

# NSF Awards 2021



NATIONAL  
SCIENCE  
FOUNDATION

16 November 2021

BMICH

Maitland Place, Colombo 07

ජාතික විද්‍යා මූලධර්ම  
පර්යේෂණ මධ්‍යස්ථානය

National Science Foundation  
No. 47/5, Maitland Place  
Colombo 07  
Sri Lanka

Phone : + 94 11 2696771  
Fax : + 94 11 2694754  
Email : [info@nsf.gov.lk](mailto:info@nsf.gov.lk)  
Website: [www.nsf.gov.lk](http://www.nsf.gov.lk)

### Copyright

© National Science Foundation of Sri Lanka

### Disclaimer

The material in this publication has been supplied by the authors. The views expressed remain the responsibility of the named authors and do not necessarily reflect those of the NSF.

### Compiled by:

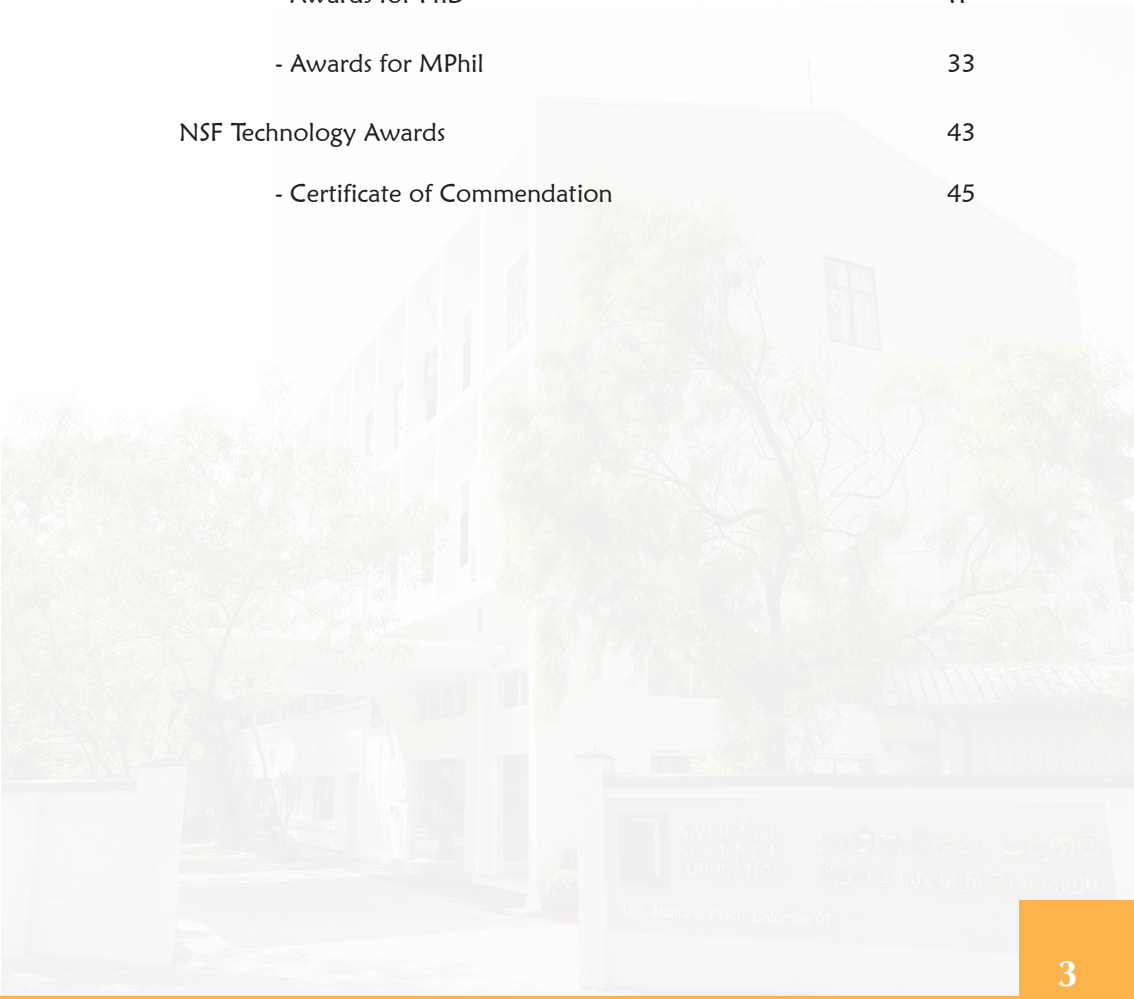
Dr Inoka Sandanayake  
Scientific Officer  
Research Division

### Graphic work & typesetting

Mrs Chani Maheshika Silva  
Management Assistant

**CONTENTS**

Message from the Chairman	04
Message from the Director General	05
Introduction	06
SUSRED Awards	09
- Awards for PhD	11
- Awards for MPhil	33
NSF Technology Awards	43
- Certificate of Commendation	45



## MESSAGE FROM THE CHAIRMAN



It affords me great pleasure to send this message for the souvenir issued to mark the “NSF Awards Ceremony 2021” held in conjunction with the National Science Week. This award ceremony is an annual event of the NSF conducted to recognize and celebrate the outstanding achievements and contributions by scientists to research, development and innovation in Sri Lanka. Here, awards are given under two categories, namely Support Scheme for Supervision of Research Degrees (SUSRED) Awards

and NSF Technology Awards.

According to the World Bank, the number of R&D personnel (fulltime equivalent) is only 106 per million of the population in Sri Lanka which is considerably lower than that even in many countries in Asia, i.e. India (253), Pakistan (336), Malaysia (2,185) and Korea (7,980). As per the Global Innovation Index figures released by WIPO in 2021, Sri Lanka is in the 95<sup>th</sup> position out of 132 countries while India (46<sup>th</sup>), Vietnam (44<sup>th</sup>) and Malaysia (36<sup>th</sup>) are well above us. These are reflected in high-tech exports which amount to only about 1% in Sri Lanka as against about 7% in India, 25% in Thailand, 42% in Vietnam and 51% in Malaysia.

Under these circumstances, the NSF in keeping with its mandate has embarked upon several novel and innovative programmes and activities under the new normal with a view to promoting and enhancing research, leading to inventions and innovations. Establishment of a digital platform to harness hitherto almost untapped, high-profile, non-resident Sri Lankan scientists, technologists and entrepreneurs across the globe and forging strategic and robust public-private partnerships so as to enhance R&D constitute two key interventions in this regard.

While reiterating our firm resolve and commitment to advancing R&D to make Sri Lanka a developed nation by 2035, I take this opportunity to congratulate all the winners most heartily and hope that your academic dynamism and intellectual vibrancy will become contagious so that more staff will acquire and internalize your qualities and attributes to attain excellence.

