



Bharath

INSTITUTE OF HIGHER EDUCATION AND RESEARCH

(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)
(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)



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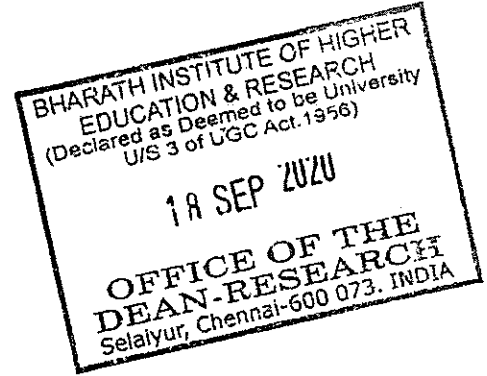
173, Agaram Road, Selaiyur, Tambaram,
Chennai - 600 073. Tamil Nadu.

RefNo.SMS-2018-O-11

Date: 18/09/2020

TO

Mrs. R. Hema,
Asst. Professor/ECE,
BIHER.



Thro: Concern Head of the Department

Greetings!!!

We are happy to announce that the Research Advisory Committee has approved your proposal for Seed Money Scheme-2018 which was presented by you. You are requested to complete the proposal and send the progress report to the Dean Research in the prescribed time period.

Title of the Project: Augmented Reality on User Friendly Maneuver for Hunting Arsenic Toxicant

Seed Money Amount: Rs.1, 00,000/- (Rupees One Lakh Only)

Approved on: 10/03/2020

Payment details:

Cheque No.351644

Dated: 16/09/2020

Bank Name: Indian Bank, Selaiyur, Chennai.

With Regards

Dean-Research

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FOR BIHER RESEARCH AND CONSULTANCY


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PROPOSAL SUBMISSION

1. Details of Principal Investigator

Name : Mrs. R.HEMA
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Highest Qualifications : M.E – Communication Systems
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2. Details of Co-Principal Investigator

Name : Dr. M.Sundararajan
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Contact no : 9840352860
Date of Joining : 2/09/2015

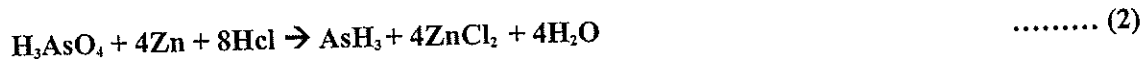
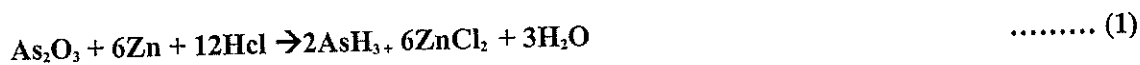
Technical details

1. Introduction

Arsenic extensively exists in Environment. It is contemporary at different levels in ocean as well as ground water. Oceanic water is an aqueous solution holding dissolved solids and gases. However there are countless contaminants in normal water, it is the main geogenic and poisonous pollutant in intake water creating health hazard. For the reason that the composite natures of the dissolved materials in normal water a particularly technologically advanced method is typically essential to achieve the concentration of whichever component. The regular approaches for the quantitative investigation of cannot be functional to marine water without sufficient checks on their precision. This is predominantly true when dealing with rudiments existent in extremely minute concentrations. In this investigation an effort is ended to mature a system for monitoring the Arsenic contamination level in sea water by means of arsenic specific sensor executing Linear Sweep Anodic Stripping Voltammetry (LSASV). It is a skill in which the metallic ion of attention is pre- attracted on an anode apparent at appropriate attracted potential and then stripped by an anodic streak voltage. The system of measurement is equipped with GPS hunting by means of GPRS and GSM communication techniques. Arsenic contamination levels in sea water at numerous places were measured by the technologically advanced system and the results were related with orthodox approaches. The precision and correlation of approximation was originated to be within the adequate limits. The system affords an effective means in development for rehabilitation of water polluted with Arsenic like toxicants and in waste water reutilizing. Fabricated Nano screen printed sensor strip was also examined for the recognition of heavy metals similar to Lead, Cadmium, Copper, Silver, Gold, Bismuth contaminants in water by suitable deposition potential. Lab on Chip is also feasible for numerous bulk metal pollutants detection on this single Nano sensor. The Virtual & Augmented reality of the contamination level and the location of the sample under the test data at remote sensing and on line monitoring system are established. When the cloud data getting was within the Maximum Contamination Level by WHO then monitors BLUE color and RED color for MCL beyond the limit.

