tasks need to be conducted outside Hong Kong (other than the Mainland), prior approval from ITC must be sought with justifications (e.g. countries/provinces/cities/overseas research

institutes which have entered into technology collaborative agreements/Memorandum of Understanding with the Government or local universities/R&D Centres).

7. Project Milestones

Please set out the key milestones pertaining to the R&D deliverables to be achieved at different stages of implementation. For the first progress report, there may not be significant progress in terms of R&D deliverables but we anticipate that all preparatory work (e.g. recruitment of staff, procurement of equipment, etc.) will be completed by then.

Proposed Commencement Date: 01 / 03 / 2020

| | Calendar Date (dd/mm/yy) | Work Progress/R&D Deliverables (in quantity and quality where possible, with start/end date of each item; excluding administrative activities such as staff recruitment and equipment procurement) |
|-----------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 st Project Milestone: (12 th month from commencement) | 28/02/2021 | <p>Electronic, Mechanical and Optical design of goggle for weight and power objectives (1/3/2020 to 30/6/2020)</p> <p>Software development for</p> <ul style="list-style-type: none"> a. Amblyopia treatment (1/3/2020 to 30/6/2020) b. Binocular vision training (1/5/2020 to 31/8/2020) <p>Building of 20 sets of goggle prototypes for vision training with</p> <ul style="list-style-type: none"> c. Binocular-control system (1/9/2020 to 31/12/2020) d. Optical-zoom function (1/11/2020 to 28/2/2021) |

| | | |
|--------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------|
| 2 nd Project Milestone: (24 th month from commencement) | 31/08/2021 | Field trial of goggle prototypes at the Children Hospital with user feedbacks (1/3/2021 to 31/8/2021) |
|--------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------|

Proposed Completion Date:

31 / 08 / 2021

Part C Assessments

I. Innovation and Technology Component

Please refer to the assessment framework in Part C of the Guide.

1. Please provide details on how the project pertains to applied research (e.g. mid-stream or downstream research, background leading to the project, rationale and innovation of the proposed R&D, comparative analysis and supporting data, etc).

This project pertains to the development of advanced signal processing algorithms and miniaturization technology for developing a stand-alone goggle device with amblyopia and binocular vision training software. The goggles will be equipped with binocular control and optical zoom which cannot be found in any of the electronic goggles in the market.

Training patterns developed in universities for high precision monitors will be adapted to goggles with color display. We will optimize the image transformation algorithm for the selected hardware platform. Standard goggle design will be enhanced with optical zoom and viewing angle adjustment. We will add a sensing camera for automatic control of training patterns and individual adjustments. Wireless communication module will be included for downloading video for entertainment and uploading training data for clinical follow-up.

Please see Annex 2 "Project details" for more information.

2. Please provide details from the following angles as fit:

| Area | Details |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) Whether the project will give rise to new technologies or products (global/regional/ Hong Kong) | While training patterns developed in universities for high precision b/w monitors have proven to be effective, this is the first attempt to adapt those patterns to goggles with 8-bit color display. Another novel aspect is the use of an integrated camera for automated control of training patterns. |
| (b) Whether the project will enhance quality (e.g. capacity, reliability, speed, etc.) | Through the added features of optical zoom, viewing angle adjustment and a camera for feedback control, a consumer-grade goggle device has been enhanced to provide training for improving the visual acuity of children. |
| (c) Whether the project will render production or application cost more competitive | In comparison to the supervised use of an expensive monitor at a clinic, the training is provided at home with a lower cost device. With the better user experience, the child would benefit more from the training and reduce the overall healthcare cost. It is expected that cost saving of up to 20% can be achieved when compared with conventional method. |
| (d) Others | |

II. Technical Capability

1. Please provide details on the viability of the proposal from the technical perspective, including R&D methodology to achieve each milestone, details of each milestone and the responsible party(ies), preliminary research results and supporting data, and the targeted results.

