Proposal for Research Fellowship on Underwater Domain Awareness (UDA)

Background

The concept of Underwater Domain Awareness (UDA) being progressed by the Maritime Research Centre (MRC) is extremely relevant to the India of 21st century in many ways:

(a)   The massive maritime infrastructure build-up in the country is a very encouraging development for economic growth. However, the lack of awareness among the stakeholders about the massive acoustic habitat degradation and also the threats to such huge investments as a result of such big projects is a cause of concern. The safe, secure and sustainable growth model for any progressive nation in the maritime sector will come from an effective UDA framework.

(b)   India with over 7,500 km of coastline and innumerable freshwater systems in the hinterland has a huge responsibility to manage the water bodies for ensuring progress in the real sense. Aspects of underwater domain need far higher awareness and study to make them contribute substantially to the overall growth of the country. There is no institute in the country that comprehensively addresses the issue of acoustic capacity building. Our track record in terms of water resource management as a nation has not been encouraging so far.

(c)   Inter-disciplinary and multi-activity interaction is a very critical ingredient for any big capacity and capability building initiative. Focused application oriented academic and research initiative for real world problem solving backed by field experimental approach is the only way forward.

(d)   The so called demographic dividend that we talk about need to be channelized to contribute to new areas of nation building initiatives. The young India has to be skilled appropriately (make them employable) to engage in constructive and high technology and research based areas. The higher end activities will also generate much bigger volumes of brown collared opportunities that will engage communities in the maritime domain to remain engaged with their traditional skills.

(e)   The UDA in the Indian Ocean Region (IOR) has its own challenges and given the dispensation of geo-politics in the region, India has to play a leadership role to ensure safe, secure and sustainable growth in the IOR. The strategic relevance of IOR in the 21st century demands that we develop technological superiority and human resource on such unique areas and leverage that on the diplomatic front.

(f)   One institute that addresses the concerns of policy/strategy, technology and innovation and large scale skilled human resource is in order. Cross pollination of multiple stakeholders and across disciplines is a time tested way forward to address complex issues particularly in a big nation like ours. We need to invest substantially in human resource. It is time we recognize that India is a Maritime Nation and in the 21st century we focus on the critical resource of water.

Broad Objectives

The proposed programme will attempt to build human resource at all levels that can engage in field experiments and massive R&D initiative to generate UDA in the IOR. MRC will collaborate with all stakeholders to synergize and augment the academic and research programme. The existing infrastructure at MRC will be complemented with specific UDA requirements to build an effective programme. This will focus on the following:

(a)   Generate ground data to plan socio-economic activities more effectively and ensure efficient utilization of resources.

(b)   Generate multi-disciplinary and highly skilled human resource to manage the massive water resource challenge that we face as a nation.

(c)   Bring together academic and R&D capabilities in various disciplines to contribute towards real world problem solving with field data collection.

(d)   Plan and implement complex projects to trigger a chain reaction, nationwide to address multiple issue of UDA in the IOR.

(e)   HR development initiative for effective water resource management to ensure safe, secure and sustainable growth for India in the 21st century.

Eligibility

The prospective candidate should have a credible academic track record. Post Graduate (PG) candidates can work on this fellowship to advance their research profile. Even professionals can also join this domain for enhanced professional growth. PhD aspirants may also join this program to identify research problem in this unique domain. Post-Doctoral fellowship can also be pursued as part of this association.

It is a multi-disciplinary program and any discipline is welcome to join this UDA project fellowship program. Appropriate project ideas will be allocated based on the interest and core discipline of the candidate. Multi-disciplinary students like science & technology, political science, geopolitics & international relations, environmental sciences, logistics & port management and data science are relevant for this UDA project fellowship.

The candidate has to first join the six weeks MRC internship program for understanding the UDA framework and the possible project ideas. The candidate not only gets to appreciate the challenges and opportunities in the UDA framework, but will also be able to make an informed choice on the project deliverables and also on the future career prospects. The details on the MRC internship can be accessed from the following link:

Fellowship Proposal

The program will translate to a candidate being supported with a total funding support of Rs. 4,00,000/- and provided all academic and technical guidance to pursue the project formalized by him/her during the six weeks internship. The candidate will have to accomplish specific deliverable prior to the release of the stipend as listed below:

(a)	Research Note (Release of 5% Payment)	-	One month from start.
(b)	Flow Chart	-	Two months from start.
(c)	Paper for UDA Digest One short article must be Submitted to the UDA Digest every two months.	-	Three months from start.
(d)	Interim Presentation (Release of 10% Payment)	-	End of three months.
(e)	Journal Paper (Release of 10% Payment)	-	End of six months.
(f)	Detailed Structure of the Book (Release of 20% Payment)	-	End of the first year.
(g)	Second Journal Paper (Release of 10% Payment)	-	End of first year.
(h)	Third Journal Paper	-	End of fifteen months.
(i)	Draft of the Monograph (Release of 20% Payment)	-	End of eighteen months.

