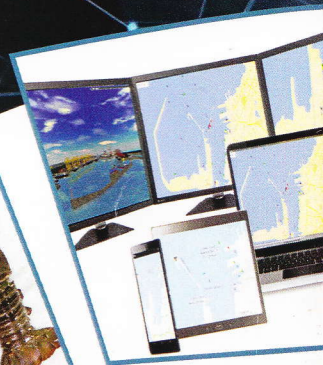# NSF AWARDS 2016

3-Dimensional (3D) View

NATIONAL SCIENCE FOUNDATION

NSF Awards 2016

NATIONAL
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National Science Foundation
31 January 2017

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- New bioactive secondary metabolites from selected endolichenic fungi occurring in two lichens, *Parmotrema* sp. and *Usnea* sp. collected from Hakgala Botanical Garden

- Investigation of genetic structure and habitat characteristics of commercially important lobster *Parnulirus homarus* in Southern coastal belt of Sri Lanka

- Fortification of selected food products with natural antioxidants by incorporating dehydrated fruits and vegetables

- Evaluation of alternative feed ingredients for preparation of low cost fish feed for sustainable ornamental aquaculture industry in Sri Lanka

- Legal ontology driven legal service process management

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- Improving the bioavailability of bioactive components for drug and cosmetic based applications

- High resolution climate change projection for Sri Lanka

- Synthesis of hydroxyapatite nanomaterials for their potential use in fabrication of bone-implants

- Investigation of background concentrations and behavior of trace metals in a selected soil association of dry zone of Sri Lanka

- Development of atomized spray pyrolysis for fabrication of thin films and development of dye-sensitized solid-state solar cells

- Isolation, identification and characterization of Microcystin degrading bacteria for water treatment solution

- Molecular identification of toxigenic cyanobacteria and effects of cyanotoxins on human renal cell lines

- Petrographical and geochemical characteristics of Sri Lankan marbles and carbonatites: implications for their genesis and economic potential

- Nanomaterials from impure marbles: synthesis, characterization and specific properties

INTRODUCTION

The NSF Awards Ceremony 2016 is organized to confer awards under the following schemes of the NSF:

- Support Scheme for Supervision of Research Degrees (SUSRED)
- NSF Technology Awards
- Third World Academy of Sciences (TWAS)/NSF Young Scientist Award

Support Scheme for Supervision of Research Degrees (SUSRED)

The awards for the Support Scheme for Supervision of Research Degrees (SUSRED) was implemented in 2011 to motivate, support and recognize scientists/engineers engaged in supervising postgraduate students conducting research in all areas of Science and Technology. This scheme will also encourage universities and research institutions to promote and facilitate postgraduate research training. Twenty four supervisory teams have been successful in securing awards for 2016 under this scheme.

NSF Technology Awards

The two technology grant schemes, "Support for Technology Development" and "Support for startup businesses based on new technologies" are implemented with a view to support innovators to develop, assimilate and use technologies for wealth creation. The grant schemes are targeted at bringing locally developed technologies for socio-economic development of the country. Another aim is to motivate grant recipients to conscientiously maintain high standards of partnerships with the public and private sectors. This awards scheme was implemented for the first time in 2014 for successful technology grant recipients. One Award and one Certificate of Commendation will be conferred at this year's ceremony.

Third World Academy of Sciences/ National Science Foundation (TWAS/ NSF) Young Scientist Award

The Third World Academy of Sciences (TWAS)/NSF Young Scientist award is another annual prize for talented young scientists who have attained a high level of excellence in their research work, in the fields of Biology, Chemistry, Mathematics and Physics. Awards are granted by the Third World Academy of Sciences (TWAS), Trieste, Italy. The prizes are intended to provide an incentive to talented young scientists to attain high levels of excellence in their research work and to reward such attainments. Two scientists in the fields of Biology and Chemistry will be awarded the TWAS/NSF Young Scientist Award 2016.

SUSRED Awards

Awards
for
Supervision of MPhil degrees

Thesis Title   :   **Fortification of selected food products with natural antioxidants by incorporating dehydrated fruits and vegetables**

Outcome/s of the research:

The research study revealed that the highest retention of antioxidants, β–Carotene, anthocyanin and total phenolics were in vacuum dried vegetables and the maximum retention of anthocyanin content was recorded in powdered *Thampala (Amaranthus caudatus)*. Higher concentrations of β–Carotene, total phenolics and maximum retention of antioxidant properties were recorded in vacuum dried samples of both beal and Palmyrah fruit powders. Retention of ascorbic acid was recorded in vacuum dried soursop powder. It was found that the high nutrient content, phenolic compounds, ascorbic acid content, total anthocyanin content and the antioxidant activity (DPPPH assay) of dehydrated fruits and vegetables depend on exposure time and processing conditions.

