Midstream Research Programme for Universities

Application Form

General

1. Please read the '**Guide to Filling in the Application Form of the Midstream Research Programme for Universities (MRP)' ("Guide")** before completing this form.

2. Applications should be submitted by the lead applicant (a university funded by the University Grants Committee (UGC)).

3. In case of an application involving more than one party (e.g. collaboration of researchers across multiple disciplines or research institutions), the lead applicant should fill in the form.

4. If an applicant wishes to apply for more than one project, it should complete one form in respect of each project.

5. 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).

6. Please attach annex(es) if space provided in the form is insufficient. Other information in support of the application, e.g. diagrams, photos, videos, samples, etc. are welcomed. Where necessary, ITC will require the lead applicant to produce the originals of the supporting documents for verification.

7. 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 for the purposes of processing the application and related purposes.

8. Applications must be submitted to the Innovation and Technology Fund (ITF) Secretariat (MRP Section) either electronically through the Innovation and Technology Commission Funding Administrative System II (https://itcfas.itf.gov.hk); or in hard copy in triplicate (one original plus two duplicate copies) in person or by post. If applications are submitted in hard copies, please also provide a soft copy (preferably in MS Word 2010 or above), together with an application datasheet (included with this application form downloaded

from the ITF website).

9. 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 (and each co-applicant for collaboration projects) in relation to the project on the other (if the application is successful), the latter will prevail.

10. 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) 認知障礙症的診斷應用程式
	(Eng) Development of a Mobile App for Dementia Diagnosis
Lead Applicant Note	(Chi) 香港研發大學
	(Eng) Hong Kong R&D University

Note:

1. The lead applicant must be a university funded by the University Grants Committee (UGC).

Part A The Applicant

I. Information on Lead Applicant

For applications involving more than one party, the lead applicant should fill in this form and provide all necessary information with the consent of parties concerned.

Lead Applicant

☑ **University funded by the University Grants Committee (UGC)^**

- ○ City University of Hong Kong (CityU)
- ○ Hong Kong Baptist University (HKBU)
- ○ Lingnan University (LU)
- ○ The Chinese University of Hong Kong (CUHK)
- ○ The Education University of Hong Kong (EdUHK)
- ○ The Hong Kong Polytechnic University (PolyU)
- ○ The Hong Kong University of Science and Technology (HKUST)
- ○ The University of Hong Kong (HKU)
- ● Others, please specify
  Hong Kong R&D University

^ *Please refer to the website of UGC (www.ugc.edu.hk) for an up-to-date list of universities.*

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

Key Contact Person(s) Assigned by the Lead Applicant [Note]

1. Project Coordinator – on technical matters

Name	(Chi)	陳大文 教授
	(Eng)	Prof. Tai-man CHAN
Post Title		Chair Professor of Computer Science
Department/Unit		Department of Computer Science
Address	(Chi)	
	(Eng)	Rm 111, ABC Engineering Building, HK R&D University, Kowloon
Tel	+852-2111-1111	Fax +852-2222-2222
E-mail	tmchan@hkrdu.edu.hk	

2. Administrative Coordinator – on administrative matters

Name	Mr. CHAN Siu-ming
Post Title	Director, Office of Knowledge Transfer and Research
Address	Rm 222, DEF Building, HK R&D University, Kowloon
Tel	+852-2333-3333 Fax +852-2444-4444
E-mail	smchan@ hkrdu.edu.hk

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 Co-applicant(s)/Sponsor(s)/ Supporting Party(ies)

Co-applicant(s) *(only applicable to collaboration projects involving multiple disciplines or research institutions. A co-applicant can be a different unit of the same university, or a different local/non-local university/research institution)* **Note**