2. Review of status of Research and Development in the subject

A focus of abundant interest global is upkeep of ecological eminence and if thinkable, the rehabilitation of exaggerated regions. To identify numerous inorganic forms of arsenic contaminants like Cacodylic acid Arsenazo III - $C_2H_{18}N_4O_{14}S_2As_2O$ - Arsenic Acid, P-Arsenic Acid - $H_2NC_6H_4AsO_3H_2$ and Dimethyl Arsenic Acid - $C_2H_8AsO_2Na$. Inorganic arsenic consists of arsenic ions united with chlorine, Oxygen & sulfur ions to form mixtures known as As-III - Arsenite & As-V Arsenate. Arsenite is further poisonous of the dual formulas. This maneuver senses the little concentration of Arsenic in drinking water from [1 $\mu\text{g/L}$] 0.1 ppb - Parts per Billion. WHO - World Health Organization recommended MCL - Maximum Contamination Level of Arsenic is 10 $\mu\text{g/L}$. Numerous approaches for finding of As III impurity quantity in intake water is established, Graphite Furnace Atomic Absorption Spectrometry - GFAAS, Inductively Coupled Plasma Mass Spectrometry - ICPMS, and ICPMS with Great Recital liquid Chromatography. Above said methods, however trustworthy, lack of feasibility checking contamination and huge count of test groups have to prepare. Moreover need appropriate research laboratory circumstances and are time taking process. Most tests for arsenic including the **Hach Method** rely on the transfiguration of arsenic to arsine gas.



The most common approach of this Method produces arsine gas which is progressive to respond by the indicator and soaked using **Hg Br₂**. Mercuric Bromide. The technique further comprises creation of HCl also toxin hard towards recognize, essential workroom with classy procedures like **Spectrometer**. It is difficult time consuming process. **ISE - Ion Selective Electrodes** method remains as similar as **antique Flame Photometry approach investigation**. ISE - Ion Selective Electrode is a transducer for direct sensing of ionic strength or concentration in a solution without reacting to the sample. Different **forms of ISE** are Ion Sensing Electrodes, Ion Selective or Ion Specific Electrode. The three forms mean a common thing about sensing the ionic strength but their inner meaning can be interpreted in a different way. **ISE** stands deprived rating detector which intelligence dissimilar ions in that period, not precise for exact ion. Ion Selective Electrode is a Choosy, enhanced ranking device for a specific ion. It intelligences more than one ion the comparative choosiness contrary to additional ions in contrast with stated ion of appropriate intended for Calibration. It intelligences greater than one ion the comparative discrimination against other ions in contrast to a identified ion makes it appropriate for the measurement. Ion Specific Electrode is the preeminent grade and merit sensor which is observed to be additional precise to a specific ion. It is preeminent ranking, excellence detector and considered as further precise for specific ion. In this case the relative selectivity to other non-specific ions is almost nix or negligible. ISE works with selective membrane technique. ISEs are of different forms Glass, Liquid membrane and Solid state Electrodes. Solid state electrodes are

economical with ease of fabrication and they use neutral carrier PVC matrix membranes. The Junction potential needs to be explained to understand the operational principle of it.

Working Principle of ISE could be explained from the behaviour when two different concentrations of similar ionic solutions are separated by a selective membrane, a voltage is produced across the walls of it as the objective ions prolix through the membrane from the higher to the lower concentration side. ISE responds selectively only for the intended ion. The voltage across this membrane is noted in between dual position electrodes. Internal reference electrode dipped in a solution having the ions to be calculated & external reference electrode making a combination of ISE and reference half-cell. The potential difference across the half-cells gives a measure of ISE potential. Measurement is using nonlinear log ruler thus decreases precision. Conversely these techniques not provides profound & precise in calibration related to the infinitesimal dense of As_3 impurity in aquatic fewer than $10 \mu\text{g/L}$.

The **Optical Sensors** are established on LEDs and fiber optics. Light passes through the feelers into a minor hose having As III founded liquids which hit on a photo diode. The technique also existence handy, Cheap, permits examination of information over PC. Where light quantity is fascinated be subject to that amount of toxic in test solution. A portion of sunlit is rapt via that solution, left over pass on it. The quantity of fascinated light be influenced by the focus of arsenic in the sample. A portion of light is captivated by the sample and the left over drops on the photo diode. The contamination of arsenic raises the sample's capability to absorb light drops. Scientists tried and motto that required very profound techniques to discover. This device could daze the overhead complications and essentials to invent.

