APJ ABDUL KALAM
TECHNOLOGICAL UNIVERSITY

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Centre for Engineering Research and Development

Report of Activities 2015-16

June 2016

THIRUVANANTHAPURAM

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Universities have been serving Societies for several centuries and over that period, Universities and the World have both undergone significant changes. People are increasingly mobile and competition is growing in every sphere of activity with changes in social structures, values and attitudes.

One of the important roles of Universities has been to perform research that creates new technologies and systems and by providing knowledge and skill to the society. Many Governments are also looking forward to Universities in need of solutions to many problems faced by the community.

The research activities in the newly formed APJ Abdul Kalam Technological University (KTU) is planned to tackle the issues faced by the community and contribute to the technological advancements and literature in the various areas of science and engineering. The University is providing grants for various research schemes and provide assistance to research scholars. The conduct of KETCON, TECHFEST, conferences and workshops are steps to disseminate information.

This report showcases all the major activities of research and the achievements made during 2015-16. Under the APJ Abdul Kalam Technological University, Centre for Engineering Research and Development can do more fruitful programmes to boost and maintain the modern high-end research in the Engineering fraternity of Kerala in the years to come.

Dr. Kuncheria P Isaac
Vice Chancellor
APJ Abdul Kalam Technological University

Thiruvananthapuram
30-6- 2016

INTRODUCTION

Centre for Engineering Research and Development (CERD) was established by Government of Kerala vide order No GO (Ms) 79/2009/HEdn dated 4-7-2009. The Centre started functioning from 2010 June 15 onwards to provide a platform for the faculty and students of Engineering Colleges in the State to pursue their interest in research. The control and administration of the centre was vested with Engineering Research Council (ERC) constituted by the government. To boost the research activities at college level, Satellite centres were also formed and are functioning in Government Engineering Colleges in the state.

As per the APJ Abdul Kalam Technological University Act 2015 of the Government of Kerala, CERD was dissolved and brought under the University. Since then, the centre is acting as the research arm of APJ Abdul Kalam Technological University. All research activities under the University is controlled by Research Council constituted by the Government. Research regulation of KTU was published in July 2015 and PhD registrations were started under KTU in the academic year 2015-16 onwards in various affiliated engineering colleges. The 2nd Research Council (RC) meeting of the University held on 29-2-2016 approved distribution of research funding to NBA accredited private self supported engineering colleges in addition to Government supported engineering colleges in Kerala.

Various schemes are being implemented by the Centre to motivate, mentor and support researchers. Some of the popular activities of CERD are :

- Research seed money to faculty members
- Support to innovative student projects at under graduate level
- Support for conducting workshops in thrust areas
- Funding to research promotional activities like exhibitions and conferences
- Fellowship to PhD research scholars etc.

The best researcher award is given annually to one faculty, selected from faculty members of Govt. Engineering Colleges in the state. Four Centres of Excellence were started to focus research on thrust areas. The centre of excellence started in College of Engineering Trivandrum called **Centre for Research in Fluid Dynamics,** could give significant contribution in the thrust area of research 'computational fluid dynamics'.

This report is brought out as the second research report of KTU, detailing the research activities during the year 2015-16.

MAJOR SCHEMES OF CERD

1. Research Seed Money

The objective of this scheme is to provide financial assistance to faculty of engineering colleges in Kerala to initiate research in frontier areas of Engineering and Technology. The proposals submitted by investigators are scrutinized and recommended for funding by a screening committee consisting of experts from institutions of national repute. The maximum assistance is Rs. 2 lakh. Summary of projects and Institutions that availed are given below :

SL. #	Institution	Number of projects sanctioned	
		2010-2015	2015-16
1	College of Engineering Trivandrum	42	3
2	Govt. Engineering College, Thrissur.	17	2
3	Rajiv Gandhi Institute of Technology, Kottayam.	6	--
4	Govt. Engineering College, Barton Hill, Trivandrum.	1	--
5	Govt. Engineering College, Kannur	4	--
6	Govt. Engineering College, Sreekrishnapuram, Palakkad.	1	--
7	Govt. Engineering College, Wayanad.	2	--
8	Govt. Engineering College, Kozhikode.	1	--
9	T.K.M. College of Engineering, Kollam.	4	--
10	N S S College of Engineering, Palakkad.	4	--
11	L B S Institute of Technology for Women, Poojappura, Trivandrum	1	--
12	Model Engineering College, Thrikkakkaara	--	1
Total		83	6

Total amount sanctioned for research seed money in the year 2015-16 is Rs 11,50,000/-.

If we knew what it was we were doing, it would not be called research, would it?

Albert Einstein

Details of few Research Seed Money Projects completed in the reporting period are given below:

Title of Project	**1.1 Analysis & Control of Grid Connected Inverter for Distributed Generation System**		
Name and address of Coordinator	**Dr. M. Nandakumar** Associate Professor in EEE Govt. Engineering College, Thrissur	**Amount**	**Rs. 152384/-**
	The concept of integrating small and medium size generating units into distribution works as alternative generating sources and becoming a reality in the world wide. Social and political considerations which encourage the utilization of renewable energy sources resulted in large deployment of Distributed Generation (DG) in power system. This paradigm is motivated by the increasing concern over greenhouse emissions and the need for eliminating the unnecessary transmission and Distribution costs. It is expected that (DG) will have a significant contribution in electrical power system in near future. Power quality, safety and environmental concerns and commercial incentives are making alternative energy sources, eg. fuel cells, photovoltaic devices, wind power and gas fired micro turbines, more desirable.		
Publications	1. Dr. M. Nandakumar and Anns George, "Reactive Power and Harmonic Compensations Using Icos Control Technique in Grid Interactive Inverter", National Conference on Advances in Manufacturing, Systems and Processes, Government Engineering College Thrissur in September 2012, p-p 360-364 2. M. Nandakumar and Ansu James, "Grid Interactive Inverter Using Instantaneous PQ Control Algorithm" National Conference on Advances in Manufacturing, Systems and Processes, held at Government Engineering College, Thrissur in September 2012, p-p 349-355		

When we tackle obstacles, we find hidden reserves of courage and resilience we did not know we had. And it is only when we are faced with failure do we realise that these resources were always there within us. We only need to find them and move on with our lives.