Principal Supervisor

Prof. N M G S B Navaratne is a Professor of Food Science and Technology, University of Sri Jayewardenepura. He is an eminent researcher with over 100 research articles in national and international journals including symposia. Further, he was able to secure 08 patent rights for innovations. He has also published 08 text books related to Food Science and Technology.

Co-Supervisor

Dr I Wickramasinghe is a Senior Lecturer attached to the Department of Food Science and Technology, University of Sri Jayewardenepura. She is an eminent researcher with over 50 peer reviewed journal publications. Further, she has been able to secure 02 patent rights for innovations.

Research Student   :   Ms R M N A Wijewardane

University   :   University of Sri Jayewardenepura

Thesis Title   :   **Legal ontology driven legal service process management**

Outcome/s of the research:

Judicial system is one of the most complex systems with wide-variety of actor participations together with paramount rules, regulations and traditions to be opted and to be complied in legal procedures. It was evident that manual operations of legislation service processes inherit serious productivity, efficiency as well as precision related deficiencies, besides unavoidable interoperability issues even among partial and scattered automation initiatives. One of the promising approaches that has been tried out in service process automation within and peripheral domains is development sound and complete domain specific ontology with an objective of rectifying afore mentioned issues and meeting inter-application/actor interoperability. In this research project, sound and complete Legal Service Process Ontology has been developed based on popular Dynamic Essential Modelling of Organization (DEMO) and its applicability has also been proved against local destruct courts systems, with a special focus to a case study on Eastern Province.

Supervisor

Dr P M Jayaweera, Commonwealth Academic Fellow, received his BSc Honours degree in Computer Science from the University of Colombo in 1995. He was awarded PhL (Licentiate of Philosophy) and PhD degrees in Computer & Systems Sciences from Stockholm University in 2002 and 2004, respectively. Presently, he is a Senior Lecturer at the University of Sri Jayewardenepura and has published his research findings in several national and international journals.

Research Student   :   Mr R K A R Kariapper

University   :   University of Sri Jayewardenepura

Thesis Title : **Single chip wireless sensor node for *in-situ* measurement of selected water quality parameters**

Outcome/s of the research:

This research was aimed at designing a low cost, real-time wireless sensor network to measure water quality parameters in real time. The designed single chip solution to interface transducers to sensor networks using Field Programmable Gate Arrays (FPGAs) easily replaces wired or wireless methods by using a wireless module having a UART interface. Any sensor having a 1-wire protocol can easily be connected without using an extra chip, through the 1-wire bus interface in the sensor node. As such, it is possible to implement standard or customer specific digital protocols in the FPGA to interface transducers to sensor networks. The designed sensor node with a single chip concept saves power, reduces the physical size of the node, equipment cost and also speeds-up the processing tasks.

Principal Supervisor

Prof. R G N Meegama obtained BSc in Computer Science with First Class Honours from University of Colombo, MSc from Asian Institute of Technology, Thailand and PhD from NTU, Singapore. Presently, he is a Professor of Computer Science at the Department of Computer Science, University of Sri Jayewardenepura. He has published many research articles based on image processing, computer graphics, mobile computing and wireless sensor networks.

Co-Supervisor

Prof. M M Pathmalal obtained MPhil degree in Environmental Microbial Ecology in 1998, and PhD in Microbial Ecology and Ecotoxicology in 2001 from Ehime University, Japan. His research interest is in cyanotoxin and their bioremediation approach as green solution for water treatment facility. He has published more than 60 index journal papers, over 25 peer reviewed papers more than 150 international and national conference proceedings and 03 books.

Awards
for
Supervision of PhD degrees

| Thesis Title | : | **Isolation, identification and characterization of Microcystin degrading bacteria for water treatment solution** |

Outcome/s of the research:

Three bacterial strains, namely, *Bacillus cereus, Stenotrophomonas maltophilia* and *Rahnella aquatilis* were isolated as efficient degraders of Microcystins. Their degradation abilities have been optimised based on temperature and nutrient (nitrate and phosphate) levels. Furthermore, a laboratory scale sand filter was established by developing a new polymer substance to attach Microcystin degrading bacteria in order to build a biofilm. The sand filter has shown 90% removal of Microcystins within four days. The study has also confirmed the use of enzyme extracts of these bacteria in the removal of Microcystins from water. Use of enzyme in sand filters will minimize the difficulties caused during backwash of sand filter. Thus, findings of this study could be used by the authorities such as National Water Supply and Drainage Board (NWSDB) to develop an efficient technology in the removal of Microcystins from drinking water.