**Emeritus Professor Ranjith Senaratne**

Chairman

National Science Foundation

Colombo 07

November 2021



## MESSAGE FROM THE DIRECTOR GENERAL



I am pleased to send this message for the NSF Awards Ceremony. The NSF Awards Ceremony 2021 is organized to confer awards under two schemes of the NSF: Support Scheme for Supervision of Research Degrees (SUSRED) Awards and NSF Technology Awards.

With our vision to be the nation's premier driving force in promoting Science, Technology and Innovation for economic and social prosperity of Sri Lanka, the NSF has been in the forefront in assisting the scientific community in many ways towards realizing this vision. As a key focus, we strive to create a conducive research culture in the country while maintaining high standards through a variety of programmes and activities as a premier funding organization for science, technology and innovation research in Sri Lanka.

I congratulate all the winners for their efforts in conducting research of high standards and for supervising young researchers. These efforts contribute not only to a healthy research ecosystem of the country, but also to the national economy with advancement of science in various interdisciplinary areas for research.

**Ravindra Pathmapriya**  
Director General (Acting)  
National Science Foundation  
Colombo 07

November 2021

## INTRODUCTION

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

- Support Scheme for Supervision of Research Degrees (SUSRED)
- NSF Technology Awards

### Support Scheme for Supervision of Research Degrees (SUSRED)

The National Science Foundation (NSF) implemented the Support Scheme for Supervision of Research Degrees (SUSRED) in 2011 with the expectation of strengthening the National Research System with an increased number of trained/ qualified research personnel within a vibrant and dynamic research culture. This will be achieved by motivating, supporting and recognizing scientists/engineers engaged in supervising students conducting research in all areas of Science and Technology leading to postgraduate degrees (MPhils and PhDs).

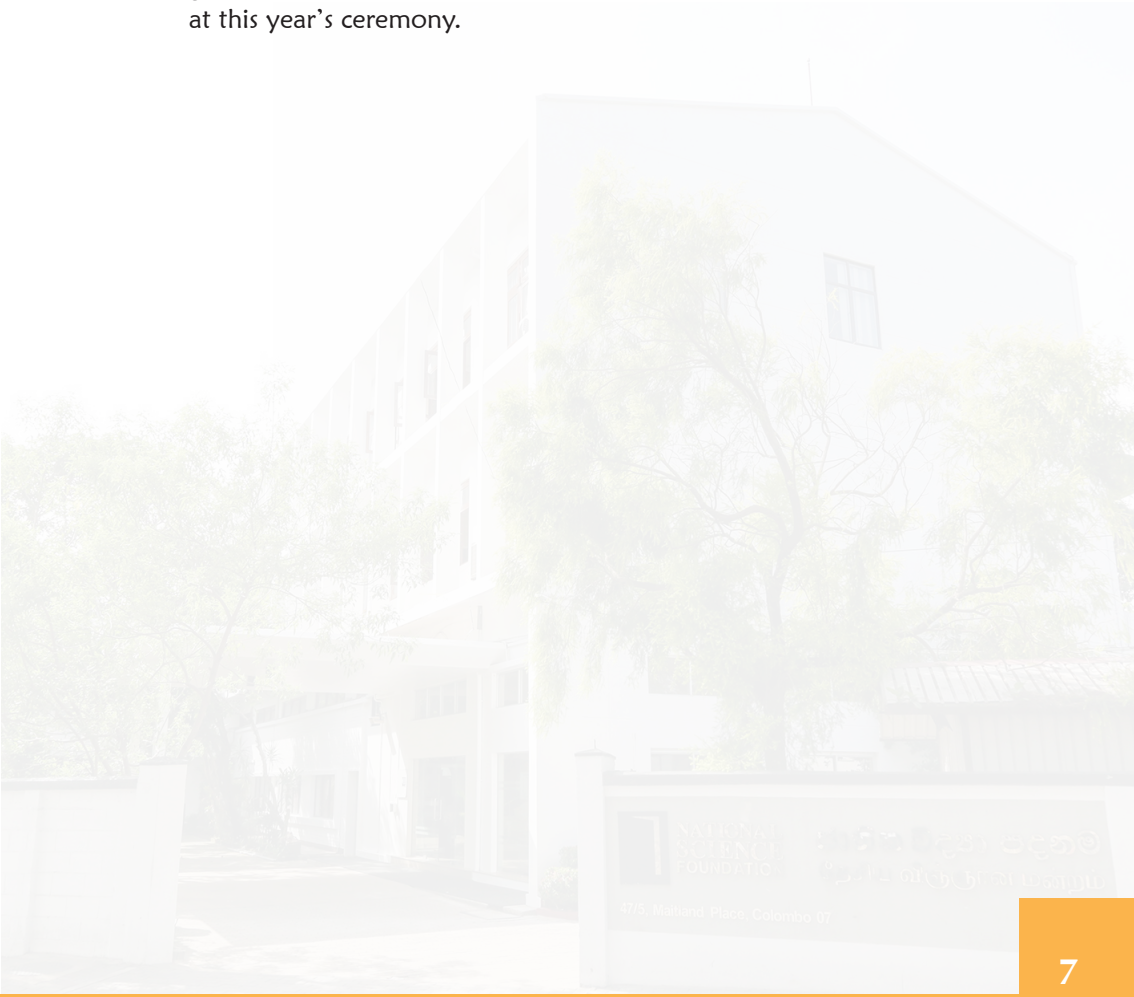
#### Objectives of the scheme are:

- Motivation of senior researchers to supervise postgraduate research degrees.
- Encourage universities and research institutions to promote and facilitate postgraduate research training.
- Encourage supervisors to complete the postgraduate research degrees within the stipulated time period without compromising quality.

Every year the NSF calls for applications through an open advertisement and the supervisors of postgraduate degrees, MPhils & PhDs, can apply. Nineteen supervisory teams (14 PhDs and 05 MPhils) have been successful in securing awards in 2019 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 promoting 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 Certificate of Commendation will be conferred at this year’s ceremony.







# SUSRED Awards 2019

---





# Awards for Supervision of PhD degrees

---







**Thesis Title :** Study on effect of quality of water in *Anopheles* mosquito breeding habitats and control of *Anopheles* mosquitoes using larvivorous fish and carnivorous copepods

### Outcome/s of the project:

Sri Lanka has eliminated malaria but number of imported malaria cases were reported after elimination of malaria. These imported cases can transmit the disease locally. This study was carried out during malaria pre-elimination period, a vital phase in terms of malaria elimination in Sri Lanka. Prevalence of major and secondary/potential malaria vectors in eight possible malaria sensitive areas/sentinel sites in the Districts of Mannar and Trincomelee were identified. Ecological and biological factors affecting immature stages of malaria vectors in these eight sentinel sites were also identified. Further, biological control agents (larvivorous fish and carnivorous copepods) for controlling malaria vectors were identified. These results would facilitate for future malaria control programme of Sri Lanka to maintain the malaria-free status.

