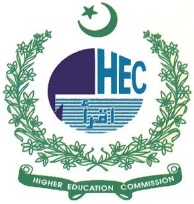
**** 

**Technology Transfer Support Fund**

**PROPOSAL COVER SHEET**

|  |  |
| --- | --- |
| **Proposal Reference No.**  (Not for completion by applicant) |  |

|  |  |
| --- | --- |
| **Title of Project:** | TTSF: Forensic based Intelligent Blackbox System for Vehicles |
| **Duration of Project:** | In months 36 |
| **Total Budget Requested** | PKR million TO BE DEFINED |

|  |  |
| --- | --- |
| **Institution Name** | University of Haripur |
| **Institutional Address** | Street Address Hattar Road |
| City Haripur |
| Country Pakistan |
| **Principal Investigator** | Name Dr Yousaf Saeed |
| Position/Title Assistant Professor |
| Department Information Technology |
| Tel. # (Office/Mobile) |
| Email yousaf@uoh.edu.pk |
| CNIC/Passport No. |

|  |  |
| --- | --- |
| **Primary Industry Partner** | Name |
| Company/Organization |
| Position/Title |
| Tel. # (Office/Mobile) |
| Email |

|  |  |
| --- | --- |
| **Priority Sector as described in Call for Proposals Guidance** |  |

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**II. EXECUTIVE SUMMARY**

The Executive Summary (limited to one page) provides an overview of the proposed technology transfer project. It should clearly identify the university developed technology research, the anticipated commercial application, the potential customer and the benefits to the customer and society. The Executive Summary should NOT include confidential information, but should provide the Evaluator with sufficient information to understand the potential impact of the technology on the marketplace. The broad project objective should be briefly described, as well as the activities to be undertaken to achieve the project goals. In addition, the roles of partners – in particular those from the commercial sector[[1]](#footnote-1)– that will contribute to the success of the proposed project should be identified.

Road Accidents are a major cause of deaths now a days. Nearly 1.25 million people die in road crashes each year, on average 3,287 deaths a day. An additional 20-50 million are injured or disabled. In previous approaches there is no data about the cause of accident whether it was a technical fault or human fault. In case of accident there is no procedure to automatically inform emergency cell and provide first aid in remote areas. To solve this issue a forensic based intelligent black box system is proposed which will contribute in constructing safer vehicles , reducing human deaths caused by road accidents, helping insurance companies with their vehicle crash investigations, and helping automobile companies to build safer vehicles.

The nature of this project is similar to aeroplane Black Box system but with some additional functionalities specific to vehicular network. The Goal to identify the cause of vehicle crashes and to build a black box system which will ensure safety of human and vehicles. The data from this system will also help to build more safer vehicles in future.

The objective of this project is to build an intelligent black box system which will acquire data from various sensors, video feed from cameras, audio feed from microphone and store that data locally in SSD drive. The system will detect the fault in vehicles and alert driver about it. It will make use of cameras, ultrasonic sensor and Kinect sensor to avoid collisions. The seat belt sensor will make sure that driver has tighten his seat belt. The health(heartbeat ,blood pressure etc.) of driver will be monitored continuously. Alcohol sensor will be used to check whether driver is drunk or not. The behavior of driver will also be analyzed locally with the help of computer vision and edge computing. Machine Learning will be used in detection and prediction of accidents. The system will generate alert messages to emergency cell in case of accident and alert driver in case of any fault in vehicle.

The data collected by the black boxes of different vehicles and road accidents can be used by automobile industry to reconsider their designs and can help them to build much safer vehicles which will help them not only to safe human lives but also to get competitive advantage. The data collected will also be used by government and law & enforcement agencies

This project will make use of raspberry pii, along with sensors ,cameras ,microphone along with other hardware. A dedicated lab will be required in order to build and test prototype.