A. P. J. Abdul Kalam

Title of Project	**1.2 Implementation of Shunt Active Power Filter with Modified Hysteresis Controller for Elimination of Harmonics and Improvement of Power Factor**		
Name and address of Coordinator	**Ms. Suhara E M** Assistant Professor in EEE Govt. Engineering College, Thrissur	**Amount**	**Rs. 206967/-**
	Recent wide spread applications of power electronic equipment has caused an increase of the harmonic disturbances in the power systems. The non-linear loads draw harmonic and reactive power components of current from AC mains. Here an adaptive hysteresis band current controlled shunt active power filter is presented to eliminate harmonics and to compensate the reactive power of three-phase rectifier. This current controller changes the hysteresis bandwidth according to modulation frequency, supply voltage, DC capacitor voltage and slope of the reference compensator current wave. An algorithm based on synchronous reference frame theory (d-q-o) is used to determine the suitable current reference signals. The feasibility of the presented scheme is confirmed using the MATLAB Simulink Power System Tool Box and the results were analysed. Hardware implementation of system has been done to validate the simulation results obtained. Analysis of results shows that the presented method is found qite satisfactory to eliminate harmonics and reactive power components from utility current and is also found effective to meet IEEE 519 standard recommendations on harmonics levels.		
Publications	1. Suhara E M, B. Jayanand "DSP based Implementation of a Shunt Active Power Filter Employing Synchronous Detection Method", DRDO Sponsored Eighth Control Instrumentation System Conference, CISCON-2011. 2. Suhara E M, Sangeetha E R, E. A Jasmine "Analysis of Harmonics in an Educational Institution and Active Filter Design for Mitigation", IEE RAICS 2011. 3. Subin Chacko, E. M Suhara, "Adaptive Hysteresis Band Current Controller for the Shunt Active Power Filter Using the d-q0 Reference Frame Theory", NAIMSAP, 5-7 September 2012. 4. Neethu Michael Elizabeth, B. Jayanand, Suhara E M, "Performance Evaluation of Shunt Active Power Filter Using Hysteresis Band Controller", NATCON 2012, GEC Thrissur. 5. Suhara E M, M. Nandakumar, "Analysis of Hysteresis Current Control Techniques for three phase PWM rectifiers", IEEE SPICES 2015. 6. Suhara E M, M. Nandakumar, "Analysis of Hysteresis Current Controlled Three Phase PWM Rectifier with Reduced Switching loss", CISCON 2015.		

Title of Project	**1.3 Fractal Analysis of Epileptic EEG Data**		
Name and address of Coordinator	**Dr. K. P. Indiradevi** Principal Govt. Engineering College, Thrissur	**Amount**	**Rs. 86943/-**
	The EEG is a complex signal, the statistical properties of which depend on both time and space. The presence of non-linearity in the EEG record from epileptogenic brain further supports the concepts that the epileptogenic is a nonlinear system. Seizure prediction is a challenging topic in EEG processing. The existence of the preictal period is the basic requirement for genuine prediction of epilepsy. A thorough study on complexity of epileptic EEG data is highly needed for seizure prediction. Most methods used correlation dimension, Lyapunov exponent and regularity measures such as Sample and approximate entropy. Recently, fractal dimension methods, such as the Hurst exponent is related Fractal dimension, which measures the smoothness of the signal. Here a multilevel wavelet based Hurst exponent is proposed for measuring the complexity of EEG records of epileptic patients. The performance of this method is compared with power spectrum, Re-scaled range method, Wavelet transform method and with sample entropy and approximate entropy methods.		
Publications	1 Dr. K. P. Indiradevi, Poster Presentation, at 3rd International Conference on Neurology & Epidemiology ICNE 2013 November 21-23, Abu Dhabi, 'Comparative study of complexity analysis of epileptic scalp EEG records'. 2. Dr. K. P. Indiradevi, Poster Presentation, at 3rd International Conference on Neurology & Epidemiology ICNE 2013 November 21-23, Abu Dhabi, 'A new techniques for automatic pruning and detection of epileptic spikes using discrete wavelet transform'.		

Governments will always play a huge part in solving big problems. They set public policy and are uniquely able to provide the resources to make sure solutions reach everyone who needs them. They also fund basic research, which is a crucial component of the innovation that improves life for everyone.

Bill Gates

Title of Project	1.4 Geographic Information System as an Aid for Flood Mitigation		
Name and address of Coordinator	**Dr. N. Sajikumar** Professor in Civil Engineering Govt. Engineering College, Thrissur	**Amount**	**Rs. 99197/-**
	Land use change like conversion of paddy field for habitat construction and commercial purposes led to the blockage of natural drainages in urban area, leading to health hazards due to prevalence of unhygienic condition, spreading of epidemic like chickengunia and blocking of transportation links. In order to alleviate such conditions, local bodies spend a lot of its fund for improvement of the drainage. However, these attempts are based on a day to day requirement with little comprehensive planning, resulting in wastage of certain portion of money. The comprehensive planning requires the development of the flood simulation model on a geographic framework.		
Publications	Number papers published in national conferences – 3 Number papers published in International conferences – 3		
Any other information	Young Scientist award for student who had done a part of the project Best paper award in Civil stream in ICMF 2013		

Title of Project	1.5 Development of an Experimental Test Facility to Assess and Quantify the Improved Coefficient of Performance of Refrigeration System with Vapour Injection		
Name and address of Coordinator	**Dr. N. Asok Kumar** Professor in Mechanical Engineering College of Engineering, Trivandrum	**Amount**	**Rs. 1,69,463/-**
	Experiments were conducted to locate vapour injection points as well as analysis of performance of compressor and condenser in a R22 vapour injection system in ambient condition. Principal aim of this study is to study performance comparison of system components in vapour compression cycle and vapour injection cycle. The main conclusion derived from the study is increase of vapour injection pressure reduces degree of super heat of refrigerant at the exit of compressor.		
Publications	Sreejith B K and N Asok Kumar "Performance Evaluation of Vapour Injected Refrigeration System at Various Injection Pressures", 13th National Conference on Technological Trends, August 10-11, 2012, CET, India.		

2. Student Projects

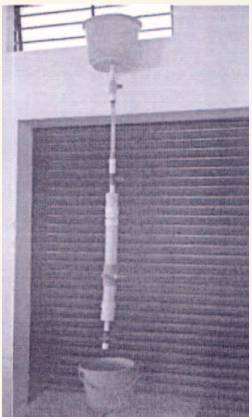
The objective of this scheme is to provide financial assistance to execute innovative projects of under graduate students of Government/ Government aided/ Government Controlled Engineering Colleges in Kerala. The maximum assistance is Rs. 50,000/-. Summary list of the student project sanctioned are given below :

SL #	Institution	No. of projects sanctioned	
		2010-15	2015-16
1	College of Engineering, Trivandrum	62	12
2	Govt. Engineering College, Thrissur	18	--
3	Rajiv Gandhi Institute of Technology, Kottayam	22	5
4	Govt. Engineering College, Barton Hill, Trivandrum	6	--
5	Govt. Engineering College, Kannur	30	--
6	Govt. Engineering College, Sreekrishnapuram, Palakkad	8	--
7	Govt. Engineering College, Wayanad	3	--
8	Govt. Engineering College, Kozhikode	7	--
9	Govt. Engineering College, Idukki	17	--
10	T.K.M. College of Engineering, Kollam	2	--
11	N.S.S. Engineering College, Palakkad	12	--
12	MA College of Engineering, Kotahamnagalam	--	1
13	College of Engineering, Pathanapuram	8	19
14	College of Engineering, Thalassery	1	--
15	LBS College of Engineering, Muliyar, Kasaragod	2	--
16	College of Engineering; Karunagappally	2	--
17	Sree Chithira Thirunal Engineering College, Trivandrum	1	--
18	Cochin University of Science and Technology, Kochi	1	--
19	College of Engineering; Perumon	3	--
20	College of Engineering; Adoor	1	--
20	College of Engineering; Attingal	4	--
	Grand Total	210	37

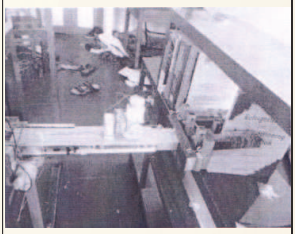
Total amount sanctioned for innovative student projects in the year 2015-16 is Rs 13,82,558/-.