Sponsor(s) *(only applicable to projects involving sponsorship)* **Note**

Supporting Party(ies) **Note**

		Name	Type^	Contact Person (Post Title, Department/Unit, Tel No, Fax No and E-mail)
In Hong Kong	Government departments/ public bodies (官)			
	Companies/ industry or trade associations (產)	ABC (HK) Ltd	2	Dr. Grace CHOW CEO 2555-5556 2666-6667 ceo@abc.com.hk
		XYZ Industries Ltd	2	Dr. Mary WONG CEO 2555-5557 2666-6668 ceo@xyz.com.hk

	Universities (學)	Hong Kong Scientific University	1	Prof. John LAM Professor, Department of Psychology 2888-8888 2999-9999 johnlam@hksu.edu.hk
	Other research institutions (研)			
	Others (e.g. charitable trusts or prominent personalities in the field)	HK ABC Association	3	Dr. Siu-ming WONG Director 2555-5555 2666-6666 smwong@hkabc.org
		Jockey Club Charitable Trust	3	Ms. Jane TSE CFO 2555-5565 2666-6676 cfo@hkjc.org

		Name	Type^	Contact Person (Post Title, 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)			
	Other research institutions (研)			
	Others (e.g. charitable trusts or prominent personalities in the field)			

Note: *Please provide supporting documents.*

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

^ Please indicate the type by-

1 - Co-applicant

2 - Sponsor

3 - Supporting party

Part B The Project

I. Key Project Details

1. Project Title : <u>Development of a Mobile App for Dementia Diagnosis</u>

2. Type of Project^

    ☐
    Standalone project
    (funding up to HK$5M)

    ☑
    Collaboration project
    involving multiple
    disciplines or research
    institutions
    (funding up to HK$10M)

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

3. Total Project Cost (HK$'000): 4,355.375

    Amount of Total Financial Contribution including
    Industry Sponsorship, if any (HK$'000) Note:

    500.000

    Amount of MRP Funding Sought (HK$'000): 3,855.375

4. **Schedule of the Project Period**

    Commencement Date (dd/mm/yyyy): 01/ 08 / 2018

    Completion Date (dd/mm/yyyy): 31/ 07 / 2020

    Duration of the Project Period
    (no. of months, max. 3 years): 24

Note:

Industry sponsorship is not mandatory for MRP projects.

5. 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 Area of Excellence (AoE) Scheme, Theme-based Research Scheme (TRS) and Collaborative Research Fund (CRF)), Environment and Conservation Fund (ECF), etc.

Project Reference No	Project Particulars	Funding Obtained
ITSP Tier 3 Project (ITS/999/15)	Mobile platform for elderly tracking	ITSP
RGC funded research (xxxxxxx)	Feasibility study on dementia diagnosis and intervention using machine learning technique	RGC

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 MRP?

☐ Yes. (Please provide details and highlight the difference of those previous projects from the current application)

☑ No.

II. Brief Description of Project Proposal

1. **Research Theme(s)** ^

    ☑   Elderly Health and Care

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

    Please provide details how this project is relevant to the selected research theme above.

    In Hong Kong, it is estimated that 5-8% of the population over 65 years of age has dementia. For the population over 80 years old, the figure is estimated to be 20-30% in terms of having dementia of different extents.

    The objective of this project is to develop a mobile application that can assist professionals or individuals for the early detection and intervention of dementia. Through a number of structured tests measuring memory and mental skills, it is anticipated that the patients and their families can have an early identification of the cognitive decline so that they can cope with the changes and challenges together. This can also help alleviate burden on the healthcare system and enable the elderly to lead an enjoyable life in the community.

2. Project Summary (no more than 200 words)

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

(Chi)

據估計，香港 65 歲以上的人口中，約有 5-8%的人患有認知障礙症，而 80 歲以上更有 20-30%的人患上不同程度的認知障礙症。

目前，雖然沒有根治認知障礙症的方法，但如能及早發現病徵，可利用藥物維持認知障礙症患者的腦部功能，減慢衰退速度。此外，通過適當的治療和訓練，亦可以增強患者剩餘的功能和技能，從而減輕家庭成員所承受的壓力。