**III. THE COMMERCIAL APPLICATION, AND THE BUSINESS AND SOCIETAL IMPACT OF THE PROPOSED TECHNOLOGY TRANSFER SUPPORT FUND PROJECT ON THE MARKET**

In this Section (maximum two pages), the Commercial Application to be addressed by the proposed TTSF project should be clearly identified.

Focus the narrative on:

* What is the innovation in the proposed product?
* Why the innovation is important to the commercial market?
* Who is the anticipated customer, and has the potential customer been validated by the team?
* What need does the innovation address?

Finally, address why the proposed innovation (and its commercialization) is important in a local and national societal context in Pakistan.

**IV. THE ACADEMIC TEAM AND SECTORAL[[2]](#footnote-2) PARTNERS**

In this Section (maximum two pages narrative, plus Table as indicated below), describe the role of the academic team and the sectoral partners for the proposed TTSF project.

Identify the skills that each key collaborator possesses, and describe their anticipated role in the project. Describe in some detail how the academic team will collaborate with the industry/sectoral partners.

Indicate how the industry/sectoral partners will advance the technological innovation to bring it to market. How much time will the industry/sectoral partners devote to the project?

TTSF projects require co-financing – including in kind and/or cash contributions – from the sectoral partners. Industry co-financing must equal at least 50% of the funding requested from HEC for the academic portion of the collaboration. Greater amounts of industry co-financing are encouraged. Describe the co-financing that will be provided to this proposed TTSF project.

**TABLE: Academic Team and Sectoral Partners**

All confirmed participants should be identified in this Table. Up to three (3) Letters of Commitment may be attached to the proposal. The primary industry/sectoral partner MUST submit a Letter of Commitment. ALL Letters of Commitment must contain a detailed co-financing commitment.

All confirmed Academic Collaborators (if any) should be identified in this Table

|  |  |
| --- | --- |
| Company/Organization Name | |
| Location | |
| Name of Collaborator | Position/Title |
| Tel. # | Email |
| Anticipated Contribution to Project Goals | |
| Anticipated Annual Financial Contribution | |
| Company/Organization Name | |
| Location | |
| Name of Collaborator | Position/Title |
| Tel. # | Email |
| Anticipated Contribution to Project Goals | |
| Anticipated Annual Financial Contribution | |
| Company/Organization Name | |
| Location | |
| Name of Collaborator | Position/Title |
| Tel. # | Email |
| Anticipated Contribution to Project Goals | |
| Anticipated Annual Financial Contribution | |
| Company/Organization Name | |
| Location | |
| Name of Collaborator | Position/Title |
| Tel. # | Email |
| Anticipated Contribution to Project Goals | |
| Anticipated Financial Contribution | |

**Research Student 1**

OMER KHAN JADOON

[omerkhanjadoons@gmail.com](mailto:omerkhanjadoons@gmail.com)

+923359119460

BS Software Engineering ,UOH

**V. PROJECT DESCRIPTION**

In this Section (maximum six pages, including Tables and Figures), describe in detail the proposed TTSF project.

**Problem Statement**: Clearly identify the research and development questions associated with the proposed Technology Transfer Support Fund activities. What approach will the project team employ to address the challenge? Provide a brief survey of the relevant literature, and of the current state of the art in the commercial sector. Identify two or three specific questions that must be addressed to move the concept to the marketplace.

Describe in appropriate detail the university developed technology and why it is innovative. What benefit does it bring to the commercial marketplace, and what broader benefits does it bring to society and to Pakistan.

**Methodology**: Describe how the research and development plan will be accomplished over the three years of funding available for the proposed project, and identify appropriate milestones and anticipated deliverables. What are the specific activities that will be necessary to develop a commercially viable product? In addition to the technical issues, what are the commercial, legal and regulatory issues that must be addressed? What market research questions will form part of the project?

**Ethical considerations related to the proposed research (If Any):** The proposal should have a description of ethical considerations relating to the study. This section should document the issues that are likely to raise ethical concerns. It should also describe how the Principal Investigator is planning to address it and how he/she plans to obtain informed consent from the research participants (the informed consent process).