Details of few student projects are given below :

Title of Project	2.1 Human Powered Electricity Generation Manual Treadmill-Design and Implementation.		
Name and address of Coordinator	**Mr. Rajesh K** Assistant Professor in EEE Rajiv Gandhi Institute of Technology, Kottayam	**Amount**	**Rs. 48,089/-**
	The modern challenge faced with global energy situation is a growing energy and the strong dependence on unsustainable fossil fuels. Another concurrent issue is adverse health and socio-economic implications of adult obesity. Human power generation, which uses metabolized human energy to generate electric power, could potentially address both these challenges. The tread mill, one of the most popular exercise machines, presently consumes large amounts of energy while dissipating a majority as heat. The purpose of this project is was to design and develop human powered tread mill generator and determine its power generation potential.		
Any other information	One among the 12 projects from state shortlisted for "AISAT-NKC Award" for the best student project conducted by AISAT college,		

Title of Project	2.2 Design and Fabrication of Compact Household Water Treatment System for Fluoride Removal.		
Name and address of Coordinator	**Dr. Vinish V Nair** Associate Professor in Civil Engineering Rajiv Gandhi Institute of Technology, Kottayam	**Amount**	**Rs. 28,022/-**
	Drinking water contamination by fluoride is recognised as a major public health problem in many parts of the world. In fact, although fluoride is an essential trace element for animals and humans, excessive fluoride intake may cause adverse health effects. Present study has been conducted to investigate efficiency of various bio-adsorbents such as MorigaOleifera (MO), Rice Husk Ash (RHA), Activated Vertiver Root (AVR) and efficiency of composite bed of bio adsorbents, their proportions using experimental column study. With a constant initial fluoride concentration it was found that increasing MO dose in composite bed results in increased fluoride removal. Prepared composite bed of 4 cm thick consisting of 75% of RHA &25% of MO shows n enhanced removal of fluoride by 90% at an equilibrium contact time of 30 minutes		

Title of Project	2.3 Arm Design for Book Picking Robot		
Name and address of Coordinator	**Mr. Anjan R Nair** Assistant Professor in Mechanical Engg. Govt. College of Engineering, Kannur	**Amount**	**Rs. 35133/-**

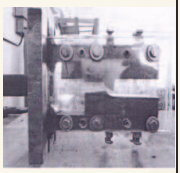


In today's world the information access becoming digital still lot of people depend on library for information. This paper describes a unique robotics project, within the context of libraries. As libraries provide a growing array of digital library services and resources, they continue to acquire large quantities of printed material. This combined pressure of providing electronic and print-based resources and services has led to severe space constraints for many libraries. Consequently, many libraries have built or plan to build off site shelving facilities to accommodate printed materials. An autonomous mobile robotic library system has been developed to retrieve items from book shelves and carry them to stations located in the off-site shelving facility. The automatic moving robot according to the input that is given and picks by using a mechanical arm. It has got to degrees of freedom, controlled by using geared motors.

Title of Project	2.4 Smart power control and security system		
Name and address of Coordinator	**Dr. Manju Manuel** Associate Professor in EEE Govt. College of Engineering, Kannur	**Amount**	**Rs. 43,914/-**

This project is designed on an RF based power control and security system using AVR micro Controller. This system provides three main facilities Automatic room power control, IR based counter, automatic front door light control and automatic room security system. It will find application in office and commercial buildings. This automatic system not only save electricity by automatically switching off the mains power but also count the number of people entering and leaving the building as well as it provide security for the whole room/building. The system consists of a transmitter and receiver section. In the transmitter section with the help of AT mega micro controller, the IR sensor senses the individuals and displays the count as well s time on LCD screen and front door light can be set and adjusted. At the receiver section the count received and processed by AT mega, and light is turns on and off automatically and GSM modem Provide Security.

Title of Project	2.5 Production of Bio Diesel from Chicken Wastes		
Name and address of Coordinator	**Dr. Ushakumary E R** Associate professor Department of Chemical Engineering Govt. Engineering College, Kozhikode	**Amount**	**Rs. 46940/-**
	Biodiesel has become an attractive focus due to its environmental friendliness and benefits. Different types of raw materials are available for the production of biodiesel. In this study a waste bio mass, chicken waste is used for biodiesel production. At first we produced bio diesel, then its properties were found out. In order to confirm that its constituents are methyl esters, FTIR analysis & GCMS are done. Then engine efficiency tests on various blends are done in order to make sure that this biodiesel can be used in engines without modifying the engine. A thorough study was made during the course of the project.		

Title of Project	2.6 Design, Development and flow visualization of dual bell nozzle and expansion deflection nozzle.		
Name and address of Coordinator	**Mr. Dhanesh Chatta** Assistant Professor Government Engineering College, Kannur	**Amount**	**Rs. 29,087/-**
	Both dual bell nozzle and expansion deflection (ED) nozzle belongs to a class of altitude compensating nozzle. An altitude compensating nozzle is used for improving the performance of rocket over a range of varying altitude. The project is aimed at designing the nozzle profiles: fabricate a test nozzle and carryout flow visualization. We have designed the nozzles at MAT LAB. AUTO CAD modelling is carried out. The test nozzle for expansion deflection nozzle is fabricated out of mild steel. The flow visualization is carried out using schlirien setup. The flow patterns are obtained and studied.		

It's very important to take risks. I think that research is very important, but in the end you have to work from your instinct and feeling and take those risks and be fearless. When I hear a company is being run by a team, my heart sinks, because you need to have that leader with a vision and heart that can move things forward.

Anna Wintour

Title of Project	2.7 Electro- Milk Tester		
Name and address of Coordinator	**Mr. Binu L S** Assistant Professor in ECE College of Engineering, Thiruvananthapuram	**Amount**	**Rs. 30,210/-**
	In recent years the national Dairy Development Board- initiated cooperative movement has led to substantial increase in milk production in India. The two main reasons for this increase are the efficient collection of milk and higher profit for the producers, both of which have to some degree been influenced by information technology. It is only recently that automation has been introduced into agriculture. In many dairy farms, computer aide control of physiological and sanitary parameters are already used and lead to a productivity increase and the elimination of some tedious operations. But even at this age of Technology, these establishments use old equipments to get convenient and wrong quality tests and thus the small dairy farmers are cheated because of their honesty. So we plan on designing and implementing an embedded solution which would allow for fast and accurate determination of the sample parameters and which can replace the existing methods.		