3. Progress /achievement so far, Social relevance and usefulness of the project :

It is user friendly as there is no hazardous poisonous gas produced because any need of pre-processing requirement. That's why without an expert like Chemist the detection could be done in simpler, faster, cheaper with excellent sensitivity and more precisely. Invent - integrated PAMSAT system is going to be responsible for the fastest, user friendly, low cost, hand held - portable accurate detection. Since Arsenic toxicant in water is additional risky to fitness, this technologically advanced system be essential in providing healthier to humankind. This Equipment senses the minute concentration of arsenic in drinking water from 0.1 ppb [$1 \mu\text{g/L}$] - Parts per Billion. Whereas World Health Organization recommended Maximum Contamination Level of Arsenic is $10 \mu\text{g/L}$. The system may also be implemented in rehabilitation efforts of purification of drinking water. And it provides precise detection and online data and location of the sample tracking. This virtual data is stored on cloud in created back end data base. Front end Smart design by Visual studio brings Augmented Reality of Remote sensing virtual data by the on line monitoring system.

4. Work Plan:

To develop Arsenic sensor with

- ✓ high precision detection limit
- ✓ Portable
- ✓ Economical
- ✓ Faster
- ✓ Automated
- ✓ User Friendly.

4.1 Methodology:

DEVELOPMENT OF ARSENIC MONITORING SYSTEM

4.2

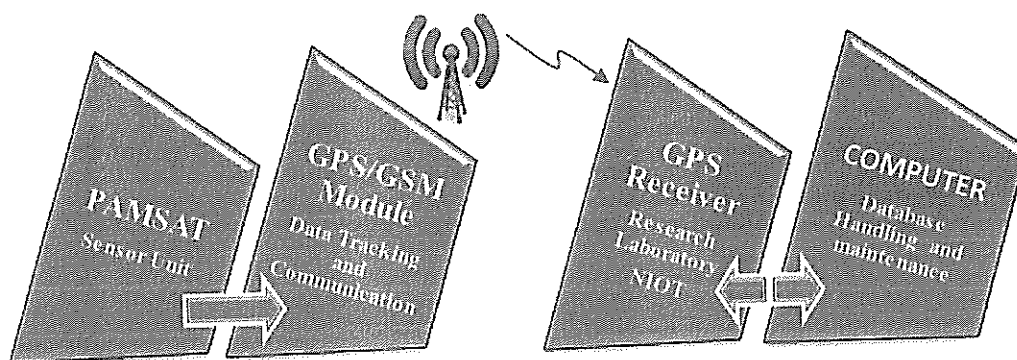


Figure 1: Architecture of Integrated System

PAMSAT - Portable Automated Monitoring System for Arsenic Toxicants sensor device senses contamination level of arsenic in water samples. The result is transmitted by GSM/ GPS - transmitter module and remotely sensing data by GPS receiver module are processed by computer system. The output of sensor is given to ADC - Analog to Digital Converter through signal (Amplification) conditioning. The corresponding digital output is given to microcontroller (ARM Processor - Advanced RISC Machine, 32 bit processor, 512 KB flash memory, 64K RAM). The impurity level of arsenic pollutant in the water sample is to be displayed by the LCD display. R&D Centre furnished with a GSM Modem; Microcontroller connected to computer system & deliberates to keep track record of each sample quality send to a Microcontroller.