### Project Team



#### Principal Supervisor

**Prof. Menaka Hapugoda**, Professor in Molecular Medicine, Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya



#### Co - Supervisor

**Prof. W Abeyewickreme**, Professor in Parasitology, Department of Para-Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University



#### Research Student

**Dr R M T B Ranathunge**, Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya

**Thesis Title :** Factors associated with herniation of the lumbar intervertebral discs in patients undergoing lumbar discectomy in a selected Neurosurgical Unit in Sri Lanka.

**Outcome/s of the project:**

Lumbar disc herniation (LDH) and associated back pain is one of the common reasons for sick leave among employees worldwide. Though conventional risk factors have been identified as vital causes for LDH, it was evident that sedentary life-styles, increased body mass index, lack of physical exercise and smoking as major contributory factors for LDH. Major findings of the study include;

- Low serum 25-hydroxy vitamin D level is significantly associated with LDH.
- Isolation of microorganisms in herniated lumbar discs and elevated serum inflammatory markers provide further evidence for the possible association of microorganisms in LDH.
- VDR gene polymorphism Fok I was not associated with LDH.
- Degenerative changes in histological investigation were more prominent when compared to detectable degenerative changes in MRI image.

Hence, non-surgical interventions such as treating with antibiotic and anti-inflammatory drugs could be a better option to use in the early stages, if proven via clinical trials.

**Project Team**



**Principal Supervisor**

**Prof. Lohini Athiththan**, Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura

**Co - Supervisor**

**Dr Sunil Perera**, The Asiri Central Hospital, Colombo

**Co - Supervisor**

**Prof. Hemantha Peiris**, Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura

**Research Student**

**Dr Niroshima Dedunu Withanage**, Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, University of Sri Jayewardenepura

**Thesis Title : The effectiveness of alternative stabilizer for Mud Concrete Technology****Outcome/s of the project:**

This study was conducted to find an alternative stabilizer for mud concrete to replace cement. The study identified the possible stabilizer for earth-based construction, and compared the structural strength of different stabilizers for soil, such as kiln ash, bottom ash and fly ash. It further identified the sustainability index of new load bearing wall made of discovered mixture and investigated life-cycle cost and carbon footprint of mud concrete block. Two patents have been awarded for this work:

- Rubber stabilized earth block for load bearing walls; Patent no – 19379
- Fly Ash stabilized self-compacting earth blocks for load bearing walls; Patent no –19495

**Project Team****Principal Supervisor**

**Prof. Rangika Umesh Halwatura**, Department of Civil Engineering, Faculty of Engineering, University of Moratuwa

**Research Student**

**Dr Chameera Udawattha**, Department of Civil Engineering, Faculty of Engineering, University of Moratuwa



**Thesis Title : Dynamics of nest attributes and worker occurrence in *Aneuretus simoni* Emery associated ant community in a selected region of two forest reserves in the wet zone, Sri Lanka**

**Outcome/s of the project:**

*Aneuretus simoni* Emery, 1893 (Sri Lankan Relict Ant) is an endangered ant species which was earlier identified as “Critically Endangered” prior to our work in 2012. The current study discovered *A. simoni* in Indikada Mukalana Forest Reserve (Colombo District) and Lenagala Forest Reserve (Kegalle District) in Sri Lanka. Based on the mean nest density, frequency of nest occurrence and worker occurrence which were calculated repeatedly, it is recognized as a permanent resident species in both forests. Discovery of the species in two more forests will enable reassessment of its conservation status in Sri Lanka. Further, the ant community at each forest was listed as an inventory for the first time. The first ant inventories of each forest will be very useful for biodiversity researchers because those provide baseline information for future research on ant fauna.

**Project Team**



**Principal Supervisor**

**Prof. R K Sriyani Dias**, Department of Zoology and Environmental Management, University of Kelaniya



**Research Student**

**Dr W S Udayakantha**, Department of Zoology and Environmental Management, University of Kelaniya

**Thesis Title : Screening of selected antibiotics contaminations and characterization of antibiotic resistant bacteria in water and sediments**

**Outcome/s of the project:**

The reported work is the first study on antibiotics, antibiotic resistance genes, and antibiotic resistance bacteria in hospital effluents, livestock farms and aquaculture environment in Sri Lanka. Antibiotic resistance against commonly used antibiotics may adversely affect on human health, veterinary and aquaculture sector of the country as well as economic development. Environmental persistence and antibiotic resistant bacteria of six important antibiotic classes (13 antibiotics) were studied. The results of the study revealed that hospital waste-water effluent is the major point source for penicillin group antibiotic (AMX, AMP and CLOX) contaminants to the environment, whereas aquaculture farms and livestock farms were identified as major point sources of the tetracycline (TET, OTC) group antibiotic contaminants in the environment. Results of the degradation kinetics studies showed that some antibiotic degrading bacteria can be used as potent candidates to degrade antibiotics in contaminated waste water (AMX, AMP, CLOX, CIP, TET). Development of a bio-filter to eliminate antibiotics in effluent water is in progress.