這個項目旨在開發一個移動應用程式，協助醫護人員或患者及早發現和治療認知障礙症。項目將以一項過往曾獲研資局資助的研究的成果(項目名稱：「使用機器學習來診斷認知障礙症的可行性研究」)為基礎，就一系列行為評估和認知測試進行<u>概念驗證</u>。

擬開發的移動應用程式會收集用戶的行為評估和認知測試結果，然後上載到雲端的分析引擎，並利用機器學習技術，有效分析及判斷用戶的認知狀態。

通過多項衡量記憶力及智力的有系統測試，預期患者及其家人可及早發現和判斷是否出現認知能力減退的情況，有助他們共同積極面對認知障礙症帶來的變化和挑戰。

(Reference:
http://www21.ha.org.hk/smartpatient/tc/chronicdiseases_zone/details.html?id=174)

(Eng)

In Hong Kong, it is estimated that around 5-8% of the population over 65 years of age has dementia. For the population over 80 years old, the figure is estimated to be 20-30% in terms of having dementia of different extents.

Although there is no cure for dementia at present, people with dementia can maintain their brain functions and slow down degeneration through medications if their symptoms are detected early. With proper treatments and training, the remaining functions and skills of the patients can be enhanced and the pressure experienced by family members can be relieved.

The objective of this project is to develop a mobile application that can assist healthcare professionals or patients in early detection and intervention of dementia. The project will provide a proof of concept for a series of behavioural evaluation and cognitive tests, based on the results from a previous funded RGC research, "Feasibility study on dementia diagnosis and intervention using machine learning technique".

The mobile application to be developed will collect the behavioural evaluation and cognitive test results of the users for subsequent transfer to the cloud based analytic engine to analyse and determine the cognitive status of the users effectively by using machine learning technique.

Through a number of structured tests measuring memory and mental skills, it is anticipated that the patients and their families can have an early identification and determination of cognitive decline so that they can cope with the changes and challenges arising from dementia together in a proactive way.

(Reference: http://www21.ha.org.hk/smartpatient/en/chronicdiseases_zone/details.html?id=174)

3. **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. One set of System Design Document including the system architecture and the design of the diagnostic system

2. A set of interactive and structural tests for identifying of the pattern of neurocognitive functions of users (implemented by Hong Kong Scientific University)

3. One mobile application which runs on Android / iOS with interactive and structural tests for cognitive assessment

4. One cloud based backend system for data analysis and user data storage

5. One analytic engine for identifying the cognitive status of the users using machine learning technique (jointly implemented by Hong Kong R&D University and Hong Kong Scientific University)

6. A field trial of deploying the mobile application at the HK ABC Association to evaluate the effectiveness of the diagnostic system

Please see Annex 2 "Specifications of the deliverables" for more information.

4. 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, e.g. three different projects to combat water pollution at a certain location.

There was a completed seed project (12 Aug 15 -11 Aug 2016) on the development of a mobile platform for tracking the movement of the elderly. These projects can create synergy in providing movement tracking as well as cognitive assessment in the mobile platform so as to enhance the quality of living for the elderly.

5. 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, etc.

Location	Name/Place of each Research Institution(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	Hong Kong R&D University	80%	80%
	Hong Kong Scientific University	20%	20%
Outside Hong Kong			

Note: *The majority R&D work of the project should be conducted within the territory of Hong Kong. However, 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.*

6. Project Milestones

Please set out the key milestones pertaining to the R&D deliverables to be achieved at different stages of implementation (including R&D work conducted by co-applicant(s), if any).