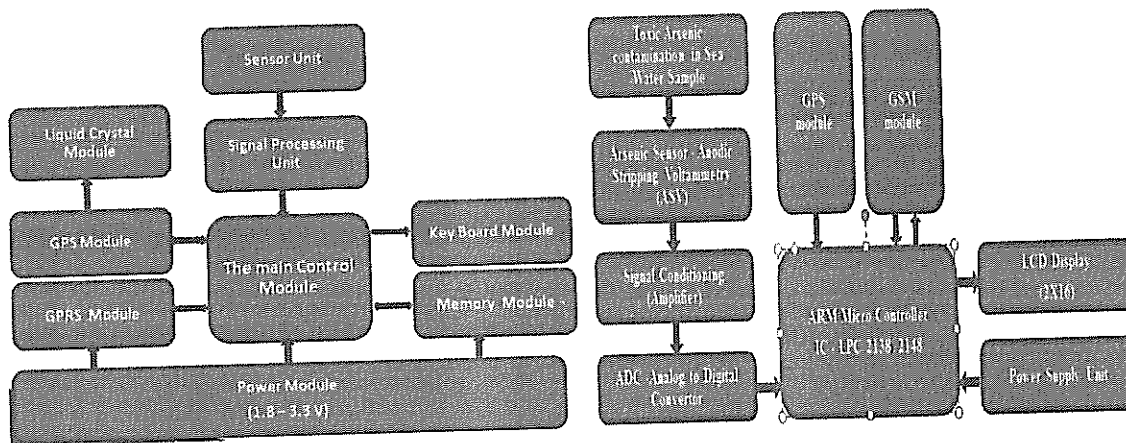


Figure 2: Detailed Block Diagram

Interfaced to a LCD display. Microcontroller connects the computer for processing and data handling through serial communication RS232 (or MAX232). For monitoring and tracking the data and data base handling, Frontend design by using Visual Basic program and backend to maintain the data by MS Access. KEIL Software and Flash program are to be used for embedded microcontroller system.

634 R - GPS is combined intelligent GPS module with 51 channels by means of ceramic patch aerial through a low noise amplifier. This feeler is connected to acquisition machine & 14 channel track engines. Skilled of receiving signals from 65 GPS Satellites & transmitting into the exact location and timing info read by either RS232 serial port or by UART port. Both the LVTTTL-level and RS232 Signal Interface is on the interface connector, source potential of 3.59 V to 5.99 V is held. The GPS aerial module can be accessible for OEM applications with adaptation. A GSM modem is an extraordinary type of modem which admits a SIM card, and functions over a subscription to a mobile operator, just similar a mobile phone. When it is linked to a workstation, this allows interactive over the mobile network. By GSM & mobile internet connectivity, this system can also be used for sending and receiving tracked data by means of SMS messages. GSM modem supports an "lengthy AT command set" for sending/receiving SMS messages. It provides cost effective, fast and excellent way of communication by the service provider. Insert a GSM SIM card into the modem and attach it to USB port on your system. Receiver module received SMS which containing Longitude, Latitude, Global Time and Sensed amount of contamination data. This information displayed in LCD module. The same will be stored in MS Access or Oracle database in System computer. In cloud Front End Application launched, user can check / analyse tested data by Virtual Remote Sensing.

4.2. Time Schedule of activities giving milestones through BAR diagram.

S. NO	ACTIVITIES	1 st 4 (month)		2 nd 4 (month)		3 rd 4 (month)	
1	Literature survey						
2	Recruitment						
3	Data Collection						
4	Analysis the Labelling						
5	Analyzing communication efficiency						
6	Compilation of results, submission of papers & report preparation						

4.3 Expected outcome within the time period of Seed Money Scheme

- Adopting Anodic Stripping Voltammetry (ASV), Arsenic level detector in water is to be developed.
- The developed sensor is to be evaluated for its detection limits and found to be better sensitive than conventional methodologies. The ionic arsenic levels were detected in water collected at various places and the results were compared with conventional photometric methods.

- The comparison correlation of 0.996 which is to be the best correlation to attain.
- And more sensitive than the conventional method.
- It is also noted that the Arsenic concentration increases the peak current at the output also increases accordingly.
- The amplitude is directly proportional to the contamination level of the sample water under test. LSV response is superior to CV.
- The study determines a **fast, user friendly, low cost, portable, automated precise sensitive and easy way.**
- Since Arsenic poisoning in water is more hazardous to health, the developed system will be of immense important in providing better health to humanity.
- The system may also be implemented in rehabilitation efforts of purification of drinking water.
- **This sensor strip is also to be tested for the detection of bulk metals like lead,Copper,Cadmium.**

5. **Suggested Plan of action stating the name of funding agency where the project will be communicated for financial support within the time period of project.**

NIL

6. **Bibliography:** NIL

7. **List of Projects submitted/implemented by the Investigators (Separate for Pi and Co-PI)**

NIL

7.1 Details of Projects submitted to various funding agencies:

Sl. No.	Title	Cost in lakhs	Month of submission	Role as PI/ Co-	Agency	Status
	NA	NA	NA	NA	NA	NA

7.2 Details of Projects under implementation

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/ Co-PI	Agency
	NA	NA	NA	NA	NA