Note: Proposals that do not address the required questions, and those that exceed the established page limits, may not be considered by HEC and will be returned without review.

### Problem Statement:

Road accidents are common now a days. According to (Pakistan Bureau of Statistics, 2018), in the year 2017- 2019 around 11121 road accidents have been recorded in which 5948 people were killed while 14489 people were injured. And due to traditional manual approaches its hard to know the cause of accidents that whether it was a technical fault or human fault .Also many crash victims die because they can’t be able to get first aid on time. The previous approaches to solve this problem relies on either data coming from the sensors or they just rely on video feed due to which we get less information about the accident. Also the information is stored in one disk and in case if that disk got damaged all the data is loss. whereas in our approach we use data from sensors as well as microphone and cameras and store them on two SSD drives to reduce thee risk of data loss. Also the cameras used in this project are night vision based smart cameras who are capable of recording videos in the dark as well.

### Literature Review:

**IOT:**

(Murshed, 2019)Proposed that most of the accidents occurs due to driver unawareness or due to over speeding so a iot based smart brake system continuously measures distances of nearby vehicles and alert the driver and applying brakes automatically if the vehicle is to close or if there is a chance of accident.

(R, 2017)suggests that we should not rely on a single factor i.e alcohol sensor but multiple factors should be consider in order to detect whether a person is drunk or not. It includes not only data from alcohol sensor but also heart beat and facial expressions.

**Computer Vision:**

(Moden, 2005)Proposed a system which is based on microscopic traffic data ,collected automatically by a video-based monitoring system, i.e. class, speed, and trajectory of each single road-user. This will help to calculate risk without relying on past accidents

(Gayathri Elumalai, 2005) proposed a traffic accident detection system that is vision based. An innovative approach for an image processing system to automatically detect, record, and report traffic accidents at an intersection and verification mechanism will provide a real-time crash warning to the operators and drivers.

**VANET:**

(Targe, 2016)Proposed that an RFID and ARM based intelligent transportation system can help to minimize traffic congestion and can provide vehicles with suitable path having low traffic

(Shahirah Mohamed Hatim, 2019)discuss about different key challenges of VANET and also shows the importance of IOT in traffic control management system

**Edge Computing:**

(Jun Zhang, 2019)Proposed that by deploying storage and computing resources at the wireless network edge, e.g., radio access points, the edge information system (EIS) including edge caching, edge computing, and edge AI will play a key role in future intelligent internet of vehicles and help in expanding capabilities of VANET.

(BILAL KHALID DAR, 2019**)** In road accident globally a significant number of deaths occur each year, caused by excessive delays in rescue activities. Vehicles embedded with sophisticated technologies, along with roads equipped with advanced infrastructure, can play a vital role in the timely identification and notification of roadside incidents. To address the problem of latency, fog computing(edge computing) emerged as a middleware paradigm that brings the cloud-like resources closer to end devices. The system also reduces cost and minimizes overall response time by minimizing human intervention through automated emergency management.

**Machine Learning:**

(Nejdet Dogru, 2018)suggests the use of Machine Learning in accident detection because machine learning algorithms are good at distinguishing normal behaviors from abnormal behaviors.

(Miao Chong, 2015) considered neural networks trained using hybrid learning approaches, support vector machines, decision trees and a concurrent hybrid model involving decision trees and neural networks. Experiment results reveal that among the machine learning paradigms considered the hybrid decision tree-neural network approach outperformed the individual approaches.

**Cognitive Sciences**

(Siegel, 2019) propose a "Cognitive Protection System" capable of using system models to ensure command safety while monitoring system performance, and develop and test a "Cognitive Firewall" and "Cognitive Supervisor."

### Methodology:

The Black Box will consist of an outer shield which will be water proof, shock proof, and fire proof. Inside that shield there are three major portions, the first portion is responsible for storing audio/video feed from camera and microphone. The camera module will be placed in front and rear side of vehicle and will wirelessly communicate with black box. Similarly microphone module will be placed near the dashboard of driver to record driver audio.