**Project Team**



**Principal Supervisor**

**Snr. Prof. Pathmalal Manage**, Dean, Faculty of Graduate Studies, University of Sri Jayewardenepura



**Co - Supervisor**

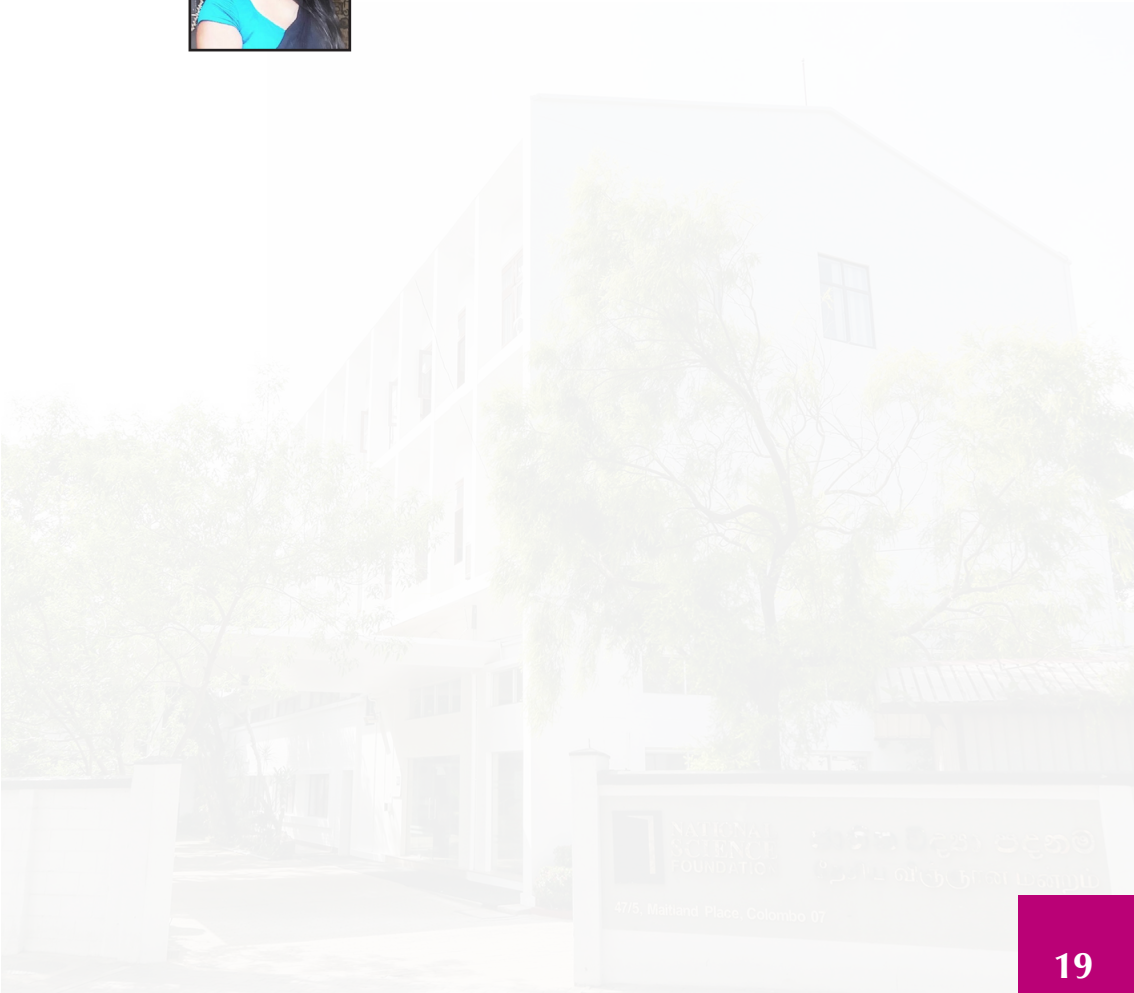
**Emeritus Professor Ajantha De Alwis**, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura

**Co - Supervisor**

**Snr. Prof. Nissanka De Silva**, Professor of Zoology, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura

**Research Student**

**Dr G Y Liyanage**, Faculty of Graduate Studies, University of Sri Jayewardenepura



**Thesis Title : Antioxidant and anti-inflammatory properties of selected green leafy vegetables in Sri Lanka****Outcome/s of the project:**

The study evaluated potential antioxidant and anti-inflammatory properties of 34 green leafy vegetables and among them five leafy vegetables namely, ranawara, kurinnan, malla, kathurumurunga and passion leaves showed significant antioxidant and anti-inflammatory properties. Hence, the results substantiate enriching our diets with antioxidant-rich leafy vegetables in protecting from diseases like cardiovascular disease (CVD) and cancer. Results of the study will be useful in the development of “Natural antioxidants” from plant, development of functional food/ ingredients/ nutraceuticals etc. characterized by potential antioxidant and anti-inflammatory properties.

**Project Team****Principal Supervisor**

**Prof. K K D S Ranaweera**, Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura

**Research Student**

**Dr K D P P Gunathilake**, Department of Food Science and Technology, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka



**Thesis Title : Utilization of environmental pollutants and biomass for the production of biofuels and industrial chemicals using heterogeneous catalysts**

**Outcome/s of the project:**

All the countries in the world heavily utilize fossil fuel, a nonrenewable and untenable energy source, to fulfill their energy requirement in the transportation sector. The results of this study reveal a heterogeneous catalytic approach and a greener technology for utilizing bio-wastes (bio-oil containing high free fatty acid (FFA)) into bio-diesel (renewable energy) that causes enhancement of engine performance and reduction in emission. Two metal composites and two metal organic frameworks were identified as novel heterogeneous acid-catalysts applicable for lowering the high FFA content in natural fats (algal-oil/non-edible-plant-oil) via pre-esterification under very mild conditions. A two-step catalytic approach to produce soap -free biodiesel in high yield from bio-waste was also developed. Since the technology identified in the present project depends on the non-edible *Calophyllum inophyllum* nuts, Chlorella algal species, waste oils (waste coconut oil) and their conversion into biodiesel, the entire procedure is cost-effective. The findings further introduce an alternative, economical, and a greener method for waste management and environmental pollution control.

**Project Team**



**Principal Supervisor**

**Prof. Manawadevi Yasatissa Udugala-Ganehenege**, Department of Chemistry, Faculty of Science, University of Peradeniya



**Co - Supervisor**

**Dr Chandrakantha Senajith Kalpage**, Department of Chemical and Process Engineering, Faculty of Engineering, University of Peradeniya



**Research Student**

**Dr Tuan Mohammed Mudassar Marso, Postgraduate  
Institute of Science, University of Peradeniya**



**Thesis Title : Fabrication of n-Cu<sub>2</sub>O quantum dots (QDs) sensitized solar cells and enhancement of their photocharacteristic properties through deposition of CAC and p-Ag<sub>2</sub>O thin films**

**Outcome/s of the project:**

The rate of global energy consumption is anticipated to grow in par with population growth and economic growth. To achieve sustainability of the energy supply, renewable energy sources are required. Solar energy can be directly converted to electric energy by the photovoltaic effect using solar energy conversion devices. This study focused on fabricating thin film solar cells and quantum dots sensitized solar cells (QDSSCs) by using low-cost fabricating methods. n-type cuprous oxide (n-Cu<sub>2</sub>O) has been shown to be an excellent material for fabricating low-cost solar cells due to the optical band gap of ~2.0 eV. A substantial photocurrent enhancement of 80% was measured at the Cu/n-Cu<sub>2</sub>O-electrolyte interface in a photo-electrochemical cell with the introduction of a thin layer of p-type Ag<sub>2</sub>O between n-Cu<sub>2</sub>O layers. The following were the major findings of the project;

- Large photocurrent enhancement in the Cu/n-Cu<sub>2</sub>O/ p-Ag<sub>2</sub>O/ n-Cu<sub>2</sub>O photoelectrode at the electrolyte interface
- Explanation of the photocurrent generation of Cu<sub>2</sub>O quantum dots (QDs) sensitized p-CuSCN stable photoelectrochemical cells
- Photocurrent enhancement of Cu/p-CuSCN/n-Cu<sub>2</sub>O quantum dot (QD) novel solid state photovoltaic cell with coconut shell activated carbon (CAC) as the upper electrode

**Project Team**



**Principal Supervisor**

**Prof. C A N Fernando**, Head, Department of Nano Science Technology, Faculty of Technology, Wayamba University of Sri Lanka