7.3 Details of Projects completed during the last 5 years

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/ Co-PI	Agency
	NA	NA	NA	NA	NA

8. List of publications published by the Investigators

8.1 Recent - Research Publications by Principal Investigator				
International Journal	National Journal	International Conference	National Conference	Total Number of Publications
26	4	8	6	44
Sl.No	Details			
1	R.Hema & M. Sundararajan , " Pollutants Literature Survey ", May 2020, Published in WJERT- World Journal of Engineering Research and Technology, Manuscript No: 1561/6/2020.			
2	R.Hema & M. Sundararajan , " Desk Research on Pollutants ", October 2020, Published in European Journal of Molecular and Clinical Medicine. 7 (4), PP 2332-2349.			
3	R.Hema & M. Sundararajan , " Enhancement Examination of Electrophoretic coating of Gold nanoparticles on Fabricated Arsenic (III) Electro Feeler ",Published in Journal of Green Engineering, December 2020. 10 (11), PP 10484-10497.			
4	R.Hema & M. Sundararajan , "Development Analysis and Evaluation of Arsenic III Sensor ", October 2020, Published in European Journal of Molecular and Clinical Medicine. 7 (4), PP 2533-2551.			
5	R.Hema & M. Sundararajan , " Augmented Reality on User Friendly Maneuver for Hunting Arsenic Toxicant ", January 2021, Published in Springer Nature - Lecture Notes in Networks and Systems Series Ed: Kacprzyk, Janusz ISSN : 2367 – 3370			
6	Paper published – Title: Automated and Portable Toxicant Arsenic Monitoring System in Under Water and Online Data Tracking. [April 2015]			
7	Paper published – Title: Arsenic (III) Sensor Development and Analysis of Electro deposition Of Gold Nano particles on Glassy Carbon Modified Electrodes For International Journal Of Emerging Technology in Computer Science and Electronics [IJETCSE] [April 2015]			
8	Paper published – Title: Sewage / River / Lake Water Quality Smart Monitoring and Metering Using LoRa M2M Technology [2018]			
9	"Fault diagnosis in mixed-mode circuit by using artificial neural network method " Published in International Journal of Engineering and Advanced Technology			
10	"IoT based gas detection in home environment ", Published in International Journal of Engineering and Advanced Technology			
11	"Coverage of neighbouring broadcasting system using efficient activity flow control ", Published in International Journal of Engineering and Advanced Technology			
12	'Strategies and technological advances in removing space debris satellite ', Published in International Journal of Engineering and Advanced Technology			

13	'Superscalar pipelined matrix multiplier in VHDL ', Published in International Journal of Engineering and Advanced Technology
14	'Power on wrist for women and school children to testimony by GPS and GSM using wireless personal area network ', Published in International Journal of Engineering and Advanced Technology
15	'Smartphone control robot with automatic firing gun ', Published in International Journal of Innovative Technology and Exploring Engineering
16	'Installed traffic control system using wireless ad hoc sensors ', Published in International Journal of Recent Technology and Engineering
17	'Development, Analysis and Evaluation of Arsenic (III) Sensor ', Published in Proceedings of 1st International Conference on Innovations in Information and Communication Technology, ICICT 2019
18	'Efficient utilization of renewable energy for boilers in tea café', Published in International Journal of Engineering and Advanced Technology , 8(6 Special Issue 2) 368-371
19	'Effect of VO(2) doping on structural and optical properties of diaquamalonato(1,10-phenanthroline)zinc(2) ', Published in International Journal Bulletin of the Korean Chemical Society
20	'Structural elucidation and location of Mn(II) ion in Tetraaquabis(hydrogen maleato)cadium(II): Single crystal EPR studies' Published in Journal of Molecular Structure
21	'Row Guidance Approach for Navigation of Semi-Autonomous Agriculture Wheel Robot', in Proceedings - International Conference on Vision Towards Emerging Trends in Communication and Networking, ViTECoN 2019 (2019)
22	'Performance analysis of localization algorithm for energy efficient node deployment in underwater acoustic sensor networks', Published in International Journal of Mechanical Engineering and Technology (2017)
23	'Strategies and technological advances in removing space debris satellite ', published in International Journal of Engineering and Advanced Technology (2019)