The second portion will be responsible for storage of data acquired from sensors. The data acquired by camera/microphone and sensors are stored on separate Solid state Disks because if one of them got damage then the other one should provide us an evidence for the crash.

The third portion can be considered as the brain of the whole black box system. It will process and analyze the video/audio feed as well as the data from the sensor and provide useful decisions e.g in case it detects a technical fault or fire or gas leakage it will send an alert to driver application. The driver application will not only alert driver about different faults or risks but will also block the calls and SMS on mobile phone while driving. By analyzing the video feed the emotions of driver will be detected whether he is normal, happy, sad or angry . It will also continuously monitor the health of the driver like blood pressure etc. In case if the driver is drunk or sleepy or if it is not wearing seat belt then it will alert driver. This portion will also analyze data send by ultrasonic sensor and Kinect sensor and will continuously measure the distance from nearby vehicles to avoid collision. When the accident will be detected it will send the picture and location along with severity of accident to emergency cell by using both cloud in urban areas and GSM in rural areas having poor or no internet.

After the accident occur the data in the black box will be helpful for law & enforcement agencies and insurance companies to find out the cause of that particular accident.

Also an accident database will be maintained on the cloud which will provide help to government in making better policies regarding road safety and will provide help to automobile industries to build more safer vehicles.

In contrary to previous approaches this project will make use of edge computing and computer vision which will help black box to make better and quicker decisions. Also it will make use of machine learning to detect abnormal behaviors of driver and road accidents.

### Goals/Objectives

* Data acquisition from various vehicular inter and intra sensors for Data Forensic
* Software Applications
* Fault detection and notification to driver based on data collection
* Automatic mode in driving like Autopilot mode
* Omni camera mode and ultrasonic sensor for avoiding collisions
* Focusing on both on weak and strong AI Approaches including Cognitive Science, computer vision and edge computing. Facial identification, mood Detection etc.
* VANET lab establishment

### Project Team, including partnerships

**TO BE DEFINED!**

### Results statement:

The Result of this project will be an Intelligent Black Box System which will help us to identify the cause of vehicle crashes and to ensure safety of human and vehicles while driving. The data collected from this system will be used by automobile companies to build more safer vehicles in future.

### Additional benefits:

According to a new World Bank study, funded by Bloomberg Philanthropies, a 10% reduction in road traffic deaths raises per capita real GDP by 3.6% over a 24-year horizon. So Black box system will help us to reduce road traffic deaths and will contribute to overall economy of Pakistan.

This research will also contribute to following SDGs

Goal 3: Good Health and Well Being

(UNDP Pakistan, n.d.) states that by 2020, halve the number of global deaths and injuries from road traffic accidents.

Black Box system will help to reduce the number of deaths by providing timely information/alert to emergency cell about the accident

Goal 11: Sustainable cities and communities

(UNDP in Pakistan, n.d.) states that by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

**VI. IMPLEMENTATION TIMELINE**

The Implementation Timeline is designed to provide a high-level overview of the planned activities of the proposed project. Develop a Gantt Chart to demonstrate how the project will proceed in a timely fashion. Then, in the Table below, identify up to five major tasks and deliverables planned for each year of the proposed project. In all aspects, disparate activities – for example research, market development, commercialization - should link together to result in a coherent workplan that achieves the objectives of the proposed project.