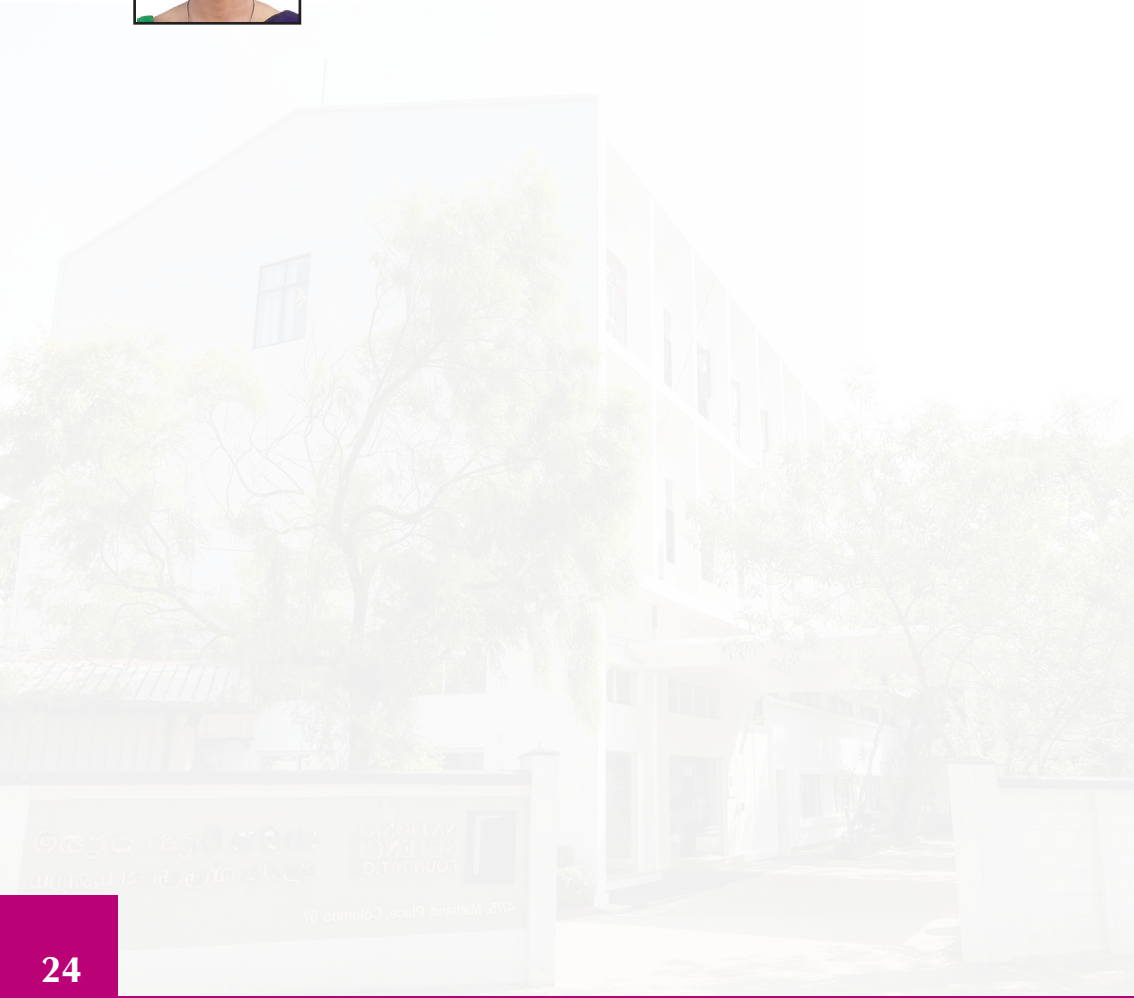
**Co - Supervisor**

**Dr S N T De Silva**, Department of Nano Science Technology, Faculty of Technology, Wayamba University of Sri Lanka



**Research Student**

**Dr P G D C K Karunarathna**, Department of Electronics, Faculty of Applied Sciences, Wayamba University of Sri Lanka





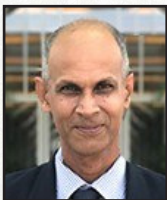
**Thesis Title : Investigation of photo-effects and their implications on solar energy conversion devices fabricated from low-cost nano-materials**

**Outcome/s of the project:**

Sri Lanka has potential for harvesting solar energy for national development. One of the main barriers for harvesting solar energy technology is high initial capital investment. This research focused on investigation of low-cost and easily fabricated material for use in solar cells because of the expensive manufacturing process of commercially available Si based solar cells. Reduced graphene oxide acts as an electron acceptor to extract photogenerated electrons from  $\text{Cu}_2\text{O}$ , thus showing an increased charge separation efficiency within the semiconductor while suppressing photodegradation. The following are the major findings of this project;

- Photo-current enhancement in the Cu/ RGO/ n- $\text{Cu}_2\text{O}$  photo-electrode at electrolyte interface
- Synthesis of p- $\text{Cu}_2\text{O}$ / RGO composite films for enhancing photocurrent of p- $\text{Cu}_2\text{O}$  and  $\text{H}_2$  generation
- Characterization of Fe doped  $\text{CuSCN}$ / P- $\text{Cu}_2\text{S}$  solid-state photovoltaic cell

**Project Team**



**Principal Supervisor**

**Prof. C A N Fernando**, Head, Department of Nano Science Technology, Faculty of Technology, Wayamba University of Sri Lanka



**Research Student**

**Dr SPA UK Samarakoon**, Department of Electronics, Faculty of Applied Sciences, Wayamba University of Sri Lanka

**Thesis Title : Interfacial properties of electrodeposited  $\text{Cu}_2\text{O}$  junctions and development of efficient homojunction solar cells**

**Outcome/s of the project:**

The study demonstrated that without expensive techniques and material it is possible to develop solar cells in Sri Lanka. As the techniques and the materials used are inexpensive, the outcome of the project reveals that there is a possibility of achieving 10% efficiency with further improvements, which is sufficient for practical applications to implement low-cost power production in Sri Lanka. The results of the study revealed that at the interface of  $\text{Cu}_2\text{O}$  with electrolyte or gold, relative band edge positions can be shifted and, in some cases, Fermi level can be pinned. It was also observed that deposition bath pH determines the interfacial properties. Using these findings, a  $\text{Cu}_2\text{O}$  solar cell with the highest reported short circuit current density of  $12.5 \text{ mA/cm}^2$  can be developed. Therefore, this study has shown the possibility of developing a low-cost  $\text{Cu}_2\text{O}$  based solar cell, although a device has not been produced for immediate use.

**Project Team**



**Principal Supervisor**

**Prof. L B D R P Wjesundera**, Department of Physics and Electronics, University of Kelaniya



**Co - Supervisor**

**Prof. W P Siripala**, Department of Physics and Electronics, University of Kelaniya



**Research Student**

**Dr F S B Kafi**, Department of Physics and Electronics, University of Kelaniya

**Thesis Title : Determinants of dividend policy and its effect on stock price volatility: Evidence from Sri Lanka****Outcome/s of the project:**

This study has focused on efficient governance mechanisms which result in a positive relation between dividend policy and corporate governance of organizations. The results indicate an inverse relationship between dividend policy and stock price volatility. The findings of the data triangulation approach revealed that the size of the firm, industry impact, corporate governance, free cash flow, earnings, past dividends, profitability, investment opportunities, net-working capital, concentrated ownership structure, and investor preference as universal set of determinants of dividend policy. It is evident that CSE-listed firms have strong dividend standards that result in paying high dividends to protect the rights of the minority shareholders. This relation is economically important for both major and minor shareholders when determining their respective payout policies and will pave the way towards more investments in stocks, which will result in a substantial economic impact on the overall economy. The findings enhance public awareness about the relation between volatile stocks and subsequent dividend payouts, while enhancing the knowledge of factors affecting the dividend payout. Hence, it will ultimately enhance the stock literacy level of the general public where they cannot be misguided by malpractices.