Title of Project	2.8 Advanced Braille Note Taking Device		
Name and address of Coordinator	**Mr. Premanand B** Associate Professor Govt. Engineering College, Thrissur	**Amount**	**Rs. 17367/-**
	The aim of the project is to create a small portable device which will act as a Braille note taker and enable the user to access internet for sending or receiving email and it can also be used as a remote to control various home appliances. The system comprises of a Braille device, a host which may be computer or ARM board and a slave device. It is designed to e operated in 2 modes. The proposed device will be a less costly and will be very small as compared to the existing Braille note takes. The user can access internet when connected to a computer. By connecting to ARM board they can access internet even when they are not near a computer which will make the proposed device a portable one.		

Title of Project	2.9 Android Based Accident Reporting System		
Name and address of Coordinator	**Dr. Manju Manuel** Associate Professor in EEE Govt. College of Engineering, Kannur	**Amount**	**Rs. 31,396/-**
	This project senses an accident in the vehicle and sends the location to an android application so that emergency care can be provided. A GPS module is used to locate the position of the vehicle. This position is sent to a server with the help of GSM module which is then accessed by an android application. This application then notifies the user about the accident and then provides the shortest distance to the location of the accident with the help of a map. When there is an accident, the accelerometer sensor detects the force experienced and compares it with predefined threshold value and sends a signal to the processor. The processor analyses the signal and finds if there is an accident. It then immediately sends the position of the vehicle to a web server so that android applications can access the data to show the position in the map. The android application is accessible by an android user, so that the nearest emergency responders like the ambulance, police can arrive in time to clear the traffic. This reduces the time taken by ambulance to arrive and also traffic can be cleared easily.		

Title of Project	2.10 Electrical Power Generation from Railway Track		
Name and address of Coordinator	**Ms. Abjhasree S. S** Assistant Professor in EEE College of Engineering, Pathanapuram	**Amount**	**Rs. 28,250/-**
	In this project we generate electrical power by running the train on the railway track. Non-conventional energy using railway track needs no fuel power to generate the output electrical power. This project uses simple drive mechanism such as rack and pinion assembly and chain drive mechanism. The pushing power is converted into electrical energy by proper driving arrangement. The number of vehicles passing over the track is increasing day by day. So the possibility of tapping energy and generating power by making the railway track as a power generation unit is enormous.		

Ideas for my first experiments in human aggression came from discussions we had in a research seminar about William Golding's 'Lord of the Flies.'

Philip Zimbardo

Title of Project	2.11 Hybrid Power Generation Using Piezoelectric Material and Speed Breaker		
Name and address of Coordinator	**Ms. Abjhasree S. S** Assistant Professor in EEE College of Engineering, Pathanapuram	**Amount**	**Rs. 31,476/-**
	This project relates about the generation of electricity from the non-conventional source of energy. The energy wasted by the vehicles in the power hump is utilised for the generation. The project is implemented using rack and pinion mechanism; the mechanical energy is converted into electrical energy and is stored in a battery. Likewise, when pressure is applied on the piezoelectric material an output is produced. The generated electricity can be used in street light and traffic control. The best method of producing electricity is from piezoelectric material. It is shown that with proper configuration, a single piezo-film can generate enough electrical density that can be stored in a rechargeable battery for later usage.		

3. Financial Support to Workshops/Seminars

In order to promote research in engineering and technology, financial assistance is provided for hosting Seminars, Symposia and Workshop on research related subjects. The maximum assistance is Rs. 60,000/-.

SL #	INSTITUTION	No. of Projects Sanctioned	
		2010-15	2015-16
1	College of Engineering Trivandrum	10	1
2	Govt. Engineering College, Thrissur	3	1
3	Rajiv Gandhi Institute of Technology, Kottayam.	2	--
4	Govt. Engineering College, Barton Hill, Trivandrum.	1	1
5	Govt. Engineering College, Sreekrishnapuram, Palakkad.	1	--
6	Govt. Engineering College, Wayanad	5	--
7	N S S College of Engineering, Palakkad	1	--
8	M.A. College of Engineering; Kothamangalam	1	1
9	College of Engineering, Punnappara	--	1
	Grand Total	24	5

A one day workshop on "Trusted Systems" was conducted at College of Engineering, Trivandrum on 12th October 2015 in collaboration with the Stevens University, New Jersey. The resource persons were from Stevens University and from KTU. Participants are faculty members from affiliated colleges to KTU. Prof. R Chandramauli of Stevens University and Dr.Ciza Thomas B, Professor in Electronics and Communication Engineering, College of Engineering Trivandrum were the coordinators of the programme.

Workshop on Trusted systems at College of Engineering, Trivandrum on 12-10-2015

സൈബർ കുറ്റകൃത്യങ്ങൾ തടയാൻ കോർ ഗ്രൂപ് രൂപവത്കരിക്കുന്നു

● സാങ്കേതിക സർവകലാശാലയും സ്റ്റീവൻസ് ഇൻസ്റ്റിറ്റ്യൂട്ടും സഹകരിച്ചാണ് പദ്ധതി

തിരുവനന്തപുരം: വെബ്സൈറ്റ് ഹാക്കിങ് ഉൾപ്പെടെ സൈബർ മേഖലയെ കുറ്റകൃത്യങ്ങൾ തടയുന്നതിന് എ.പി.ജെ. അബ്ദുൽ കലാം സാങ്കേതിക സർവകലാശാലയും അമേരിക്കയിലെ സ്റ്റീവൻസ് ഇൻസ്റ്റിറ്റ്യൂട്ടും ചേർന്ന് കോർ ഗ്രൂപ്പിന് രൂപം നൽകുന്നു. സാങ്കേതിക സർവകലാശാലയിൽ സംഘടിപ്പിച്ച അന്താരാഷ്ട്ര സാങ്കേതിക സമ്മേളനത്തിലാണ് തീരുമാനം.

സൈബർ രംഗത്ത് വ്യാപകമാകുന്ന ഹാക്കിങ്, സാമ്പത്തിക തട്ടിപ്പുകൾ, സാമൂഹിക സ്വാ

ഹാർദം തകർക്കുന്ന പ്രചാരണങ്ങൾ തുടങ്ങിയവ പ്രതിരോധിക്കാൻ കോർ ഗ്രൂപ് ഒന്നിച്ച് പ്രവർത്തിക്കുകയും പുതിയ ആശയങ്ങളും സാങ്കേതികവിദ്യയും വികസിപ്പിക്കുകയും ചെയ്യും. ടി.സി.എസ്, ഇൻഫോസിസ് എന്നിവയുടെ സഹകരണത്തോടെയായിരിക്കും കോർ ഗ്രൂപ് പ്രവർത്തിക്കുക. സംസ്ഥാന സർക്കാറുമായും സഹകരിക്കും. ഭാവിയിൽ ഇത് ഓസ്ബർ സുരക്ഷാകേരളയിലെ ഇന്ത്യക്കും അമേരിക്കക്കുമിടയിലെ സഹകരണമാക്കി വികസിപ്പിക്കും. കേരള സർക്കാറിന്റെ ഔദ്യോഗിക വെബ്സൈറ്റിന് നേരെയുണ്ടായ ആക്രമണങ്ങളും സമ്മേളനത്തിൽ ചർച്ചയായി. ഇതെല്ലാം മുന്നിൽകണ്ട് സൈബർ സുരക്ഷക്കുള്ള പുതിയ ആശയങ്ങളും സാങ്കേതികവിദ്യയും കോർ ഗ്രൂപ് വികസിപ്പിക്കുക. ഈ മേഖലയിലെ വിപുലമായ ഗവേഷണങ്ങൾക്കും കോർ ഗ്രൂപ് തുടക്കം കുറിക്കും.