Proposed Commencement Date: 01/ 08 / 2018

	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)
1st Project Milestone: (12th month from commencement)	31/7/2019	Deliverable 1: One set of System Design Document including the system architecture and the design of the diagnostic system [01/08/2018 to 30/11/2018] Deliverable 2: A set of interactive and structural tests for identifying of the pattern of neurocognitive functions of users (implemented by Hong Kong Scientific University) [01/12/2018 to 31/03/2019] Deliverable 2: One mobile application which runs on Android / iOS with interactive and structural tests for cognitive assessment [01/12/2018 to 31/03/2019] Deliverable 2: First field trial of the mobile application with the collection of user feedbacks [01/04/2019 to 31/05/2019] Deliverable 3: One cloud based backend system for data analysis and user data storage [01/06/2019 to 31/07/2019]

2nd Project Milestone: (24th month from commencement)	31/07/2020	Deliverable 4: One analytic engine for identifying the cognitive status of the users using machine learning technique (jointly implemented by Hong Kong R&D University and Hong Kong Scientific University) [01/08/2019 to 31/01/2020] Deliverable 5: A thorough field trial of deploying the mobile application at the HK ABC Association to evaluate the effectiveness of the diagnostic system [01/02/2020 to 30/04/2020] Deliverable 5: Final fine-tuning and follow-up actions based on user feedback [01/05/2020 to 31/07/2020] Please see Annex 4 "Project Implementation Plan" for more information.
3rd Project Milestone: (36th month from commencement)		

Proposed Completion Date:　　　　　　　31/ 07 / 2020

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. expected project outcomes and impacts, merits of the proposed collaborative efforts (for collaboration projects only), background leading to the project, rationale and innovation of the proposed R&D, comparative analysis and supporting data, etc).

Dementia is a syndrome in which there is deterioration in cognitive function beyond what might be expected from normal ageing. It affects memory, thinking, behaviour and the ability to perform everyday activities. Although there is no cure for dementia at present, people with dementia can maintain their brain functions and slow down degeneration through medications if their symptoms are detected early.

Existing dementia diagnosis methodologies attempt to correlate the physical signs and symptoms to pre-defined patterns. However, if there is no information of the patterns for the response of patients with cognitive impairment, existing technology will not be able to identify unusual or anomalous behaviors within a short timeframe. Since machine learning uses an iterative and automated approach, the analytic engine of the proposed system will be able to capture and reprocess test data until a robust pattern is found. This allows the engine to go beyond looking for known patterns.

Based on the algorithms from a previous funded RGC research, "Feasibility study on dementia diagnosis and intervention using machine learning technique", the project team will investigate and develop advanced machine learning models and algorithms that can look for unusual or anomalous behaviors in the cognitive assessment perspective. With the help of these advanced machine learning techniques, the system can automatically detect dementia in an early stage.

(Reference: http://www.who.int/mediacentre/factsheets/fs362/en/)

Please see Annex 1 "Technical Background", Annex 2 "Specifications of the deliverables" and Annex 4 "Project Implementation Plan" 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 existing dementia diagnosis methodologies attempt to correlate the physical signs and symptoms to pre-defined patterns, this is the first attempt to adapt advanced machine learning models and algorithms that can look for unusual or anomalous behaviors in the cognitive assessment perspective.
(b) Whether the project will enhance quality (e.g. capacity, reliability, speed, etc.)	Through advanced machine learning models and algorithms, the proposed system may save valuable healthcare professional resources in conducting cognitive assessment for potential dementia patients, by significantly reducing the assessment time from 1 hour to 15 minutes.
(c) Whether the project will render production or application cost more competitive	In comparison to existing dementia diagnosis methodologies, it is expected that cost saving of up to 40% can be achieved since the assessment time can be significantly reduced. The early detection of dementia also helps the family and the society to provide better healthcare programme to the elderly and reduce the overall social cost.
(d) Whether the project will lead to further downstream R&D work	The project team will lead to further downstream R&D work such as enhancing the developed system with additional R&D targeting other cognitive disorders, so as to turn the R&D results into a complete solution for the public sectors and the healthcare industry.
(e) Others	N/A

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, the details of each milestone and the responsible party(ies), preliminary research results and supporting data, and the targeted results.

The project is divided into five phases.