In addition to the Gantt Chart and the Table, this Section can include a narrative (maximum two pages) that provides further details on the Implementation Timeline.

|  |
| --- |
| **YEAR ONE** |
| **Major Tasks and Deliverables** |
| * Project Procurement * Build Audio/Video Storage Section * Research on driver emotion/mood detection * Unit Testing 1 * Documentation 1 & Review * Build Sensor data storage section * Integrate Accident Detection Feature |

|  |
| --- |
| **YEAR TWO** |
| **Major Tasks and Deliverables** |
| * Research on Collusion Avoidance * Build modules(seat belt,alcohol detection) * Testing & Documentation * Research on Fault/Abnormal Behaviour * Driver App Development * Emergency cell app Development * System Testing * Final Review & Submission |

**VII. PHYSICAL RESOURCES AND FACILITIES**

In this Section (maximum one page), describe the physical resources and facilities that are available to the proposed project. Be sure to comment on how these resources and facilities will enable the work plan of the proposed project to be accomplished.

|  |
| --- |
| Facilities (Equipment available for the research project in the host university/institution) |
| 1. Dedicated Lab. 2. Internet 3. Printer 4. Staff 5. Testing Area |
| Facilities (Equipment not available for the research project in the host university/institution) |
| 1. Sensors 2. Microcontrollers 3. Cameras 4. Microphone 5. Black Box Case 6. Other Hardware 7. Powerful Computers which can run high computational tasks   . |

**VIII. RISK MANAGEMENT STRATEGY**

In this Section (maximum one page), describe the Risk Management Strategy that will be employed by the proposed project.

First, consider the potential risks that could imperil the progress towards commercialization, and describe the strategy and process that will be used to minimize and address these risks.

Second, describe the strategy that will be used to identify, mitigate and address those unexpected risks that emerge during the project lifetime.

In both contexts, discuss how the Principal Investigator will work together with the industry/sectoral partners to implement the strategy.

One of the possible risk associated with this system is that as this is an electronic system so a minor mistake can cause whole system to be damaged. So in order to reduce this risks strong precautionary measures would be taken and safety principles would be strictly followed while working in lab.

**IX. LIST OF REFERENCES**

Proposals should follow accepted academic practice in citing references throughout the proposal. References should numbered sequentially, and listed separately as a required attachment to the proposal. References should be reported in a standard form, and include:  the names of all authors; the article and journal title; book title; volume and page numbers; and year of publication. If available, a Digital Object Identifier (DOI) may be provided.

# References

|  |  |
| --- | --- |
| [1] | Pakistan Bureau of Statistics, "Pakistan Bureau of Statistics," 2018. [Online]. Available: http://www.pbs.gov.pk/sites/default/files//tables/Traffic%20Accidents%20%28YEARLY%29.pdf. [Accessed 24 12 2019]. |
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| [9] | A. A. Miao Chong, "Traffic accident analysis using machine learning paradigms," *Informatica,* p. 9, 2015. |
| [10] | K. B. L. Jun Zhang, "Mobile Edge Intelligence and Computing for the Internet of Vehicles," *arxiv,* p. 18, 2019. |
| [11] | S. Gayathri Elumalai, "Vision Based Intelligent Traffic Analysis System for Accident Detection and Reporting System," *International Journal of Engineering Development and Research ,* p. 5, 2005. |
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| [15] | UNDP Pakistan, "UNDP Pakistan," [Online]. Available: https://www.pk.undp.org/content/pakistan/en/home/sustainable-development-goals/goal-3-good-health-and-well-being.html. [Accessed 24 12 2019]. |
| [16] | UNDP in Pakistan, "UNDP in Pakistan," [Online]. Available: https://www.pk.undp.org/content/pakistan/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html. [Accessed 24 12 2019]. |

1. **PROPOSED PROJECT BUDGET**

Complete the Budget Table provided below. Additional rows may be added in each category as required. TTSF funding should not go to sectoral/industry partners. TTSF guidelines require co-financing (in-kind or cash) by sectoral/industry partners. Please refer to Budget Guidelines available on HEC Website for details of each budget head.