ഐ.ഐ.ടി.എം.കെ പ്രൊഫസറും മുൻ കേന്ദ്ര വ്യോമയാന സെക്രട്ടറിയുമായ മാധവൻ നമ്പൂതിരി സമ്മേളനം ഉദ്ഘാടനം ചെയ്തു. സാങ്കേതിക സർവകലാശാല വൈസ് ചാൻസലർ ഡോ. കെ.പി. മോഹനൻ അധ്യക്ഷത വഹിച്ചു. സ്റ്റീവൻസ് ഇൻസ്റ്റിറ്റ്യൂട്ട് വൈസ് പ്രസിഡന്റ് ജോർജ് കൊപ്പീയാത്തിസ് മുഖ്യപ്രഭാഷണം നടത്തി. പ്രഫ. ആർ. ചന്ദ്രമൗലി, പ്രഫ. കെ.പി. സുധീർ, ലക്ഷ്മി, ബാംഗ്ലൂരു ഇൻഡ്യൻ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് സയൻസിലെ പ്രഫ.എൻ. ബാലകൃഷ്ണൻ, പ്രഫ. നിക്കോളാസ് ബൊവർ, പ്രഫ. ജോർജിയോസ്, പ്രഫ. ഗ്രെഗ് വൈസാൻഡർ, പ്രഫ. സിസ മോസസ് എന്നിവർ സംസാരിച്ചു.

Newspaper report of workshop on Trusted Systems

A Two day workshop on "Analytical and Documentation Tools for Research" was conducted at Govt. Engineering College, Thrissur during 15th to 16th October 2015. Faculty/Research Scholars of AICTE approved Engineering Colleges registered in the workshop. Shri. Binoy B.B, Asst. Professor in Electrical Engineering, Govt. Engineering College, Thrissur was the coordinator of the programme.

Workshop on Analytical Documentation Tools for Research at GEC Thrissur on 15th and 16th October 2015

Pre conference workshop of international colloquium ICTER was conducted in Government Engineering College Barton Hill on 13th March 2016. The event was presidential by Prof. John Loike of Columbia University. Dr. Kuncheria P. Isaac, The Vice Chancellor of the APJ Abdul Kalam University inaugurated the programme. The workshop was coordinated by Dr. S. AnilLal.

Pre Conference Workshop associated with ICTER 2016 at Govt Engineering College BartonHill on 13th March 2016

Faculty development programme on 'nanotechnology and application in engineering' was conducted by the department of electrical and electronics in MA College of Engineering at Kothamangalam on 8-14 July 2015. Faculty of affiliated Engineering Colleges to KTU are attended the programme.

FDP on Nanotechnology Application in Engineering at MA College Kothamangalam on 8th and 14th July 2015

Total amount sanctioned for conducting workshops in affiliated colleges is Rs 3,00,000/-

4. Research Promotional Activities

Financial Assistance under this scheme is for conducting poster presentation, expert lecture etc. Maximum assistance is Rs. 60,000/-

SL #	INSTITUTION	No. of Projects Sanctioned	
		2010-15	2015-16
1	College of Engineering Trivandrum	9	1
2	Govt. Engineering College, Thrissur	1	--
3	Rajiv Gandhi Institute of Technology, Kottayam.	2	1
4	Govt. Engineering College, Barton Hill, Trivandrum.	1	2
5	Govt. Engineering College, Wayanad	1	--
6	M.A. College of Engineering; Kothamangalam	1	--
7	TKM College of Engineering, Kollam	1	--
	Grand Total	16	4

Poster presentation was organized in the College of Engineering Trivandrum in connection with National Conference in Technological Trends (NCTT) 2015 for M.Tech, M.Plan and M.Arch students. There were a total of 121 posters presented from the six Departments Civil, Mechanical, Electrical, Electronics, Computer science and Architecture. The poster presentation was inaugurated by Sri.Ali Asgar Pasha, IAS, Managing Director, KTDC on 11th September 2015.

Poster presentation in the college of Engineering Trivandrum in connection with NCTT 2015 on 11th September 2015.

At Rajiv Gandhi Institute of Technology, Kottayam, MTech Thesis poster presentation contest was conducted on 1st October 2015. Dr. Ciby Thomas, Professor in charge CERD, Satellite Centre, RIT, Kottayam was the co-ordinator of the event

Poster presentation at Rajiv Gandhi Institute of Technology, Kottayam on 1st October 2015

Total amount sanctioned for research promotional activities in the year 2015-16 was Rs 2,09,500/-

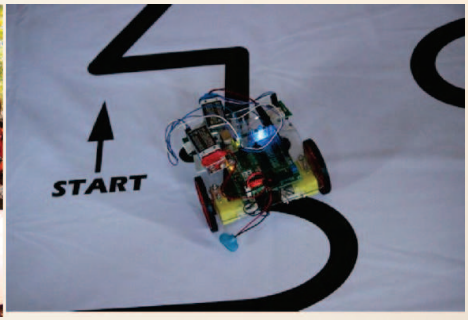
We have to build the capacity of our institutions, employees and workers. Our regulatory environment has not been encouraging to research, innovation and enterprise.

Narendra Modi

'TECHEXPO' is an inter college competition of Government Engineering College, Barton Hill Thiruvananthapuram. The technical events of the fest were conducted during 11th to 12th September 2015. Tech Expo is a research based technical exhibition. The students from different engineering colleges and students of branches other than Electronics and Communication from the same college were participated. The projects exhibited will be creative innovative and having social relevance. Smt. N Ambily, Asst.Professor in Electronics and Communication Engineering, Govt. Engineering College, Barton Hill, was the coordinator of the event.

TECH EXPO at Government Engineering College Barton Hill Thiruvananthapuram on 12th September 2015

AAGNEYA is the inter college techno cultural fest of Government Engineering College, Barton Hill, Thiruvanathapuram. The technical events of the fest were conducted on March 4th at college campus, followed by cultural events on March 5 and 6. The fest saw a huge participation with registrations exceeding 600 students from various engineering colleges of the state. Prof. Nadheera M, Assistant Professor, Electronics and Communication Department, co-ordinated the technical events.