Phase 1: The design of the overall system architecture will be completed in the first 4 months. [01/08/2018 to 30/11/2018]

Phase 2: Prof. John LAM from the Department of Psychology, Hong Kong Scientific University will investigate and propose a set of interactive and structural tests for identifying of the pattern of neurocognitive functions of users. Based on the inputs from Prof. LAM and his project team, a series of interactive and structural tests for cognitive assessment will be designed and these tests will be implemented on a mobile application which runs on both Android and iOS. This will be completed in the next 4 months. [01/12/2018 to 31/03/2019] After that, user feedbacks will be collected from a field trial with the professionals from the healthcare industry based on the applicability and the acceptability of the interface of the mobile application. [01/04/2019 to 31/05/2019]

Phase 3: One cloud based backend system for data analysis will be used for receiving data from the mobile application and storing them into a database. The supporting system infrastructure for storage and processing will be built. [01/06/2019 to 31/07/2019]

Phase 4: One analytic engine for identifying the cognitive status of the users using machine learning technique will be developed. Based on the algorithms from a previous funded RGC research, "Feasibility study on dementia diagnosis and intervention using machine learning technique", the engine will process the test data received from the mobile application and provide a scale indicating the deterioration in cognitive function beyond what might be expected from normal ageing. Prof. LAM and his project team will provide technical expertise in development of the analytic engine in terms of cognitive psychology and neurocognitive trajectory of dementia. [01/08/2019 to 31/01/2020]

Phase 5: A thorough field trial of deploying the mobile application at the HK ABC Association will be conducted to evaluate the effectiveness of the diagnostic system. [01/02/2020 to 30/04/2020] Based on user feedback collected from the trial, the project team will perform the fine-tuning and the respective follow-up actions if necessary. [01/05/2020 to 31/07/2020]

Additional Information: Please see Annex 1 "Technical Background", Annex 2 "Specifications of the deliverables" and Annex 4 "Project Implementation Plan" for more information.

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.).

Project Coordinator	Prof. Tai-man CHAN (PhD in Computer Science, Harvard) has over 20 years of R&D experience in software design, computer visions, big data analytics and its application in public healthcare. (Please see CV in Annex 3) Prof. Chan will be the Project Coordinator to manage the project team and to liaise with external parties to conduct the field trial.
Research Team	[Co-applicant(s), if any] Prof. John LAM (PhD in Psychology, University of British Columbia) has over 15 years of R&D experience in neuropsychology and cognitive affective neuroscience. Prof. LAM is the project co-applicant from the Department of Psychology, Hong Kong Scientific University. He and his project team will provide support in the development of the tests and the analytic engine in terms of cognitive psychology and neurocognitive trajectory of dementia. [Team members] Dr. XX Li, PhD in Electronic Engineering, Oxford University has over 10 years of R&D experience in software design, machine learning and optimization (Please see CV in Annex 3). Dr. Li will be the Deputy Project Coordinator supervising the architecture design of the mobile application for this project. Ms Siu-ling WONG, HKU (First Class Hon), Stanford University (Research Scholar) has over 15 years of R&D experience in visualization technologies and data analytics. (Please see CV in Annex 3). Ms Wong will supervise the statistical analyses for this project.

III. Financial Considerations

A. Project Expenditure

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

Summary:

	Cost (HK$'000)
(i) Manpower	2,640.000
(ii) Equipment	60.000
(iii) Other Direct Costs	382.000
(iv) Co-applicant's Expenditure	770.500
(v) Administrative Overheads	502.875
Total Project Cost (A):	**4,355.375** (i)+(ii)+(iii)+(iv)+(v)

(i) Manpower

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

Post Title/ Rank [Note]	No. Required	Duration (months)	Monthly rate or equivalent (HK$'000)	Total (HK$'000)	Job Description
Senior research associate	1	24	40.000	960.000	Develop the architecture of the system, such as the components and the user interfaces etc. The appointee is not an existing staff of the University.
Research associate	1	24	30.000	720.000	Design the structural tests for cognitive assessment, and develop the machine learning algorithms for identifying the cognitive status of the users etc. The appointee is not an existing staff of the University.
Research assistant	2	24	20.000	960.000	Develop, test and verify the system including the mobile application, backend storage modules and the analytic engine etc. The appointee is not an existing staff of the University.
			Sub-total A(i):	**2,640.000**	

☑ 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 Project Coordinator and Deputy Project Coordinator (if applicable).