* In addition to the institution submitting the proposal, any universities that will have subawards must complete a Budget Table for costs anticipated at the subaward university.
* For Personnel Costs, identify the total annual costs for each individual to be charged to the proposed TTSF Grant, and in the narrative indicated below show the months charged for each individual.
* For Faculty members, identify the faculty member by name
* “Other Personnel” may include technicians, IT specialists, etc. Identify the role of each “Other Personnel” listed.
* For Major Equipment, identify the proposed equipment and the anticipated cost. Provide details in the narrative indicated below
* Provide a broad description of the supplies that will be purchased
* For Travel, provide details of anticipated travel in the narrative indicated below
* For each Subaward, complete a separate Institutional Budget Table and include in this Section of the Proposal
* For Other Costs, describe in some detail any other costs in the Budget narrative indicated below. This may include costs associated with filing patents, producing licensing agreements, legal advice, and marketing to potential investors.
* Overhead rates should reflect the official rate for the higher education institution as indicated in the Budget narrative.
* Overhead should be included for the Project costs at each institution. For example, Overhead can be included on subaward1. However, the line for Overhead on the Budget Table prepared by the submitting institution should only include the amounts incurred by the submitting institution.

In addition to the Budget Table, this Section can include a narrative (maximum two pages) that provides further details on the proposed budget. Each institution submitting a budget for a subaward may include a (maximum 2 pages) budget narrative.