Technical Events along with AAGNEYA 16 at Government Engineering College Barton Hill Thiruvananthapuram on 5th and 6th March 2016

5. CERD Researcher of the Year Award.

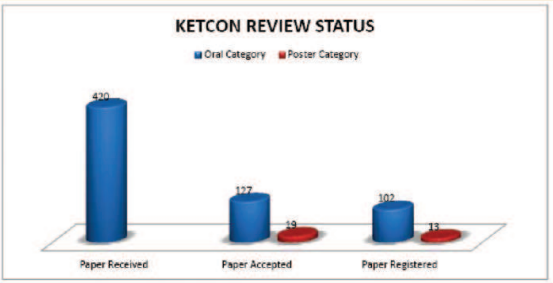
Best Researcher of the year award is given annually to the faculty of Engineering Colleges in the State considering the research output of the previous three years. The selection process is by a Screening Committee and the awardee will be eligible for a sponsored research to the tune of Rs. 15 Lakh. The award consists of citation, gold medallion (worth Rs.25,000/-), and cash award of Rs. 25,000/-. The best researcher of the year 2015 is Dr. Leena Mary, Professor and Head of Electronics and communication department, Rajiv Gandhi Institute of Technology, Kottayam.

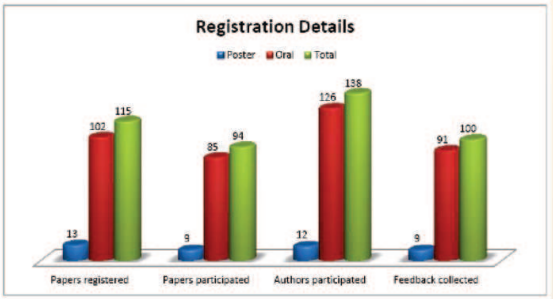
Best Researcher of the year Award 2015 to Dr. Leena Mary, RIT Kottayam
By Chief Minister Sri Ommen Chandy

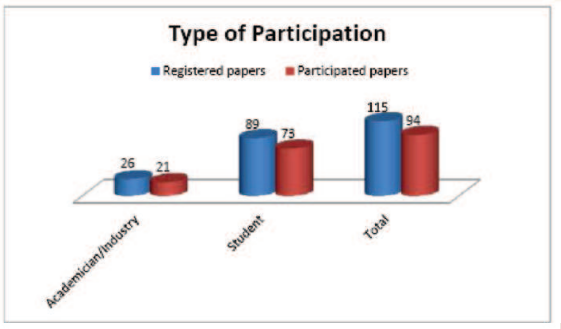
6. Kerala Technological Congress (KETCON)

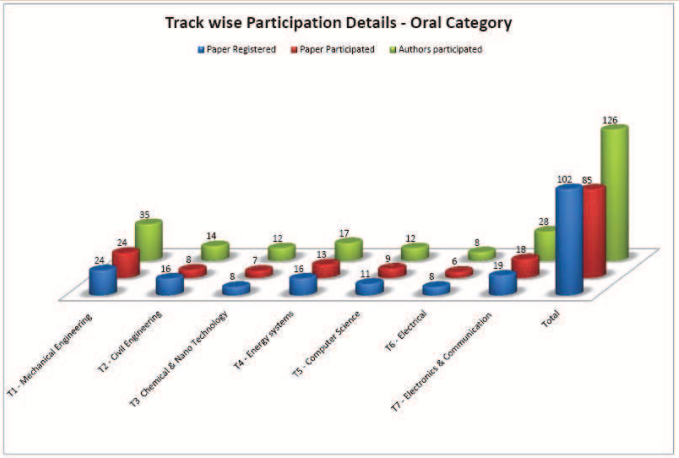
The annual Kerala Technological Congress is organized to attract the researchers from all over the country to congregate in the state. Experts of international repute working in frontier areas of technology are invited as key note speakers. This provides an opportunity to the researchers in the state to interact with national/international experts and exchange ideas. The engineering research carried out in the State is showcased during this event. Project Exhibition, competitions, research poster presentation etc. are also conducted as a part of the programme. Assistance of Rs. 15 Lakhs was provided to the hosting institution. KETCON & TECHFEST 2016 was conducted in association with Kerala State Council for Science Technology and Environment (KSCSTE).

Amal Jyothi College of Engineering (AJCE), Kanjirappally was the venue of the events this year. Prof. Dr. Kuncheria P Isaac, honourable Vice Chancellor of KTU, inaugurated the twin events on 8-1-2016. In the event, the number of research papers received was 420. After a series of reviews by peer groups, 127 were selected for oral presentation in 7 tracks. Of these, 102 papers got registered for oral presentation. It is worthy to note that 82 papers were orally presented during Jan 8-9, 2016, in 5 venues. The number of authors who attended the Congress was 126. Side by side, 19 papers were accepted for poster presentations. The number of posters registered for presentation was 13 and that presented at the venue was 9 by a total of 12 authors. All these highlight the interest developed by this event in the minds of students and faculty of the engineering colleges, and engineering professionals in Kerala.









KETCON 2016 at Amal Jyothi College of Engineering (AJCE), Kanjirappally on 8th and 9th January 2016

The valedictory function was held at 4:00 pm on January 9, 2016. Sri. Oommen Chandy, Hon'ble Chief Minister of Kerala, delivered the valedictory address, lighted the lamp, and gave away the prizes to the winning teams and the best researcher award.

7. TECHFEST

TECHFEST is the programme of Kerala State Council for Science Technology and Environment (KSCSTE) for competitive showcasing of innovative Engineering B.Tech final year projects jointly organised with CERD since 2013. This exhibition is conducted along with KETCON in the same host Institute.

In the event, TECHFEST-2016 of KSCSTE, 185 project proposals were received. These were shortlisted to 24 projects in the Competition Category and 51 under the Exhibition Category, by an Expert Committee constituted by the KSCSTE. In addition to these, the 15 projects selected under KSCSTE's INNOVATE scheme were also added to the Competition Category making it a total of 39 projects for the competition. A panel of experts nominated by KSCSTE, evaluated and graded these, for the awards. Based on final evaluation of the innovations displayed at the venue in the competition Category, three teams were awarded with first, second, and third prizes by Sri. Oommen Chandy, Hon'ble Chief Minister of Kerala, at the valedictory function held on January 9, 2016. Nine teams were awarded special prizes. Five of the projects were selected by the KSCSTE for further assistance from KSCSTE for technology up-gradation and refinement.

TECHFEST 2016 at Amal Jyothi College of Engineering, Kanjirappally

TECHFEST 2016 at Amal Jyothi College of Engineering (AJCE), Kanjirappally on 8th and 9th January 2016

8. Financial Assistance for Paper Presentation Abroad Scheme

CERD is assisting faculty to present technical papers in International Conferences, for those who are satisfying stipulated criteria. The maximum assistance is of Rs.1.5 lakh. This assistance can be availed once in two years.