Additional Information: Please see Annex 5 "Budget Justification" for more 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.)
High end workstation	2	20.000	40.000	See Annex 5 "Budget Justification" The University does not have dedicated high end workstations for this project at this moment.
Mobile devices	4	5.000	20.000	See Annex 5 "Budget Justification" The University does not have dedicated mobile devices for this project at this moment.
		Sub-total A(ii):	**60.000**	

☑ 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:

1. *Please indicate (by putting in [#]) where the equipment is estimated to cost HK$500,000 or above per item.*

2. *Please indicate (by putting in [@]) where the equipment is to be covered by in-kind contribution.*

3. *Only cost of new equipment for implementing the project can be charged to MRP.*

Additional Information: Please see Annex 5 "Budget Justification" for more information

(iii) Other Direct Costs

Item Note	Quantity	Unit cost (HK$'000)	Total (HK$'000)	Justifications
Subscription fee for cloud services	1	100.000	100.000	See Annex 5 "Budget Justification"
Mobile application developer program membership fee	2	1.000	2.000	See Annex 5 "Budget Justification"
Patent fee	2	100.000	200.000	It is planned to apply for 2 patents for the deliverables of the project. Please see Annex 5 "Budget Justification" for more information.
External audit fee	2	20.000	40.000	See Annex 5 "Budget Justification"
Conference	2	20.000	40.000	See Annex 5 "Budget Justification" For each conference trip will only support one project team member and economy class airfare will be selected.
Sub-total A(iii):			**382.000**	

☑ I/We confirm that for the cost of local/ non-local training, study/trade mission and field trip, the number of participant is not more than one person from the project team, members of which shall be from the lead applicant or the co-applicant(s); and any travelling expenses incurred account for no more than 5% of the total amount of MRP Funding requested and cover the cost of economy class fares (if any) incurred by the project team member (if applicable).

Note: Please indicate (by putting in @) where the consumables are to be covered by in-kind contribution.

Additional Information: Please see Annex 5 "Budget Justification" for more information

(iv) Co-applicant's Expenditure [Note]

Please provide a separate annex on the expected R&D work to be undertaken by each co-applicant(s) and a breakdown of the estimated project expenditure which is directly related to such R&D work with justifications.

Item	Total (HK$'000)
Expenditure incurred by Hong Kong Scientific University	770.500
Expenditure incurred by co-applicant 2	
Sub-total A(iv):	**770.500**

Note: Applicable for collaboration projects only.

☑ An annex/Annexes on co-applicant's expenditure is/ are attached. The exchange rate used for conversion of foreign currency, if any, has been quoted in the annex(es).

(v) Administrative Overheads [Note]

Item	Total (HK$'000)
Administrative Overheads met by MRP	502.875
Sub-total A(v):	**502.875**

Note:

1. *The administrative overheads to be included in the project budget can be up to 15% of the MRP Funding requested (net of overheads).*

B. Industry Sponsorship/Other Sources of Financial Contribution

Industry sponsorship is not mandatory for MRP projects.

Please list all the industry sponsorship and other sources of financial contribution to be received <u>within</u> the Project Period, if any.

Name of Sponsor/ Contributor	Cash Contribution (HK$'000)	In-kind Contribution		Total (HK$'000)
		Details (e.g. description of equipment/consumables etc. and basis of conversion to cash value)	Cash Equivalent (HK$'000)	
ABC (HK) Ltd	250.000			250.000
XYZ Industries Ltd	250.000			250.000
			Sub-total B:	**500.000**

C. Project Income

Please list out all projected 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	
(ii) Estimated Income to be Received After Project Completion	5,000.000
Total Estimated Project Income (C):	**5,000.000** **(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):	