**Project Team****Principal Supervisor**

**Prof. Y K Weerakoon Banda**, Department of Finance, University of Sri Jayewardenepura



**Co - Supervisor**

**Prof. A A Azeez**, Department of Finance, University of Colombo



**Research Student**

**Dr N Jayantha Dewasiri**, Faculty of Graduate Studies, University of Colombo



**Thesis Title : Haematological, immunomodulatory and cancer chemopreventive activities of the mature leaf concentrate of *Carica papaya* L Sri Lankan wild type cultivar**

**Outcome/s of the project:**

This study provided a comprehensive scientific validation of the traditional claims of mature leaf concentrate (MLCC) of *Carica papaya* as a safe and holistic therapeutic remedy. The MLCC of Sri Lankan wild type variant possessed haematological, immunomodulatory, cancer chemo preventive and antioxidant activities when tested using *in vitro* and *in vivo* rat models. In depth chemical analyses of MLCC using GC-MS/ LC-MS explicated the presence of several known immunomodulatory and cytotoxic compounds. The study provided a platform for the isolation and identification of phyto constituent(s) responsible for therapeutic activities of papaya leaves and initiated the development of herbal therapeutic agents. Findings of the present study will immensely benefit patients with thrombocytopenia and other immunomodulatory disorders as an effective, affordable, safe and readily available remedy.

**Project Team**



**Principal Supervisor**

**Prof. Preethi V Udagama**, Senior Professor in Zoology, Department of Zoology and Environment Sciences, Faculty of Science, University of Colombo



**Co - Supervisor**

**Emeritus Professor W D Ratnasooriya**, Department of Zoology and Environment Sciences, Faculty of Science, University of Colombo



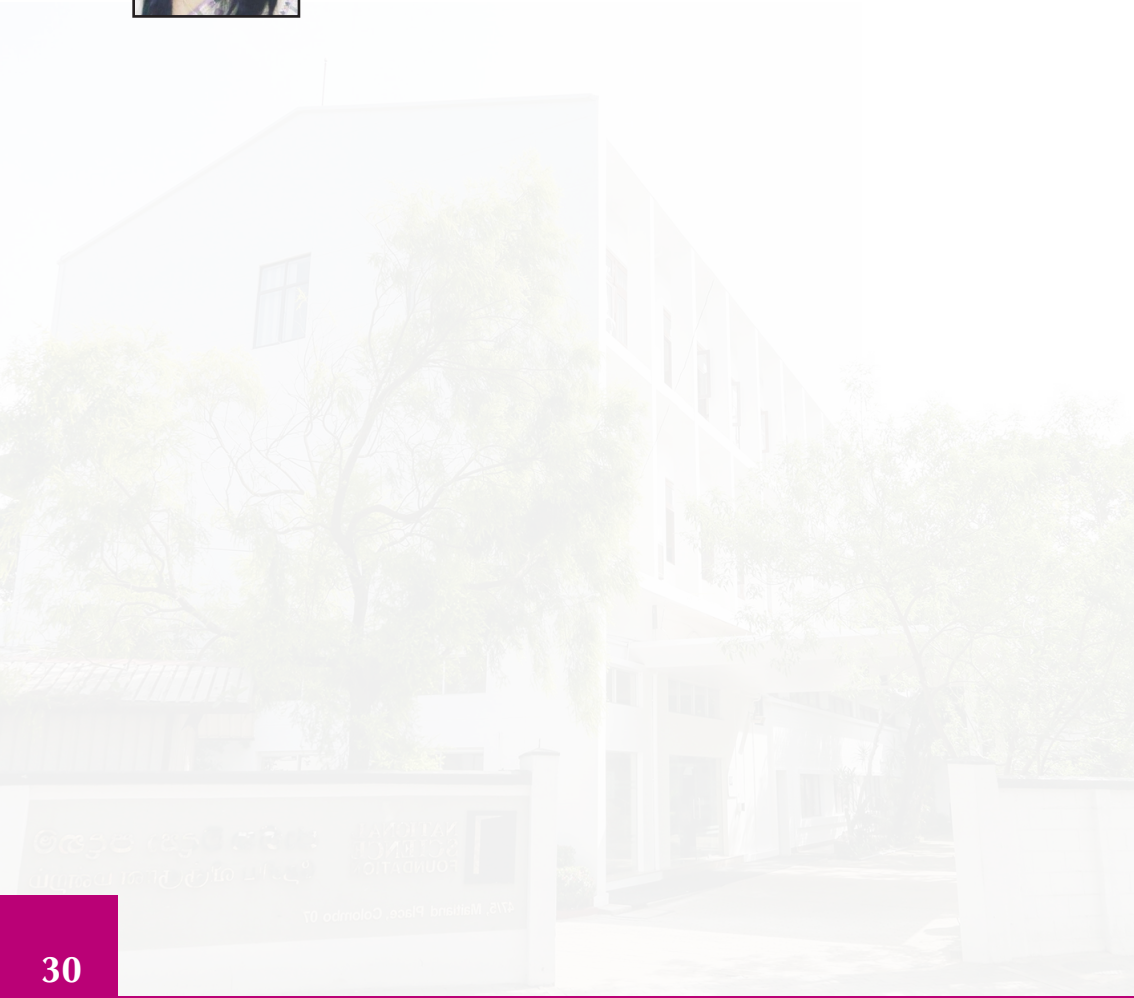
**Co - Supervisor**

**Dr G A S Premakumara**, Head, Department of Basic and Social Science, Faculty of Nursing, University of Colombo



**Research Student**

**Dr Chanika D Jayasinghe**, Department of Zoology Faculty of Natural Sciences, The Open University of Sri Lanka



**Thesis Title : Development of a vision aided reach-to-grasp path planning and controlling method for trans-humeral robotic prostheses**

**Outcome/s of the project:**

In this research, a simulation environment consisting of a virtual shoulder joint was developed, which can be used for future research of shoulder motion analysis. An EMG-Force Proportional and Moment Balance model for elbow motion prediction was also developed. A dynamic path tracking method and a vision-based path planning and control method for reach-to-grasp motions of trans-humeral prostheses were proposed. These methods can be used to properly control trans-humeral prostheses. The developed control method can be used to carry out the daily tasks of amputees with a prosthetic device.