# Estimated budget for the proposed research period

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Description** | **% of time devoted to project** | **year 1** | **year 2** | **year 3** | **Amount**  **(in million Rs.)** |
| 1. **Salaries and Honorarium** | | | | | |
| **PI:** (Either on BPS or TTS)  One month initial basic pay of scale per year on following rates:  Assistant Professor: Rs=40155/-  Associate Professor: Rs=46705/-  Professor: Rs=51885/- |  | 0.040M | 0.040M | 0.040M | 0.12M |
| **Co-PI:** (Either on BPS or TTS)  One month initial basic pay of scale once in entire project life on following rates:  Assistant Professor: Rs=40155/-  Associate Professor: Rs=46705/-  Professor: Rs=51885/- |  | 0.040M | 0.040M | 0.040M | 0.12M |
| **Studentships @** |  |  |  |  |  |
| Rs=25000/- per month for Ph.D. |  |  |  |  |  |
| Rs=20000/- per month for M.S./M.Phil. |  | 0.24M | 0.24M | 0.24M | 0.72M |
| Lab Assistant |  | 0.24M | 0.24M | 0.24M | 0.72M |
| Automobile Industry Expert |  | 0.24M | 0.24M | 0.24M | 0.72M |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Subtotal: |  | 0.8M | 0.8M | 0.8M | 2.4M |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 1. **Permanent Equipment** (Please attach invoice/quotation and expected delivery date for items costing Rs. 0.1 million or above) | | | | | |
| Name | Quantity | Year 1 | Year 2 | Year 3 | Total |
| Grove - Alcohol Sensor | 3 | 12,000 |  |  | 12,000 |
| URM37 V5.0 Ultrasonic Sensor | 3 | 15,000 |  |  | 15,000 |
| AMS5812-0300-A Pressure Sensor | 3 | 13,500 |  |  | 13,500 |
| Analog LPG Gas Sensor (MQ6) | 3 | 9000 |  |  | 9000 |
| OBD 2 Reader | 2 | 21,000 |  |  | 21000 |
| Go Direct® Force and Acceleration Sensor | 2 | 46,000 |  |  | 46000 |
| Light Sensor | 8 | 16,000 |  |  | 16000 |
| Break Sensor | 3 | 13,500 |  |  | 13500 |
| Reed Switch (Seat Belt) Sensor | 4 | 20,000 |  |  | 20,000 |
| GPS | 4 | 14,000 |  |  | 14,000 |
| Cloud Storage/Computation | 1 | 60,000 | 60,000 | 60,000 | 0.18M |
| Raspberry pi 4 b+ basic kit \* 2 | 4 | 60,000 |  |  | 60,000 |
| Black Box Case | 1 | 90,000 |  |  | 90,000 |
| Intel Neural Compute Stick 2 | 2 | 60,000 |  |  | 60,000 |
| Night Vision compatible Camera\*2 | 4 | 48,000 |  |  | 48,000 |
| STS21 High Accuracy Temperature Sensor | 3 | 12,000 |  |  | 12000 |
| Flame Sensor | 2 | 3000 |  |  | 3000 |
| Robotic Car kit | 1 | 3000 |  |  | 3000 |
| SSD Drive (1 TB) | 3 | 81,000 |  |  | 81,000 |
| GSM Module | 3 | 9000 |  |  | 9000 |
| Kinect 2 Sensor | 2 | 40,000 |  |  | 40,000 |
| Rode NT-USB USB Microphone | 2 | 50,000 |  |  | 50,000 |
| Node MCU \* 5 | 10 | 15,000 |  |  | 15,000 |
| Chairs | 8 |  |  |  |  |
| Tables | 2 |  |  |  |  |
| PC i7 | 1 |  |  |  |  |
| Soldering Kits | 3 | 12,000 | 5000 | 5000 | 22,000 |
| Digital Multimeter | 3 | 13,500 |  |  | 13,500 |
| Jumper wires, leds , resistors,capacitors |  | 10,000 | 10,000 | 10,000 | 30,000 |
| Subtotal: |  | 0.746 M | 75,000 | 75,000 | 0.89M |
|  |  |  |  |  |  |
| 1. **Expendable Supplies**(It is mandatory to give year wise quantity and cost with full justification) | | | | | |
| Paper |  | 5000 | 5000 | 5000 | 15000 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Subtotal: |  | 0.005M | 0.005M | 0.005M | 0.015M |
|  |  |  |  |  |  |
| 1. **Local Travel** (Purpose of local travel, with justification and detailed calculations of each visit/ tentative schedule of visits for each year on a separate sheet) | | | | | |
| Local Travel  (Maximum 0.2 million per year or as per actual) |  | 0.2M | 0.2M | 0.2M | 0.6M |
| Local Automobile Industry |  | 0.05M | 0.05M | 0.05M | 0.15M |
| Conferences |  | 0.1M | 0.1M | 0.1M | 0.3M |
|  |  |  |  |  |  |
| Subtotal: |  | 0.35M | 0.35M | 0.35M | 1.05M |
|  |  |  |  |  |  |
| 1. **Others (**Literature, documentation, information, online literature search, contingencies, postage, etc.) | | | | | |
| Journal publication fee / Online material (Max Rs=50,000/- or as per actual) |  | Rs.45,000 |  |  | Rs.45000 |
| Stationary/Contingency  (Max Rs=10,000/year or as per actual) |  | Rs.10,000 | Rs.10,000 | Rs.10,000 | Rs.30,000 |
| Documentation |  | Rs.20,000 | Rs.20,000 | Rs.20,000 | Rs.60,000 |
|  |  |  |  |  |  |
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|  |  |  |  |  |  |
| Subtotal: |  | 0.075M | 0.03M | 0.03M | 0.135M |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 1. **Miscellaneous** | | | | | |
| Audit / Accountant Fee (Max. Rs 10,000) |  | Rs.10,000 | Rs.10,000 | Rs.10,000 | Rs.30,000 |
|  |  |  |  |  |  |
| Quality Testing Fee |  | Rs.10,000 | Rs.10,000 | Rs.10,000 | Rs.30,000 |
|  |  |  |  |  |  |
| Subtotal: |  | 0.02M | 0.02M | 0.02M | 0.08M |
| **Subtotal (D + E + F):** |  | 0.445M | 0.4M | 0.4M | 1.265M |
|  |  |  |  |  |  |
| 1. **Indirect cost** (University overheads) | | | | | |
| 15% of total direct cost to meet office support and utilities etc. of ORIC (If ORIC office is fully functional).  OR |  |  |  |  | 0.84M |
| 02% of total direct cost to meet research office support and utilities, etc. (if ORIC is not established). |  |  |  |  |  |
| Subtotal: |  |  |  |  | 0.84M |
| **Grand Total (A + B + C + D + E + F+ G):** |  |  |  |  | 5.41M |