(ii)   Estimated Income to be Received After Project Completion

Source of Income	Basis of Projection/Assumptions	Amount (HK$'000)
Licensing fee	Market forecast by ABC (HK) Ltd Please see Annex 6 "Target Results and Benefits" for detailed market projection	2,000.000
Licensing fee	Market forecast by XYZ Industries Ltd Please see Annex 6 "Target Results and Benefits" for detailed market projection	3,000.000
	Sub-total C(ii):	**5,000.000**

D. Funding Request

	Amount (HK$'000)
Total Project Cost (A):	4,355.375
Total Industry Sponsorship and Other Sources of Financial Contribution (B):	500.000
Net Amount of Funding Sought from MRP (D):	**3,855.375** (D) = (A)-(B)

MRP Funding vs. Total Project Cost (expressed as a %):	**88.52%**	(D) / (A)

IV. Plan for Downstream Research and/or Product Development Activities

1. Please 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	○	√	○	○	○	○	○	○	○	○	*	○	Prototyping and trials

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.

Stage	**Scale**
Inception of idea	1 – 2
Proof of concept	3 – 6
System/process optimisation	7 - 9
Prototyping and trials	10 - 12

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

2. Please provide information in relation to the expectations of the industry sponsors (if any) on the R&D output and the business plan where appropriate. Please enter N/A if there is no industry sponsorship.

In order to facilitate the technology transfer, regular meetings will be held between the industry sponsors, healthcare organizations and the research team. In particular, the industry sponsors will provide market information and assistance in turning the R&D output into a commercial package when it is ready for realization/commercialization.

Please see Annex 6 "Target Results and Benefits" for (1) market analysis and customer segmentation, (2) the competitive analysis in assessing the strengths and weaknesses of existing technologies in the market, (3) the market positioning of the proposed system, (4) the SWOT analysis of the project deliverables, and (5) potential technology transfer plan.

3. Please elaborate on the overall plan for further downstream research and/or development of new products or services, including activities to be undertaken to:
   - conduct downstream research;

   - through the development of new products or services, realise the application of the R&D deliverables in the public sector i.e. Government Departments, public bodies, trade associations, charitable organisations; and/or

   - turn the R&D results into new products or services for marketing 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 and details of further downstream research and/or development of new products or services.

   The project team intends to conduct downstream research in order to enhance the developed system with additional R&D work targeting other cognitive disorders in the first 6 months after project completion, so as to turn the R&D results into a complete solution for the public sectors and the healthcare industry.

   Please see Annex 6 "Target Results and Benefits"
   for (1) market analysis and customer segmentation, (2) the competitive analysis in assessing the strengths and weaknesses of existing technologies in the market, (3) the market positioning of the proposed system, (4) the SWOT analysis of the project deliverables, and (5) potential technology transfer plan.

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.

   Please see Annex 6 "Target Results and Benefits" for (1) market analysis and customer segmentation, (2) the competitive analysis in assessing the strengths and weaknesses of existing technologies in the market, (3) the market positioning of the proposed system, (4) the SWOT analysis of the project deliverables, and (5) potential technology transfer plan.

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

Please see Annex 6 "Target Results and Benefits" for (1) market analysis and customer segmentation, (2) the competitive analysis in assessing the strengths and weaknesses of existing technologies in the market, (3) the market positioning of the proposed system, (4) the SWOT analysis of the project deliverables, and (5) potential technology transfer plan.

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)

The project team intends to apply for collaborative research projects under ITF to enhance the developed system with additional R&D work targeting other cognitive disorders.

☐ 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 of Hong Kong.

> The Government has an initiative in enhancing the healthcare support for the public. The proposed deliverables may save valuable healthcare professional resources in conducting cognitive assessment for potential dementia patients. The early detection of dementia also helps the family and the society to provide better healthcare programme to the elderly and reduce the overall social cost.

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).

> The proposed system can provide training for 4 project members from Hong Kong R&D University and 2 project members from Hong Kong Scientific University in the R&D of cognitive assessment, machine learning, data analytics, software development and cloud computing.