After the packaging technology has been selected for the chosen MCU, display, camera and RF modules with a target weight of 400gm and 4W power consumption, the hardware and software architecture design will be completed in the first 4 months. (Milestone 1)

Transformation algorithm for training patterns will first be developed on PC and streamed to goggles for comparison with high precision b/w versions. First version of image processing of camera output will be evaluated for goggles tethered to PC after 6 months. (Milestone 1)

Software developed on PC will then be ported to MCU packaged with display driver and RF module. Electronic assembly of hardware components should be completed within 10 months. Development of optical zoom and viewing angle adjustment should also be completed. Camera with optical components will be mounted and tested with improved image processing software. (Milestone 1)

By the end of month 12, system testing will be performed after all components have been integrated. Automatic control of training patterns and individual adjustment will be validated. Integrated prototype with control software would be ready for evaluation. (Milestone 1)

During the last 6 months of the project, twenty prototype goggles will be provided to the Children Hospital for user feedbacks, which would be used for fine-tuning of hardware and software. (Milestone 2)

Please see Annex 2 "Project details" for more information.

Additional Information: n/a

2. Please provide details on the competence of the Project Coordinator and the research team by providing background, qualifications, experience, track record in previous research (especially ITF), recognition (locally and outside Hong Kong), etc. Please state the role of key members/involved parties in implementing the project. Please include any other information you consider useful to support the application (e.g. industry and academic awards won in the past, endorsement of outstanding experts in the field, etc.).

| | |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Project Coordinator</p> | <p>Dr Tai-man CHAN (PhD in ME, Harvard) has over 20 years of R&D experience in system design and miniaturization for consumer products using advanced techniques in RF, embedded software and SiP. (Please see CV in Annex 2.)</p> <p>Dr Chan will be the Project Coordinator to manage the project team and to liaise with external parties to conduct the field trial.</p> |
| <p>Research Team</p> | <p>Dr XX Li, PhD in Electronic Engineering, Oxford University has over 10 years of R&D experience in VLSI design, signal processing and optoelectronics. (Please see CV in Annex 2.).</p> <p>Dr Li will be the Deputy Project Coordinator supervising the electronic and optical development work for this project.</p> <p>Ms Siu-ling WONG, HKU (First Class Hon), Stanford University (Research Scholar) has over 15 years of R&D experience in image processing, including video compression and image enhancement and denoising. (Please see CV in Annex 2.).</p> <p>Ms Wong will supervise the software development work for this project.</p> |

III. Financial Considerations

A. Projected Expenditure

Please list all the expenditure items to be incurred within the Project Period and provide breakdown of each item in the following sections.

Summary:

| | Cost (HK\$'000) |
|--------------------------------------------------|-------------------------------------------------|
| (i) Manpower | 8,057.700 |
| (ii) Equipment | 1,308.520 |
| (iii) Other Direct Costs | 5,409.500 |
| (iv) Administrative Overheads (where applicable) | 1,770.858 |
| Total Project Cost (A): | 16,546.578 (i)+(ii)+(iii)+(iv) |

(i) Manpower

Please provide details of members in the team in descending order (i.e. more senior members first).

| Position/ Rank <small>Note</small> | No. Required | Duration (months) | Monthly rate or equivalent (HK\$'000) | Total (HK\$'000) | Job Description |
|---------------------------------------|-----------------|----------------------|------------------------------------------------|---------------------|----------------------|
| *R&D Director | 0.5 | 18 | 165.300 | 1,487.700 | See Annex 3 "Budget" |
| Engineer | 10 | 18 | 36.500 | 6,570.000 | See Annex 3 "Budget" |
| | | | | | |
| Sub-total A(i): | | | | 8,057.700 | |

- I/We confirm that the project team members listed in the table above are not existing staff of the lead applicant.
- I/We confirm that the manpower cost covers no other than the salary of project staff, including employer's mandatory contribution to the Mandatory Provident Fund (MPF), contract gratuities, annual salary adjustment (excluding increments and promotions) and general fringe benefits (e.g. medical) in accordance with the established mechanism of the lead applicant.