INSTITUTION	2010-15	2015-16
College of Engineering; Trivandrum	8	1
Govt. Engineering College, Kannur	1	--
Govt. Engineering College, Barton Hill, Trivandrum	1	--

Availing financial assistance from this scheme, Dr. Suresh Subramoniam, Associate Professor , CET, School of Management, College of Engineering, Trivandrum presented a paper in 2016 POMS Annual Conference at Orlando, Florida, USA during 6th May to 9th May 2016.

Dr. Suresh Subramoniam presenting a paper in 2016 POMS Annual Conference at Orlando, Florida, USA on 6th May 2016.

9. Financial Assistance for Paper Presentation in India.

CERD is assisting faculty to present technical papers in National/International Conference in India organized by Profession bodies, for those who are satisfying stipulated criteria. The maximum assistance is Rs.40,000/-. This assistance can be availed once in two years.

INSTITUTION	2010-15	2015-16
College of Engineering; Trivandrum	4	1

Dr. Sunilkumar.S, Associate Professor in Mechanical Engineering, College of Engineering, Trivandrum, presented paper in 26th International Cryogenic Egnineering Conference at Manekshaaw Centre New Delhi during 7th March to 11th March 2016.

10. Incentive for Peer Reviewed Reputed Technical Journal Publication

This scheme provides an incentive to faculty for publishing technical papers in reputed and peer reviewed journals having Impact factor higher than 0.25. The maximum assistance for one paper is Rs.10,000/-.

SL. #	INSTITUTION	2010-15	2015-16
1	College of Engineering Trivandrum	69	16
2	Govt. Engineering College, Thrissur	10	6
3	Rajiv Gandhi Institute of Technology, Kottayam	14	1
4	Govt. Engineering College, Barton Hill, Trivandrum	2	1
5	Govt. Engineering College, Sreekrishnapuram, Palakkad	3	--
6	Govt. Engineering College, Idukki	3	1
7	Govt. Engineering College, Kannur	9	1
8	T.K.M. College of Engineering, Kollam	1	--
9	Govt. Engineering College, Kozhikode	1	--
10	Govt. Engineering College, Wayanad	5	--
Total		117	26

Total amount sanctioned for giving incentives to authors of journal paper publication in the year 2015-16 is Rs2,60,000/-

11. Innovation Centres

The Innovation Centres are established in Engineering Colleges to facilitate the development of innovative ideas of students. The modern tools, equipment and work shop facilities are provided to the students for realization of their ideas. Interaction with innovators is arranged on a regular basis to kindle the creative ability of the students. A maximum of Rs 20 lakhs assistance is provided to establish the centre at Govt. Engineering Colleges.

No.	Institution
1	College of Engineering Trivandrum
2	Govt. Engineering College, Thrissur
3	Rajiv Gandhi Institute of Technology, Kottayam
4	Govt. Engineering College, Sreekrishnapuram, Palakkad
5	Govt. Engineering College, Idukki
7	Govt. Engineering College, Wayanad
8	GEC, Barton Hill, Thiruvananthapuram

12. Centre of Excellence

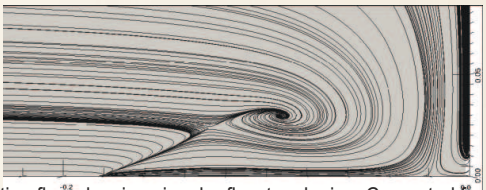
CERD takes a lead role in establishing Centres of Excellence in Thrust areas for undertaking research. At present the following centres have been funded. A maximum of Rs 50 lakhs assistance is provided to establish the centres at Govt. Engineering Colleges.

Sl #	Name	Institution	Co-ordinator
1	Centre for Research in Fluid Dynamics	College of Engineering, Trivandrum	Dr. Anil Lal
2	Laboratory for Nano Particles	Govt. Engineering College, Thrissur	Dr. Manjith B
3	Advanced Digital Signal Processing Laboratory	Rajiv Gandhi Institute of Technology, Kottayam	Dr.Leena Mary
4	Centre of Excellence in Advanced Computing	Govt. Engineering College, Palakkad	Shri.Naseer C

12.1 Centre of Excellence in CET

The Centre is known as **Centre for Research in Fluid Dynamics.** So far one Ph.D has been completed and two are in progress at the Centre. A collaborative research project with Aerospace Department faculty of IIT Madras is in progress. A wind tunnel with accessories having 100 km/hr speed with a test section of size 50 cm x 50 cm x 2 m installed. The major achievement during the period of this report is the development of two dimensional and three dimensional computer codes for the analysis of incompressible flow using MPI parallelisation. The 96 core multi-processor blade server in the center is the largest capable High Performance Computer(HPC) available in all the Engineering Colleges in Kerala. This HPC has been found to give a linear speed-up in computations upto 60 cores. This means a job taking 60 days for computation in a single processor computer can be completed in one day using decomposition of domain into 60. Experimental investigation of flow past circular cylinder is also carried out in wind tunnel using hot wire anemometer. The current research activities include:

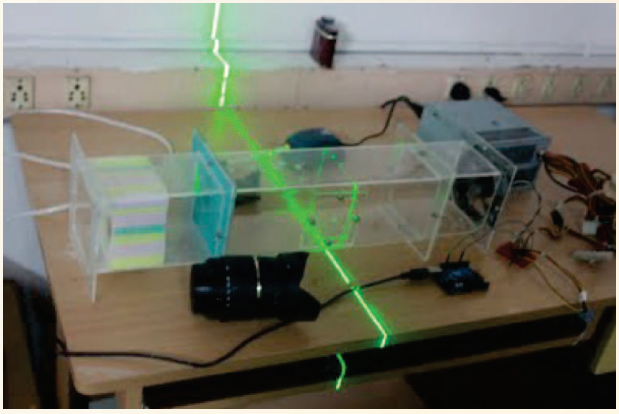
1. Stabilization of flow through multiple square cylinders (2D).
2. Natural convection in vertical annulus (3D).
3. Experimental and numerical investigation of turbulent flow past circular cylinder.
4. Three dimensional analysis of flow topology in the junction between a horizontal plate and a vertical cylinder.
5. Blood flow analysis in patient specific vessels.



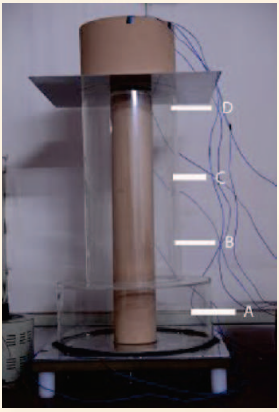
Stream lines in the junction flow showing singular flow topologies. Computed from three dimensional analysis using in house parallel code and blade server

96 core blade server HPC
(# of cores in this server
is extendable upto 256)

Low speed wind tunnel facility



Flow visualization using laser sheet.



Facility for the experimental study of
natural convection in a vertical annulus.

List of publications

1. E Jabir and S Anil Lal, Blood flow through concentric stenosis: An investigation using les, Proceedings of the 2014 International Conference on Interdisciplinary Advances in Applied Computing, ACM, 2014, p. 14.