8.2 Recent Research Paper Publications of Co-Principal Investigator

1.	M.Sundararajan, Hema R, "Development, Analysis and evaluation of Arsenic (III) Sensor", IEEE Xplore Digital Library, 20th June 2019
2.	M.Sundararajan, Kongkham D, "A Survey on Cognitive Radio Networks for detecting unwanted access of malicious nodes", IEEE Xplore Digital Library, 20th June 2019
3.	M.Sundararajan, Kongkham D, "Cognitive Radio Networks for Detecting Malicious Nodes", International Journal of Recent Technology and Engineering, 2019.
4.	M.Sundararajan, Venkatraman S, "Area and interconnect length optimisation for VLSI floor planning problem by using harmony search algorithm", International Journal of Recent Technology and Engineering. Vol.7, Issue – 653, , 2019, pp.139-143
5.	M.Sundararajan, Tamil Selvan. S, "Performance parameters of 3 value 8t cntfet Based Sram Cell Design Using H-Space", International Journal of Recent Technology and Engineering. Vol.8, Issue – 235., 2019, pp.22-27
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7.	M.Sundararajan, Hema. R, Balaji. S, "Smartphone control robot with automatic firing gun",Publication of International Journal of Innovative Technology and exploring engineering. Vol.8, Issue – 953., 2019, pp.625-627
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9.	M.Sundararajan, Kongkham D, "Distributed Wideband sensing method for faded dynamic spectrum access", Publication of International Journal of Innovative Technology and exploring engineering. Vol.8, Issue – 10., 2019, pp.4309-4312
10.	M.Sundararajan, Prashantgokul.K, Paul.P.K, "Big data management data science and data analytics: What is it and where-an educational in indian perspective", Publication of International Journal of Innovative Technology and exploring engineering.

11.	Kongkham.D & Sundararajan.M, “ Optimization scheme with energy detector model for cognitive radio networks”, Published in International journal of Innovative Technology and Exploring Engineering, Vol. 8., Issue – 4, 2019, pp. 376-381. (Scopus Indexed)
12.	Kongkham.D & Sundararajan.M, “ Minimized interference in CRN using conjunction analysis and resource utilization over the network”, Published in International journal of Innovative Technology and Exploring Engineering, Vol. 8., Issue – 4, 2019, pp. 368-375. (Scopus Indexed)
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15.	Daimiwal.N, Martin.B, Sundararajan.M & Shriram.R.,” Robust estimation of brain functional connectivity from functional magnetic resonance imaging using power, cross correlation and cross-coherence”, Published in Advances in Intelligent systems and Computing, Vol 712, July 2018, PP 403-414. (Scopus Indexed)
16.	Shriram.R., Martin.B, Sundararajan.M & Daimiwal.N,” Statistical Analysis of derivatives of cranial Photoplethysmogram in Young adults”, Published in Advances in Intelligent systems and Computing, Vol 712, July 2018, Pp 415-425. (Scopus Indexed)
17.	R.Varatharajan, M.Sundararajan, Xiao-zhi Gao & Jinming Wen,” Introduction to special issue on Green Computing Technique for wireless Sensor Networks”, Published in Sustainable Computing: Informatics and Systems, Vol 18, June 2018 pp 78-79. (Scopus Indexed)
18.	Khanaa, V., Sundararajan, M.,” Enhancing the true-positive alarm rate in network intrusion detection using online adaboost method”, Published in International Journal of Pure and Applied Mathematics, 119(Special Issue 7B),(2018) pp. 1507-1515. (Scopus Indexed)
19.	Karthick, R., Sundararajan, M.,” A novel 3-D-IC test architecture-a review”Published in International Journal of Engineering and Technology(UAE)-2018, Vol. 7(Issue 1.1), pp. 582-586. (Scopus Indexed)