# **XI. REQUIRED ATTACHMENTS**

1. Letter of Support (maximum two pages) from the University Vice-Chancellor. The letter should: confirm the institutional commitment to the proposed project
2. Letters of Commitment (maximum two pages each)
   * From industry/sectoral collaborators (maximum 3 letters).
   * The letters should describe the how the collaborator will contribute to the proposed project goals. The letter must also describe how, and at what level, the collaborator will finance their participation in the proposed TTSF project. Industry co-financing must equal at least 50% of the funding requested from HEC for the academic portion of the collaboration. Greater amounts of industry co-financing are encouraged.
3. Affidavit for time commitment and honorarium of PI and Co-PIs by the respective Head of the (University (VC/ Rector) and the collaborating Institutions/ organizations).
4. Appointment letter from the PI & Co-PIs to confirm their affiliation with Universities and collaborating Institutions.
5. Last pay slip of PI and Co-PIs for finalizing the personnel cost in Budget.
6. Ethical Certificate duly signed by Ethical Research Committee of Institute
7. Declaration Certificate duly signed and stamp by PI of research proposal, Director ORIC and Head of Institute
8. Signed and dated Curriculum Vitae of the following individuals:
   * Principal Investigator
   * The lead collaborator from the primary industry/sectoral partner
   * Up to three additional collaborators who will contribute to the proposed Project.
   * The CVs should be of a standard form (maximum two pages) and include the following information:
     + Full Name
     + Position/Title
     + Institution
     + Professional Training/Education
     + Chronological List of Positions
     + List of up to five publications related to the proposed project, in standard citation format
     + List of up to five activities related to the proposed project. These activities may include: technology transfer activities; patents; current or previous grants; teaching; collaborations; leading workshops/conferences; community outreach or engagement; consulting; etc.

**XII. Declaration Certificate**

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| --- | --- |
| It is hereby certified that:   1. PI is a full time regular faculty member of HEI or if is hired on contract, same is not less than project life/duration. 2. The university will spare the faculty members from any teaching or administrative responsibilities against their time committed on the proposed project. 3. Equipment(s) demanded for the proposed project is / are not available in the University / Institute. 4. No portion of the proposed project has been submitted and /or funded by HEC or any other funding agency. 5. The proposed project is genuinely novel and that there is no plagiarized material including self-plagiarism. 6. PI has never been blacklisted by HEC. 7. PI is not executing any other project of HEC which is delayed. 8. Decision of HEC will be considered final and will not be challenged in a court of law. 9. The University/DAI will provide complete support and facilitation to the PI and his project team for the establishment & operation of the proposed project, if approved by HEC and funds awarded to the University/ DAI. Accordingly, the University/ DAI will provide necessary facilities for smooth execution of the project including land, building, space, laboratories, machinery, equipment, transport, amenities like utilities and other services. 10. The University/DAI will get clearance from HEC (Project Completion Certificate /Project Clearance Certificate (PCC)) in order to relieve the PI, for any reason e.g. for postdoc leave/EOL/study leave/ termination of job etc. if the proposed project is awarded by HEC. 11. The University/DAI will not replace the PI of the proposed project without getting prior permission from HEC in writing. | |
| **Signature of Principal Investigator**  Name:  Designation:  Department:  University/ DAI Name | **Signature with Stamp of Director (ORIC/Research Office)**  Name:  Designation:  University/DAI Name |
|  |  |
| **Signature with Stamp of the Head of University/ DAI**  (Vice-chancellor/Rector)  Name:  University/ DAI Name: | |

1. Sectoral stakeholders should primarily focus on private enterprise (including, but not limited to, large multinationals and regional or local SMEs). [↑](#footnote-ref-1)
2. Sectoral stakeholders should primarily focus on private enterprise (including, but not limited to, large multinationals and regional or local SMEs). [↑](#footnote-ref-2)