**Project Team**



**Principal Supervisor**

**Prof. R A R C Gopura**, Professor in Mechanical Engineering, Department of Mechanical Engineering, University of Moratuwa



**Co - Supervisor**

**Dr Y W R Amarasinghe**, Senior Lecturer, Department of Mechanical Engineering, University of Moratuwa



**Research Student**

**Dr D G K Madusanka**, Lecturer, Department of Mechanical Engineering, University of Moratuwa

**Thesis Title : Enhancing interpretation of uncertain information in navigational commands for service robots using neuro-fuzzy approach**

**Outcome/s of the project:**

This research is part of a project for developing an intelligent service robot for the elderly and the disabled. The intelligent service robots used for service tasks, are anticipated to have direct interactions with human users in domestic environments. Therefore, service robots should be able to interpret uncertain information in human-robot interactions. This study investigated methods for resolving spatial ambiguities arising due to the inclusion of uncertain information such as “little”, “large”, “few” and “far” contained in navigation instructions for improving human-robot interactions. Enhancing the interpretation of uncertain information in navigation commands for improving human-robot interaction resulted in the following:

- Adapting robot’s perception of distance and directional notions based on environment
- Personalizing the robot’s perception of uncertain information while adapting to the environment
- Interpreting uncertainties in relation to the relative references
- Adapting the robot’s perception of uncertain information according to the information conveyed non-verbally

**Project Team**



**Principal Supervisor**

**Prof. A G Buddhika P Jayasekara**, Department of Electrical Engineering, University of Moratuwa



**Research Student**

**Dr M A Viraj J Muthugala**, Department of Electrical Engineering, University of Moratuwa



# Awards for Supervision of MPhil degrees

---





**Thesis Title : Assessment of post-harvest losses of paddy stored under different temperatures in compliance with global warming and possible adaptation techniques**

**Outcome/s of the project:**

This study was conducted to assess the effect of temperature increment on quality deterioration of stored paddy in line with global warming and suggest adaptation techniques to minimize the impact. High temperature adversely affects dry mass loss (DML) and decreasing germination rate of stored paddy and DML is nearly doubled when storage temperature is increased from 26°C to 38°C in raw paddy. However, selected paddy varieties can survive even up to 38°C with acceptable milling quality in terms of head rice yield (HRY) and grain hardness of paddy was increased with the increment of storage temperature. Parboiling can be introduced as an adaptation technique to reduce the quality losses of paddy stored under high temperature conditions as parboiled paddy imparts high quality rice with less DML and high HRY for a 6 month of storage period. Introducing paddy varieties such as Kuruluthuda paddy which may have a natural resistance to cope with the high temperature conditions was identified. It was also identified that packing raw paddy in polyethylene bags is best for storage at high temperatures for a short period (6 months) and second best is poly-sack. Any variety of parboiled paddy can be stored in any type of bags including gunny, poly-sacks and polyethylene with minimum quality degradation. The techniques identified will be beneficial to producers, marketers and users to assess and predict the quality status of the stored paddy.

**Project Team**



**Principal Supervisor**

**Prof. S B Navaratne**, Department of Food Science and Technology, Faculty of Applied Sciences, University of Jayewardenepura



**Co - Supervisor**

**Prof. C M Navaratne**, Department of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna



**Co - Supervisor**

**Dr B M Jinendra**, Department of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna



**Research Student**

**Ms M G G Awanthi**, Department of Food Science and Technology, Faculty of Applied Sciences, University of Jayewardenepura



**Thesis Title : Population diversity and carbon source dependent anaerobic soil disinfestation (ASD) based disease management of *Sclerotinia sclerotiorum* on cabbage**

**Outcome/s of the project:**

Soil borne fungal plant pathogen, *Sclerotinia sclerotiorum* causing cabbage head rot was described and its population genetic structure was studied for the first time in Sri Lanka. The pathogen population displayed a high genetic diversity and recombination was also detected. Since recombination generates new genetic variants, if an epidemic occurs, the disease management will be challenging. Since inappropriate pesticide application was detected, farmer awareness programmes were conducted via regional agricultural research center, Kahagolla, Bandarawela. Some isolates were insensitive for more than a single fungicide, emphasizing the importance of researching alternative control methods. Developed countries use chemical soil fumigation as a control measure, which has many disadvantages. Anaerobic soil disinfestation (ASD) with readily available carbon sources (cabbage and leek cull piles) to mitigate *S. sclerotiorum* was found to be very effective and its application towards other pathogens in the upcountry vegetable production system is also being investigated.

**Project Team**



**Principal Supervisor**

**Prof. Renuka N Attanayake**, Department of Plant and Molecular Biology, University of Kelaniya



**Co - Supervisor**

**Prof. C S K Rajapakse**, Department of Chemistry, University of Kelaniya



**Co - Supervisor**

**Mr K P Somachandra**, Director Research, Regional Agricultural Research and Development Center, Kahagolla, Bandarawela



**Research Student**

**Ms Thirega Mahalingam**, Department of Plant and Molecular Biology, University of Kelaniya

**Thesis Title :** On the initial algebras and final coalgebras of endofunctors arising from self-similar systems on the category of  $k$ -pointed metric spaces

**Outcome/s of the project:**

Theoretical research plays a fundamental role in shaping human understanding, provides innovative applications and promotes critical investigation. The results of this study provide improvements to the theory of describing self-similar objects by means of final coalgebras. Such descriptions have important applications in mathematics and computer science. Two fundamental examples were given outlining how the theory on describing a topological self-similar object as a final coalgebra for an endofunctor can be extended to the metric setting. Based on the above examples, a general theory was developed to describe a self-similar metric space as a final coalgebra, under some mild assumptions. As per the findings of this study, one can now describe metric properties of self-similar objects by means of final coalgebras, where it was limited to topological spaces prior to this research.

**Project Team**



**Principal Supervisor**

**Dr Romaine Jayewardene**, Department of Mathematics, University of Colombo



**Co - Supervisor**

**Dr Jayampathy Ratnayake**, Department of Mathematics, University of Colombo



**Research Student**

**Mr Manoharan Annanthakrishna**, Department of Mathematics and Statistics, University of Jaffna

**Thesis Title : Polyacrylic acid-acrylamide based water purification systems for the removal of selected anions and cations from aqueous media**

**Outcome/s of the project:**

During the past few decades rapid industrialization has escalated environmental pollution. Therefore, contamination of water by indiscriminately disposed waste water is a frequent issue. In this study, water purification systems were developed using modified polymeric hydrogels under three approaches, with the aim to remove fluoride ions and some targeted heavy metal ions from aqueous media. In the developed water purification systems this was achieved in three stages as follows;

Stage-1: Trimetallic composite for selective removal of fluoride ions

Stage-2: Polyacrylamide (PAM)/ metal composite for selective removal of fluoride ions, from aqueous media

Stage-3: Highly cheatable polymer to remove heavy metals.