20.	Khanaa, V., Sundararajan, M.,” Survey of IoT based prediction of bus arrival time using GPS system” Published in International Journal of Pure and Applied Mathematics, 119(Special Issue 7B),(2018) pp. 1499-1506. (Scopus Indexed)
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22.	Karthick, R., Sundararajan, M.,” Optimization of MIMO channels using an adaptive LPC method”, Published in International Journal of Pure and Applied Mathematics, 118(Special Issue 10),(2018) pp. 131-134. (Scopus Indexed)
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26.	Kanniga, E., MohamedMalik, S., Sundararajan, M.,” Multicast MIMO system using spatial modulation”, Published in International Journal of Pure and Applied Mathematics, 119(Special Issue 7B),(2018) pp. 1483-1490. (Scopus Indexed)
27.	Kanniga, E., Kumar, S., Sundararajan, M., Malik, S.M.,” Literature survey on indigenous stealth nano drone”, Published in International Journal of Pure and Applied Mathematics , 119(Special Issue 7B),(2018) pp. 1423-1430. (Scopus Indexed)
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45.	Beulha Hemalatha, Dr.M.Sundararajan & S.Arul Selvi," FPGA based scalable switching network for wireless PBX systems", Published in International Journal of Pure and Applied Mathematics, Volume 116, Issue 15 Special Issue, 2017, Pages 387-392. (Scopus Indexed)
46.	S.Arul Selvi, S.Karthick & Dr.M.Sundararajan," A frame work for road network extraction from remotely sensed high resolution images", published in International Journal of Pure and Applied Mathematics, Volume 116, Issue 15 Special Issue, 2017, Pages 355-360 (Scopus Indexed).
47.	R.Karthick & Dr.M.Sudnararajan," Design and implementation of low power testing using advanced razor based processor", Published in International Journal of Applied Engineering Research, Volume 12, Issue 17, 2017, Pages 6384-6390.(Ref.Jor-Anne-II)
48.	R.Karthick & Dr.M.Sundararajan," PSO based out-of-order(OoO) execution scheme forth-MPSOC", Published in Journal of Advanced Research in Dynamical and Control Systems, Volume 9, Issue Special Issue 6, July 2017, Pages 1969-1986 (Ref.Jor-Anne-II)

49. L.Escalin Tresa & Dr.M.Sundhararajan,” Advanced Image Compression Technique for Medical Imaging Using MPEG H.264”, Published in Journal of Computational and Theoretical Nanoscience, Volume 14, Number 6, June 2017, pp. 2653-2665. (Ref.Jor-Anne-II).

9. DETAILS OF BUDGET

NAME OF INSTRUMENTS / EQUIPMENTS	MODEL / MAKE	VALUE
Spin coating unit	Spectron Spin coating	2000
Dip coating unit	Spectron Dip coating	2000
UV-Vis Spectrophotometer	Uv-1800 shimadzu	50000
Hot air oven	SG furnace	12000
Ultrasonic cleaner	Sigma scientific	4000
Incubator shaker	Krishnaram laboratories	10000
Magnetic stirrer with hot plate	Sigma scientific	8,000
Electronic balance	Sigma scientific	4000
Polishing machine	Southern metallurgical	3000
Miscellaneous	Electrinks	5000
	Total	100000

10. Name of at least two subject experts from the Institute and one from the outside

Institute with their contact details:

- a) Dr. M.Sundararajan – COE, BIHER, Chennai-600073
- b) Dr. Sreeja , Professor, Dean R&D, SSN Engg College, Chennai

CERTIFICATE FROM THE INVESTIGATOR

Project Title: Augmented Reality on User Friendly Maneuver for Hunting Arsenic Toxicant

It is certified that

1. I do hereby agree to submit a complete proposal for financial support to the external funding agency within the time period of SMS-2018
2. I undertake that spare time on equipment procured in the project will be made available to other users.
3. I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in to.
4. I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involves field trails/experiments/exchange of specimens, human & animal materials etc.
5. I agree to abide by the terms and conditions of SMS-2018, BIHER, and Chennai.


Name and signature of


Principal Investigator


Name and signature of

Co-Principal Investigator

Date: 09 /02/ 2020

Place: Chennai-73


Forwarded by Head of the Department


Signature of the Head

PROJECT EVALUATION FORMAT

Recommendation Sheet

Name of the Principal Investigator	Mrs. R.HEMA
Name of the Co-Investigator	Dr. M.Sundararajan
Name of the Department	ECE
Title of project	Augmented Reality on User Friendly Maneuver for Hunting Arsenic Toxicant
Recommendation of the evaluation committee	- Recommended -
Financial allocation recommended	Rs. 1,00,000 -

NAME OF INSTRUMENTS / EQUIPMENTS	MODEL / MAKE	VALUE
Spin coating unit	Spectron Spin coating	2000
Dip coating unit	Spectron Dip coating	2000
UV-Vis Spectrophotometer	Uv-1800 shimadzu	50000
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Magnetic stirrer with hot plate	Sigma scientific	8,000
Electronic balance	Sigma scientific	4000
Polishing machine	Southern metallurgical	3000
Miscellaneous	Electrinks	5000
	Total	100000/-

Name and Signature of the Research Advisory Committee members with date