Note: Please indicate (by putting in *) for Deputy Project Coordinator (if applicable).

Additional Information:

(ii) Equipment

| Equipment to be used ^{Note} | Quantity | Unit cost (HK\$'000) | Total (HK\$'000) | Justifications (e.g. why essential for the research, reasons why existing equipment cannot be used/shared for the project; how equipment will be treated after completion of the project etc.) |
|--------------------------------------|----------|----------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assembly Equipment | 2 | 75.000 | 150.000 | See Annex 3 "Budget" |
| # Testing equipment | 1 | 786.000 | 786.000 | See Annex 3 "Budget" |
| Optical equipment | 5 | 66.000 | 330.000 | See Annex 3 "Budget" |
| High end workstation | 2 | 21.260 | 42.520 | See Annex 3 "Budget" |
| Sub-total A(ii): | | | 1,308.520 | |

- I/We confirm that the equipment will remain under the ownership of the lead applicant for at least two additional years after the project completion or termination of the project agreement.

Note:

- Please indicate (by putting in #) where the equipment is estimated to cost HK\$500,000 or above per item.*
- Please indicate (by putting in @) where the equipment is to be covered by in-kind contribution from the lead applicant or industry sponsor(s) or supporting organisation(s).*
- Only cost of new equipment for implementing the project can be charged to the ITF.*

Additional Information: The testing equipment will be available for shared use by

HKU Medical Faculty researchers during and after the
completion of this project. All the equipment will be part of
the infrastructure for future bio-medical applied R&D
projects in ASTRI.

(iii) Other Direct Costs

| Item ^{Note} | Quantity | Unit cost (HK\$'000) | Total (HK\$'000) | Justifications |
|-------------------------------------------|----------|----------------------|------------------|----------------------------------|
| Audit fee | 1 | 20.000 | 20.000 | To fulfill auditing requirements |
| Patent fee | 1 | 100.000 | 100.000 | To register patent |
| Conference | 3 | 32.000 | 96.000 | See Annex 3 "Budget" |
| Duty travel | 14 | 11.000 | 154.000 | See Annex 3 "Budget" |
| Consultancy services | 4 | 177.500 | 710.000 | See Annex 3 "Budget" |
| CAD software | 1 | 161.500 | 161.500 | See Annex 3 "Budget" |
| Electrical design & prototypes | 20 | 109.400 | 2,188.000 | See Annex 3 "Budget" |
| @ OLED and LCoS display samples (in-kind) | 20 | 20.000 | 400.000 | See Annex 3 "Budget" |
| Optical design & prototypes | 20 | 79.000 | 1,580.000 | See Annex 3 "Budget" |
| Sub-total A(iii): | | | 5,409.500 | |

- I/We confirm that for all travelling, they are at reasonable cost (e.g. economy class fare only if applicable) and are of direct relevance to the project and account for no more than 5% of the total amount of funds requested from ITF; the number of participant is not more than one person from the project team, members of which shall be from the lead applicant and/or the implementing organisation(s) (if applicable).

Note:

1. Please indicate (by putting in @) where the consumables are to be covered by in-kind contribution from the lead applicant or industry sponsor(s) or supporting organisation(s).

2. *Project funds cannot be used to cover general administration and office expense. Please refer to the list of unallowable cost items in Part C of the Guide.*

3. *Services provided by the lead applicant (e.g. inter-departmental charges) are generally not allowed to be charged to the ITF. ITC may consider approving the charging of such services provided that they are (a) justifiable on grounds of operational efficiency, reliability and quality of service, etc.; (b) not general or administrative support in nature; and (c) charged at cost.*

Additional Information:

(iv) Administrative Overheads

| Item | Total (HK\$'000) |
|-----------------------------------------------------|---------------------|
| Administrative Overheads met by ITF ^{Note} | 1,770.858 |
| Sub-total A(iv): | 1,770.858 |

Note: The administrative overheads to be included in the project budget can be at most 15% of the ITF funding requested (net of overheads).