The candidate will be handed over 5% payment of the total amount at start of the fellowship and the remaining 20% on submission of the final copy of the book. The copy right of the book will remain with MRC. Founder & Director MRC will be the mentor and guide for the project and will closely associate with the progress of the work. The monthly internal review will be undertaken by Director MRC and the candidate will be reporting to him on a regular basis.

The candidate will have an internal evaluation every month and an external review at the end of three months and the final review at the end of the fellowship. The external review will not only evaluate the progress of the project but also the relevance of the work for the larger UDA framework. The external review will include certain domain experts as well as industry reps. Candidates desirous of opportunities in the industry may be able to connect with the appropriate stakeholders and make an impression. MRC will identify the appropriate industry and invite their reps for the review.

Project Ideas
The five project ideas pertain to real world problem solving with field data collection. These projects will be relevant to the stakeholders and will be undertaken in collaboration of the stakeholders. These include:

(a) **Sediment Classification for Effective Dredging Activities** The siltation is a very critical issue in the foreseeable future and the ports and other maritime infrastructure are heavily silted due to tropical condition in the Indian Ocean Region (IOR). De-siltation effort requires precise sediment classification to optimize water

resource management. Sediment classification in ports and other maritime infrastructure across the country is a major challenge and massive efforts are required to address the issue comprehensively at all levels from policy to technology and innovation for effective water resource management. Field experimental validation using acoustic survey as a key tool will be the corner stone of such research. Field data analysis will also provide scientific inputs for effective policy framework.

(b) **Environmental Impact Assessment (EIA) for the Maritime Infrastructure Building Projects** The Maritime Infrastructure Building projects are an ambitious project with significant socio-economic ramifications. However, the sustainable growth from the projects requires optimal EIA considering the Acoustic Habitat Degradation in a comprehensive manner. The marine mammals in these ecosystems are a very unique species that use acoustic vision to perceive the environment around them. Project Funding Agencies, do have budget allocation for EIA, however the acoustic habitat assessment is a critical area that has been ignored by the project management teams. The safe, secure, sustainable growth from such massive projects needs to address the EIA more holistically. Passive Acoustic Monitoring (PAM) of the animal in their habitat along with the detailed analysis of the possible noise sources will facilitate effective policy formulation and generation of scientific data for effective Environmental Impact Statement (EIS).

(c) **Special Ideas for Community Development and Effective Participation of the Local Communities in Big Projects** The mega projects and specifically maritime infrastructure projects have a very big scale and long terms horizon. However, at times these mega projects tend to alienate the local communities and fail to get their whole hearted involvement. Community involvement is a must to make such projects sustainable in every sense of the word. This requires deeper understanding of the local culture and socio-economic practices. It has to be a two way process – one where the project tries to adopt local knowledge of the ground realities and the second where the local community is involved in the project activities based on their traditional skills and cultural practices. The changing socio-economic and cultural dynamics need to be assessed to remain aligned to the aspirations of the next generation, rather than getting outdated.

(d) **Modelling & Simulation and Data Analytics** The nation today is going through a massive transformation. Mega projects are going to change the socio-economic and cultural framework of the society and the ecosystem to an extent that we will not be able to imagine. Deeper multi-disciplinary studies are required with scientific modelling and simulation tools and also data analytics tools to be able to assess the trends and formulate future models based on historical inputs. This could be a very fascinating research idea, but the time has come that we in India need to think beyond and act to be able to keep pace with the changing world order.

(e) **Futuristic Science & Technology** India to achieve $ 5 trillion economy target has to be ahead of the science and technology curve. The hardware and software infrastructure has to keep pace with the local site specific conditions and indigenous efforts with deeper understanding of the local ground realities is inescapable. We have been importing science and technology tools and measures with little effort on field experimental R&D initiatives. Stakeholder fragmentation has been a major cause of concern with no concept of pooling of resources and synergizing of efforts. Every

stakeholder has his own R&D program and many times they have been reinventing the wheel several times, over and over again. The UDA framework addresses many such issues for the maritime domain and there is a case to evolve policy, technology & innovation and human resource development projects to effectively realise the SAGAR vision.

Deliverables

Apart from the learning experience, the UDA project fellows will have the following take away:

(a)   Connect with the Industry for making well informed career choices. Direct interaction with the industry reps in the course of the fellowship may also open up opportunities.

(b)   Development of industry relevant skills to enhance the employability for the stakeholders for an effective future placement.

(c)   Candidates with entrepreneurial ambitions may also find appropriate ideas for their start-up ventures.

(d)   Candidates with ambitions for higher learning may improve their profile to enhance their chances of selection in reputed universities both within and abroad.

(e)   Enhanced project deliverables can directly impact their grades in the ongoing academic curriculum.

(f)   The candidates will be able to interact with other researchers and fellows at MRC and get a very broad perspective on the ongoing developments both within and abroad to be able to make better choices. There will be multiple lectures and interactions organized with experts and policy makers of very high stature.

Mentor and Coordinator

Dr(Cdr) Arnab Das, Founder & Director MRC will be the mentor of the programme. The entire fellowship will be coordinated by MRC, Pune and M/S NirDhwani Technology Pvt Ltd.