The designed product is a cheaper, environmental-friendly alternative for water purification systems in the country.

## Project Team



**Principal Supervisor**

**Dr K M Thilini Dhakshina Gunasekara**, Department of Polymer Science, University of Sri Jayewardenepura



**Co - Supervisor**

**Dr Asitha T Cooray**, Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura





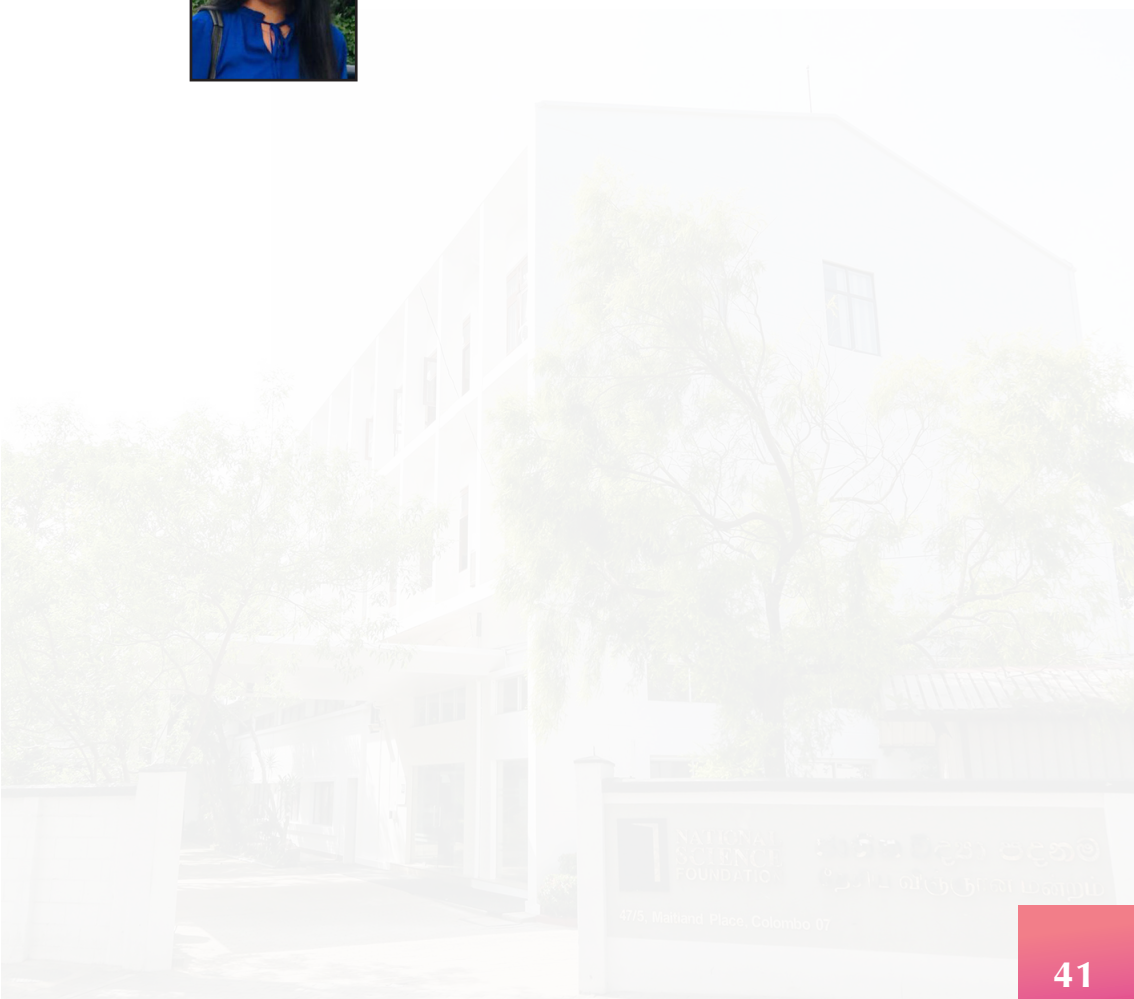
**Co - Supervisor**

**Dr Dilru Ratnaweera**, Head of Discovery Labs,  
MAS Innovation Pvt. Ltd.



**Research Student**

**Ms S K Thilini Thatsara**, Department of Chemistry,  
University of Sri Jayawardenepura

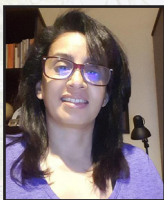


**Thesis Title : Trematode infections in common hourglass tree frog (*Polypedates cruciger*): multiple parasitism and age dependent resistance and tolerance**

**Outcome/s of the project:**

Environmental stressors such as parasites impair survival and induce deformities in amphibians contributing to the decline in populations and species extinctions. This study shows how the development-dependent host strategies like tolerance and resistance to parasitism and the sequence in which the host encounters multiple parasites influences interactions between parasites and host pathology. Older tadpoles of the common hourglass tree frog, *Polypedates cruciger* showed increased tolerance and resistance to exposure to the pleurolophocercous and furcocercous cercariae of digenetic Trematodes. Resistance could reduce parasite prevalence, whereas tolerance could be neutral towards or increase parasite prevalence in a population, and therefore, these two strategies have epidemiological significance. Further, the variation in the sequence of parasite exposure leads to additive, antagonistic, or synergistic effects, reinforcing the notion of cryptic interactions between parasites and host communities in nature.

**Project Team**



**Principal Supervisor**

**Prof. Rupika Rajakaruna**, Department of Zoology,  
Faculty of Science, University of Peradeniya



**Research Student**

**Ms Nuwandi U K Pathirana**, Department of Zoology,  
Faculty of Science, University of Peradeniya

# NSF Technology Awards 2018/2019

---







# Certificate of Commendation

---





**Project Title : Real time translation of Sinhala to Sign Language**

**Grant No : TG/2014/Tech-D/02**

### **Outcome/s of the project:**

A person who is born with aural disability does not have the capability to extract information from outside as the mother tongue of a deaf person is the sign language. This has resulted in the requirement for a human interpreter whenever a deaf person wants to convey a message to another healthy person or vice-versa. To fill this void, a Sinhala to Sinhala Sign Language (SSL) translation software was developed. The software translates Sinhala voice / Sinhala text to a group of Sinhala Sign Language gestures via 3D virtual human (3D avatar) appearing on a computer. Moreover, the software can translate numbers and basic mathematical equations into SSL. Along with the capability of adding new SSL signs within minutes, the software is also capable translating some of Sinhala grammatical notions to SSL. The real benefit of the proposed project can be reaped by this marginalized community as the system can be used to establish a communication link between an aurally handicapped and a healthy person in real time.

## **Project Team**



### **Principal Investigator**

**Prof. R G N Meegama**, Department of Statistics & Computer Science, University of Sri Jayewardenepura



### **Co - Investigator**

**Mr M. Punchimudiyanse**, Department of Computer Science, Open University of Sri Lanka