B. Industry Sponsorship/Other Sources of Financial Contribution

Please list all the industry sponsorship and other sources of financial contribution to be received within the Project Period, and provide breakdown of each item in the following sections.

Summary:

| Category | Amount (HK\$'000) |
|----------------------------------------------|---------------------------|
| (i) Industry Sponsorship | 2,520.000 |
| (ii) Other Sources of Financial Contribution | 450.000 |
| Total (B): | 2,970.000 (i)+(ii) |

(i) Industry Sponsorship Note

| Name of Sponsor | Cash Contribution (HK\$'000) | In-kind Contribution | | Total (HK\$'000) |
|------------------------|------------------------------|-------------------------------------------------------------------------------------------|----------------------------|------------------|
| | | Details (e.g. description of equipment/consumables and basis of conversion to cash value) | Cash Equivalent (HK\$'000) | |
| Local | | | | |
| ABC (HK) Limited | 920.000 | OLED and LCoS display samples | 400.000 | 1,320.000 |
| XYZ Industries Limited | 700.000 | | | 700.000 |
| KLM Electronics | 500.000 | | | 500.000 |
| Non-local | | | | |
| | | | | |
| Sub-total B(i): | | | | 2,520.000 |

Note: At least one private company shall contribute industry sponsorship to cover at least 10% of the total project cost. At least 50% of the industry sponsorship (both cash and in-kind) should be paid upfront and the remaining sum should be paid at the 'mid-point' of the Project Period.

(ii) Other Sources of Financial Contribution

Please set out other sources of financial contribution in this section. It can include own sources of funding provided by the lead applicant, contribution from supporting parties, e.g. charitable organisations, individuals, etc. It can also include contribution by project team members. It shall however not include income generated from the project and the industry sponsorship specified in the table above.

| Name of Contributor | Cash Contribution (HK\$'000) | In-kind Contribution | | Total (HK\$'000) |
|------------------------------|------------------------------|-------------------------------------------------------------------------------------------|----------------------------|------------------|
| | | Details (e.g. description of equipment/consumables and basis of conversion to cash value) | Cash Equivalent (HK\$'000) | |
| HK Eye Foundation | 300.000 | | | 300.000 |
| Jockey Club Charitable Trust | 150.000 | | | 150.000 |
| | | | | |
| Sub-total B(ii): | | | | 450.000 |

Note: Other sources of financial contribution should be received by the 'mid-point' of the Project Period.

C. Project Income

Please list all the estimated income (e.g. licence fees, royalties, etc.) to be received, if any, and provide breakdown of each item and the basis of estimation in the following sections.

Summary:

| Category | Amount (HK\$'000) |
|---------------------------------------------------------------|------------------------------|
| (i) Estimated Income to be Received During Project Period | 0.000 |
| (ii) Estimated Income to be Received After Project Completion | 12,000.000 |
| Total Estimated Project Income (C): | 12,000.000 (i)+(ii) |

(i) Estimated Income to be Received During Project Period

| Source of Income | Basis of Projection/Assumptions | Amount (HK\$'000) |
|-------------------------|----------------------------------------|------------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | Sub-total C(i): | 0.000 |

(ii) Estimated Income to be Received After Project Completion

| Source of Income | Basis of Projection/Assumptions | Amount (HK\$'000) |
|-------------------------|----------------------------------------------------------------------------------------------------------|------------------------------|
| NRE + royalties | Market forecast by ABC (HK) Limited (Based on sale volume of 1,000 units at cost of \$5,000 per unit) | 5,000.000 |
| NRE + royalties | Market forecast by XYZ Industries Limited | 4,000.000 |
| NRE + royalties | Market forecast by KLM Electronics Please see Annex 4 "Target Results and Benefits" | 3,000.000 |
| | | |
| | Sub-total C(ii): | 12,000.000 |