2. E Jabir Lal and S Anil, Numerical analysis of blood flow through an elliptic stenosis using large eddy simulation, Proc IMechE Part H: J Engineering in Medicine (2016).

3. S Anil Lal and V Arun Kumar, Numerical prediction of natural convection in a vertical annulus closed at top and opened at bottom, Heat transfer engineering 34 (2013), no. 1, 70–83.

4. S Anil Lal, RV Reji, and KS Santhosh, Evaluation of diffusive flux across faces of arbitrary shaped finite volume cells, Computers & Fluids 57 (2012), 225–236.

5. S.Anil Lal and Neeraj M Paul, An accurate taylors series solution with high radius of convergence for the blasius function and parameters of asymptotic variation, Journal of Applied Fluid Mechanics 7 (2014), no. 4, 557–564.

6. MR Rajkumar, G Venugopal, and S Anil Lal, Natural convection from free standing tandem planar heat sources in a vertical channel, Applied Thermal Engineering 50 (2013), no. 1, 1386–1395.

7. S Anil Lal S Ajith Kumar and A Sameen1, Flow past a moderately heated horizontal cylinder at low Reynolds number, Journal of Aerospace Engineering, Proceedings of the Institution of Mechanical Engineers Part G (2015), 1–16.

12.2 Centre of Excellence at RIT, Kottayam.

Advanced Digital Signal Processing Research (ADSPR) Lab is the Centre of Excellence established in RIT, Kottayam. Through the consortium project funded by Department of Electronics and Information Technology, Government of India, ADSPR Lab is collaborating with 10 leading Institutes in different parts of India which included IIT Kanpur, IIT Kharagpur, IIT Guwahatti, and IIT Hyderabad. The faculty are actively involved in the funded research projects undertaken by the centre. Completed one patent search for one work (Invention Disclosure Form under preparation) and search completed for another. Considering the research contributions during the period 2012-2015, Dr. Leena Mary was selected as the "Researcher of the Year 2015" award instituted by CERD, KTU. Five Ph. D scholars (3 under KTU and 2 under MGU) are attached to this research lab.

ADSPR Lab in a glance and Dr. K. Balan, Former Director, CERD evaluating the research proposal in one day workshop on "Engineering Research: Opportunities and Challenges" held on 28th March 2016 organized by the centre.

13. CERD Ph.D Research Fellowship

This Scheme is available to students intending to pursue full time research leading to PhD Degree. Selection is on the basis of research aptitude test and personal interview. The monthly fellowship of Rs. 18,000/-for the first two years and Rs. 20,000/- for the third year. In addition, annual contingent grant of Rs. 20,000/- is also paid.

INSTITUTION	No. of Candidates	
	2010-15	2015-16
College of Engineering Trivandrum	15	3
Govt. Engineering College, Thrissur	7	4
RIT Kottayam	--	1

The executive committee of KTU revised the monthly fellowship to Rs 25,000/- from March 2016 at par with MHRD. The total amount given to research scholars as fellowship in the year 2015-16 is Rs 33.11lakhs

14. Other Activities

- Fifty percentage reimbursement of annual membership fee in professional bodies
- Reimbursing actual expense for attending workshops/training courses at IITs or NITs
- Coordinates the resources of different engineering colleges and knowledge of experts to form research clusters
- Assisting innovators to obtain patents for their intellectual property obtained from CERD funded projects.
- Assisting the Institutions for Industry-Institute Interaction and thereby initiating need based research.

PARAM SHEVAK SUPER COMPUTING FACILITY

PARAM SHAVAK, a super computing facility is installed by APJ Abdul Kalam Technological University at State Data Centre, Techno Park Trivandrum for facilitating high end research of faculty in affiliated Engineering Colleges. The total amount spent for setting this facility is 12 lakhs.

PARAM Shavak

High performance computing applications available on PARAM Shavak include:

Bio-informatics: mpiBLAST
Molecular Dynamics: GROMACS, LAMMPS, NAMD
Weather forecasting and Oceanography: WRF, MOM
Quantum Chemistry: NWChem, ABINIT
Materials Science: Quantum Espresso
CFD: OpenFOAM

Researchers of **Centre for Research in Fluid Dynamics** functioning in CET started utilising this facility in their research activities.

PhD RESEARCH UNDER KTU

With the implementation of the Ph.D regulations of APJ Abdul Kalam Technological University, the registration of Ph.D scholars under KTU has started in 2015-16 academic year. The applications for research program are invited by the University twice a year to enable admissions in the months of July and January .The selection procedure is through discipline wise common written tests and/or personal interview as decided by the University from time to time. Eleven scholars were already registered for odd semester admission from CET, RIT, Kottayam and GEC, Thrissur together. In the latest advertisement for Ph.D admission for even semester, 352 applications were received online for full time and part time PhD registration. For selection of eligible candidates, written objective type test was conducted in two centres. Based on the test, ten candidates were selected for full time research with fellowship and forty four scholars were selected for part time research. Registrations of 11 scholars to KTU with CERD fellowship are completed in College of Engineering Trivandrum, GEC Thrissur and RIT Kottayam. Registration processes of 48 scholars are under progress in 20 affiliated Engineering colleges to KTU.

Look at the sky. We are not alone. The whole universe is friendly to us and conspires only to give the best to those who dream and work.

A. P. J. Abdul Kalam

RESEARCH COUNCIL MEMBERS

No	Name	Designation
1	Dr. K.P. Isaac	Vice Chancellor, KTU
2	Dr. M.Abdul Rahiman	Pro Vice Chancellor, KTU
3	Dr.K.M.Abraham	Principal Secretary, Finance department, Govt of Kerala
4	SRI. B. Srinivas, IAS	Secretary, Higher Education Dept
5		Vice-Chairman, Higher education Council
6	Dr. Bhaskar Ramamurthy	Director, IITM, Madras
7	Dr. P.K. Radhakrishnan	Vice Chancellor, Kerala University
8	Dr. K. Sivan	Director VSSC, Trivandrum
9	Dr. K.S. Dasgupta	Director, IIST
10	Sri. S. Kedarnath Shenoy	Director, National Physical & Oceanographic Laboratory, Kochi.
11	Dr. Sivaji Chakravorty	Director, NIT, Kozhikode
12	Dr. V. Ramakrishnan	Director, IISER, Trivandrum
13	Dr. Suresh Das	Director, KSCSTE
14	Prof. Ashutosh sharma	Secretary, Department of Science and Technology, India
15	Dr. Girish Sahni	Director General, CSIR and Secretary, DSIR
16	Dr. K. Vijayakumar	Director Technical Education, Kerala
17	Dr. Shajan Kuriakose	Prof. Mechanical Engg, MA College, Kothamangalam
18	Dr. V.I Beena	Prof. Civil Engg., GEC, Kannur
19	Dr. Ciza Thomas	Prof. Computer Science, CET
20		Dean Research, KTU

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