Principal Supervisor

Prof. M M Pathmalal obtained MPhil degree in Environmental Microbial Ecology in 1998, and PhD in Microbial Ecology and Ecotoxicology in 2001 from Ehime University, Japan. His research interest is in cyanotoxin and their bioremediation approach as green solution for water treatment facility. He has published more than 60 index journal papers, over 25 peer reviewed papers more than 150 international and national conference proceedings and 03 books.

Co-Supervisor

Prof. B G D N K de Silva is attached to the Department of Zoology, University of Sri Jayewardenepura. He obtained his PhD in Molecular Entomology in 1995. His long research carrier includes development of molecular assays for the identification of malaria vectors and sand flies, population genetic structure analysis of malaria vectors, dengue vectors, and sand flies. He has more than 75 research papers and communications published in peer reviewed local and international journals.

Co-Supervisor

Dr S D M Chinthaka obtained BSc (Chemistry) with First Class Honours from University of Sri Jayewardenepura and PhD from Wayne State University, USA. Currently, he is working as Senior Lecturer in the Department of Chemistry, University of Sri Jayewardenepura. His research interests are environmental analytical chemistry and computational chemistry. He has published more than 10 research articles in both international and local journals and 40 communications.

Research Student   :   Dr F S Idroos

University   :   University of Sri Jayewardenepura

Thesis Title : **Molecular identification of toxigenic cyanobacteria and effects of cyanotoxins on human renal cell lines**

Outcome/s of the research:

The results of this study suggest that Microcystin-LR is more cytotoxic to normal embryonic kidney cells than to kidney adenocarcinoma cells. The study has optimised a PCR method for detection of cyanobacterial genes responsible for Microcystin degradation. It has also been able to confirm the ability of Microcystin to cause kidney failure and this finding will be an eye-opener for the general public as well as the authorities who are engaged in provision of safe drinking water. Discussions were held with National Water Supply and Drainage Board (NWSDB) of Sri Lanka to convince the importance of providing Microcystin free water to the users.

Principal Supervisor

Prof. M M Pathmalal obtained MPhil degree in Environmental Microbial Ecology in 1998, and PhD in Microbial Ecology and Ecotoxicology in 2001 from Ehime University, Japan. His research interest is in cyanotoxin and their bioremediation approach as green solution for water treatment facility. He has published more than 60 index journal papers, over 25 peer reviewed papers more than 150 international and national conference proceedings and 03 books.

Co-Supervisor

Prof. Kamani Tennekoon is a Senior Professor of Molecular Life Sciences at the Institute of Biochemistry, Molecular Biology and Biotechnology, University of Colombo. Her current research includes molecular genetics of cancer, reproductive and developmental biology, DNA variation, medicinal plants with anti-cancer and anti-filarial activities, *in-vitro* toxicity testing of natural compounds etc.

Co-Supervisor

Prof. B G D N K de Silva is attached to the Department of Zoology, University of Sri Jayewardenepura. He obtained his PhD in Molecular Entomology in 1995. His long research carrier includes development of molecular assays for the identification of malaria vectors and sand flies, population genetic structure analysis of malaria vectors, dengue vectors, and sand flies. He has more than 75 research papers and communications published in peer reviewed local and international journals.

Research Student   :   Dr M A P C Piyathilaka

University   :   University of Sri Jayewardenepura

Thesis Title : **Active contour based medical image segmentation**

Outcome/s of the research:

The research project introduced a novel active contour model to accurately capture discontinuous boundaries present in X-ray medical images by incorporating prior knowledge of discontinuous regions into the segmentation process. The model is applied on medical images derived from X-rays of various anatomical structures, particularly, bone and dental X-ray images which exhibit sharp discontinuous regions. The prior knowledge of the significant corner regions were extracted by a corner detection operator, which is capable of ignoring all the false feature points that exist outside of the targeted object. The results obtained after applying the technique on several synthetic and X-ray medical images show the performance of the proposed model, even with complex discontinuities, accurately extracting object boundaries.

Principal Supervisor

Prof. R G N Meegama obtained BSc in Computer Science with First Class Honours from University of Colombo, MSc from Asian Institute of Technology, Thailand and PhD from NTU, Singapore. Presently, he is a Professor of Computer Science at the Department of Computer Science, University of Sri Jayewardenepura. He has published many research articles based on image processing, computer graphics, mobile computing and wireless sensor networks.

Co-Supervisor

Prof. M Kapurubandara is the Dean International and Professor, Faculty of Computing, SLIIT. She earned her PhD at Western Sydney University (WSU), Australia. She had served as a visiting Professor at University of Uppsala, Sweden, and Lecturer at WSU, Australia. Her research interests are ICT for SMEs, women entrepreneurship and business process management (BPM).

Research Student : Dr U A A Niroshika

University : University of Sri Jayewardenepura