D. Funding Request

| | Amount (HK\$'000) |
|--------------------------------------------------------------------------------|----------------------------------------|
| Total Project Cost (A): | 16,546.578 |
| Total Industry Sponsorship and Other Sources of Financial Contribution (B): | 2,970.000 |
| Net Amount of Funding Sought from ITF (D): | 13,576.578 (D) = (A) - (B) |

| | | |
|-------------------------------------------------------------------|---------------|-------------------------------------|
| ITF Funding vs. Total Project Cost (expressed as a %): | 82.05% | $\frac{(D)}{(A)}$ |
|-------------------------------------------------------------------|---------------|-------------------------------------|

IV. Existence of a Holistic Plan to Realisation/Commercialisation

1. The applicant should provide an estimate with reference to the scale below. ^{Note}

| | | | | | | | | | | | | | |
|-------------------|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| Inception of Idea | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Use by public sector/ launch into open market |

Please indicate by putting '√' in a circle to show at what stage you are at present.
Please indicate by putting '*' in a circle to show at what stage you will be at upon project completion.

| <u>Stage</u> | <u>Scale</u> |
|----------------------------------------------|--------------|
| Inception of idea | 1 – 2 |
| Proof of concept | 3 – 6 |
| Production of samples/prototypes/tools | 7 – 8 |
| Conduct of trial schemes | 9 – 10 |
| Use in public sector/launch into open market | 11 – 12 |

Note: *The scale is not meant to be exhaustive but rather a tool to facilitate understanding of the project.*

2. Please provide information in relation to the expectations of the industry sponsors on the R&D output and the business plan where appropriate.

ASTRI has already engaged three companies, 2 local companies and 1 from Mainland. They are interested in developing training goggle components and products. Also, a Mainland company, based in Sichuan province, is interested in commercialize the project results. The technology platform for portable visual training device, could be enhanced with additional features, such as myopia treatment software, memory training software, stroke recovery software, etc.

3. Please elaborate on the overall realisation/commercialisation plan, including activities to be undertaken to:

- disseminate the R&D deliverables;
- realise the application of the R&D deliverables in the public sector, i.e. Government bureaux/departments, public bodies, trade associations, charitable organisations; and/or
- market the R&D results in the commercial world, e.g. target users, marketing strategy including market segmentation and analysis of 4Ps in marketing (Products, Price, Place, Promotion), etc.

Please also provide specific timeframe of commercialisation plan (i.e. time schedule for the commercialisation plan to realise/commercialise).

ASTRI will generate a number of IPs including patent and software copyrights in this project. Based on the patient statistics and volume projection, there is potentially a big market and thus good business profit in portable visual training goggle products. Seed project results have attracted three companies to provide cash contribution as advanced payment of NRE and licensing fees of the related IPs from ASTRI. The royalties received will generate income to ASTRI after project completion. In addition, ASTRI will market the technology platform to other electronics companies for providing new training patterns.

The Children Hospital shows interest in trial test of the project deliverables (Support letter enclosed).

Please see Annex 4 "Target Results and Benefits" for more information.

4. Please provide information in relation to the future positioning of the technology/product in the market and potential industry partners for technology transfer/manufacturing/sales, etc.

The worldwide statistics of patients with various vision problems are huge. In addition, in China, according to a survey carried out by the Chinese Amblyopia and Strabismus Treatment and Prevention Group, amblyopia affects about 3% of the general population. Ten million children and thirty million adults need treatment. The societal and economical loss associated with amblyopia is enormous in China. Improved detection and treatment are in great demand.

According to iSuppli, July 2012, the revenue of medical electronics product in China is 2.8 billion USD in 2009 and 3.3 billion USD in 2010. The growth rate in 2013 is expected to be 18.2%. It is forecasted that the revenue will be increased to 8.6 billion USD in 2016.