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

The project is intended to train up local engineering and scientific personnel in the areas of information technologies and biomedical engineering, who can then be recruited by the industry to carry out R&D in Hong Kong, especially in upgrading the healthcare industry for a better livelihood for the elderly.

4. Please explain how the R&D project can bring social benefit.

According to the World Health Organization, 47.5 million people have dementia worldwide and there are 7.7 million new cases every year. While time has not brought a cure, this R&D project has brought new innovations which can ease the caregiving burden and can relieve the physical and psychological impact on both the families and the society.

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)

      It is planned to apply for 2 patents for the deliverables of the project.

      Please see Annex 5 "Budget Justification" for more information.

      ☐ 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/patents 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.

> The IPs generated from this project will be vested with the Hong Kong R&D University. Unrestricted use of the technology would be allowed for relevant Government departments.

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

The IPs generated from this project will be vested with the Hong Kong R&D University. The revenues and benefits arising therefrom will be shared with the Hong Kong Scientific University on an equitable basis.

VII. Management Capability

1. Please set out the organisational structure and division of responsibilities among parties concerned to undertake/manage/market, etc. the project.

    ### *Lead Applicant*

    The project will be conducted by the Hong Kong R&D University, including the management and administration of the project, as well as the development of the system.

    ### *Co-applicant(s)*

    Hong Kong Scientific University will provide support in the development of the tests and the analytic engine in terms of cognitive psychology and neurocognitive trajectory of dementia.

    ### *Other Related Parties*

    The project has gained support from the HK ABC Association for the provision of a trial site as well as the industry to provide market information when the product is ready for realization/commercialization.

2. Please provide details of all relevant parties involved in the downstream research and/or development of new products or services.

> The project has gained support from the industry, namely ABC (HK) Ltd and XYZ Industries Ltd to provide market information and suggestions for the future positioning of the deliverables in the market.
>
> HK ABC Association and the Jockey Club Charitable Trust will provide user feedback during the trial to facilitate the future realization/commercialization of the deliverables.

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 his/her 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
Mobile platform for elderly tracking	ITS/999/15	12 Aug 2015	11 Aug 2016

□ 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).

Prof. Tai-man CHAN (PhD in Computer Science, Harvard) has over 20 years of R&D experience in software design, computer visions, big data analytics and its application in public healthcare. He is an active researcher focusing on public health such as dementia.

Prof. Chan has sufficient capacity and capability to handle the project satisfactorily based on the number of R&D projects under his purview. (Please see CV in Annex 3 for more information)

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	Details of previous researches in relation to this proposed project.
2	Specifications of the deliverables	Details of the deliverables of this proposed project.
3	CV	CVs of the Project Coordinator and the Research Team
4	Project Implementation Plan	The implementation plan of this proposed project.
5	Budget Justification	Breakdown and justifications for the budget of this proposed project.
6	Target Results and Benefits	Planning for further downstream research

Part E   Declaration

Declaration

I/We have carefully read and fully understand the 'Guide to Filling in the Application Form of the Midstream Research Programme for Universities (MRP)' 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	Mr. CHAN Siu-ming
Post Title	Director, Office of Knowledge Transfer and Research
Tel	+852-2333-3333
Name of Lead Applicant	Hong Kong R&D University
Date	01 / 03 / 2018

- Chop -

Lead Applicant Chop

Co-applicant 1

Authorised Signature for and on
Behalf of the Co-applicant 1

_____

Name Prof. John LAM

Post Title Professor, Department of Psychology

Tel 2888-8888

Name of Co-applicant 1 Hong Kong Scientific University

Date 01 / 03 / 2018

- Chop -

**Co-applicant 1
Chop**

Co-applicant 2

Authorised Signature for and on
Behalf of the Co-applicant 2

_____

Name _____

Post Title _____

Tel _____

Name of Co-applicant 2 _____

Date _____

- Chop -

**Co-applicant 2
Chop**