ASTRI has already engaged three companies, 2 local companies and 1 from Mainland. They are interested in developing training goggle components and products. ABC is a display component supplier working with product houses. The algorithms could be ported to other technology platforms. XYZ is a healthcare product company with sales and marketing channels. The technology platform for portable visual training device, could be enhanced with additional features, such as myopia treatment software, memory training software, stroke recovery software, etc. KLM is a consumer electronics design house planning to enter the healthcare market with the reference design.

5. Please examine whether there are/will be competitors and if yes, analyse your strengths/weaknesses/opportunities/threats vs. theirs (i.e. SWOT analysis).

When compared with the electronic goggles available in the market, we cannot find any of them for visual training. The electronic goggles nowadays are for entertainment such as movie viewing and 3D-game. On the technical side, most of the others can provide only 8 bits gray-level resolution in monochromatic display. We aim to achieve higher resolution up to 10 bits for providing sufficient visual stimuli to the amblyopia and binocular vision patients.

6. Please indicate whether you intend to apply for further phases of funding under the ITF upon completion of this project.

Yes. (Please provide details.)

ASTRI intends to apply for collaborative research projects under

ITF to enhance the developed technology platform with additional

R&D targeting other visual impairments and new applications.

No.

v. Relevance with Government Policies or in Overall Interest of the Community

1. Please explain how the R&D project can support major Government initiatives/policies (e.g. environmental protection and healthcare) of Hong Kong.

There are a number of people in Hong Kong with amblyopia (around 3% of the population, estimated by a scholar at CUHK), resulting long waiting time for treatment at local hospitals. The project would probably help to release the pressure facing the local Eye Clinics as the project deliverable, a pair of goggles with software, can be used at patients' home to carry out the needed treatment.

2. Please explain how the R&D project can provide opportunities for training of engineering/scientific/R&D personnel in Hong Kong (or facilitate exchange with R&D personnel outside Hong Kong).

To provide training for 10 project members in the R&D of embedded software, image processing, optical systems and system-in-packaging.

3. Please explain how the R&D project can contribute to the upgrading of the industry.

ASTRI will generate a number of IPs including patent and software copyrights in this project. This will attract a number of companies to license the related IPs from ASTRI. Also, this project will establish a good technology platform for portable visual training device, such as myopia treatment software, memory training software, stroke recovery software, etc.

A Mainland company, based in Sichuan province, is interested in commercialize the project results. This would probably help to promote the project deliverable in Mainland market.

4. Please explain how the R&D project can bring social benefit (e.g. creating devices to address unmet clinical needs).

The statistics of amblyopia patients in Hong Kong can be referenced to a preliminary amblyopia screening done by Order of St. John (OSJ) Children Amblyopic Fund in 2007. The research result conducted by OSJ shown that there are a total of 1,232 suspected amblyopia cases among 7,325 children. The occurrence rate is more than 15%.

VI. IP Rights and Benefit Sharing

1. Please explain whether the R&D will lead to patent(s) or the R&D deliverables will be protected by other IP rights?

- Yes. (Please set out plan for application for grant of patent and whether the R&D deliverables will be patentable.)

Patentable Item: goggle with optical zoom and adjustable viewing
angle; Country where registration will be filed: China and US

- No.

2. Please indicate whether background IPs/patents of a third party will be used in the R&D project, and if so, whether consent/licence for use of such IPs has been/will be obtained.

- Yes. (Please provide details.)

- No.

3. Please set out the proposed ownership and/or right to use the IPs of the deliverables arising from the current project.

All IPs will be owned by ASTRI.

4. Please set out with justifications the sharing of IP benefits among all parties concerned.

n/a

VII. Management Capability

1. Please set out the organisational structure and division of responsibilities among parties concerned to undertake/manage/market, etc. the project, both the lead applicant and other related parties as appropriate.

Lead Applicant

ASTRI has strong technical capability in developing Bio-medical equipment. Over US\$ 1 million exclusive licensing fees has been collected as a result of one of the recently completed project under the Bio-medical Domain.

Other Related Parties

The Mainland collaborator based in Sichuan province is the 4th largest medical device manufacturers in Mainland China with more than 1000 staff and a strong market team of nearly 100 staff. This would help to support the commercialization of the project deliverables.

2. Please provide details of all relevant parties involved in the realisation/ commercialisation of the R&D deliverables, e.g. Technology Transfer Office of universities, research partners with successful track record or good international R&D marketing experience, etc.

Twenty prototypes will be evaluated by patients at the Children Hospital. ASTRI has already engaged three companies interested in developing training goggle components and products. ABC is a display component supplier working with product houses. XYZ is a healthcare product company with sales and marketing channels. KLM is a consumer electronics design house planning to enter the healthcare market with the reference design.

3. Please advise whether there are any completed or on-going ITF/non-ITF projects in the same/related areas undertaken by the Project Coordinator and the research team members.

Yes. (Please set out details of the project as follows.)

| Project Title | Project Ref. No. (for ITF projects only) | Commencement Date | Completion Date |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------|----------------------------|
| Feasibility Study on An Amblyopia Treatment System (ATS): Training Equipment and Procedure | ARD/048 | 12/02/2014 | 11/09/2014 |

No.

4. Please indicate if the Project Coordinator has sufficient capacity to handle the project satisfactorily (e.g. the number of R&D projects under his purview or any other significant commitments during the Project Period).

Yes.

Part D Attachments for the Application

Please number the supporting documents to be submitted together with this form as annexes, and provide the file description.

| Annex No. | File Name | File Description |
|-----------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Technical background | Information on RGC funded research and ITF ASTRI seed project |
| 2 | Project details | <ol style="list-style-type: none"> 1. Medical Background <ol style="list-style-type: none"> 1.1 Amblyopia 1.2 Strabismus 1.3 Diplopia 1.4 Binocular vision disorder 2. Market and Applications 3. Technology Background <ol style="list-style-type: none"> 3.1 Principle of amblyopia treatment system 3.2 Perceptual Template Model (PTM) 3.3 Principle of Binocular vision training 3.4 Design of binocular vision training by ASTRI 4. Preliminary competitive analysis 5. CVs of project team members |
| 3 | Budget | Detailed breakdown of project budget |
| 4 | Target Results and Benefits | Project end results, commercialisation plan, etc. |

Part D Attachments for the Application

| | | |
|---|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | Supporting letters | Supporting letters from Children Hospital, ABC (HK) Ltd, XYZ Industries Ltd, KLM Electronics, Hong Kong University, Hong Kong Eye Foundation, Jockey Club Charitable Trust, Lund University Denmark |
|---|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Part E Declaration

I/We have carefully read and fully understand the 'Guide to Filling in the Application Forms for the Innovation and Technology Support Programme (ITSP)' and the information in this form.

I/We certify that all the information provided in this form is true, complete and accurate. In the event that any information is found untrue, incomplete or inaccurate in future, ITC reserves the right to revoke its approval of any application, withdraw any grant approved, request for refund to the Government of any payment already made, and subject the case to legal proceedings.

I/We agree that information provided in this form will be used and/or disclosed by the Government to relevant parties to process the application, to conduct research and survey, and if the application is successful, to monitor the project, to exercise its rights and powers in relation to the project, and for other related purposes.

Lead Applicant

Authorised Signature for and
on Behalf of the Lead Applicant

Name

Dr Tai-man CHAN

Post Title

R&D Director

Tel

852-3406 2983

Name of Lead Applicant

The Hong Kong Applied
Science and Technology
Research Institute Company
Limited

Date

10 Feb 2020

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**Lead Applicant
Chop**