FICCI

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Department of Science and Technology
Government of India

TECHNOLOGY COMPENDIUM

TECHNOLOGY DEVELOPMENT TRANSFER (TDT)
DEPARTMENT OF SCIENCE & TECHNOLOGY, GOI

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INTRODUCTION

Department of Science & Technology (DST)

India is one of the top-ranking countries in the field of basic research. Indian Science has come to be regarded as one of the most powerful instruments of growth and development, especially in the emerging scenario and competitive economy. In the wake of the recent developments and the new demands that are being placed on the S&T system, it is necessary for us to embark on some major science projects which have relevance to national needs and which will also be relevant for tomorrow's technology. The Department of Science & Technology plays a pivotal role in promotion of science & technology in the country. The department has wide ranging activities ranging from promoting high end basic research and development of cutting edge technologies on one hand to service the technological requirements of the common man through development of appropriate skills and technologies on the other.

Technology Development and Transfer (TDT)

Technology Development and Transfer (TDT) is a division under Department of Science & Technology (DST) to help promote technology development in various fields. TDT has been supporting technology development projects that support activities aimed at developing and integrating innovative solutions in advanced and emerging areas.

Objectives

- To develop and integrate technologies following a holistic approach in identified areas.
- Promote application of modern and advanced technologies for solving socio-economic problem
- Encourage development in application of R&D activities;
- Promote activities aimed at improving technology, technique, material, methods and other appropriate activities conducive for development of technology status in identified areas.

Agriculture & Food Processing

TECHNOLOGY: AN IMPROVED SEED DRILL CHOKE INDICATOR FOR TRACTOR DRIVEN SEED DRILL

Key Facts	
	Dr. A K Rai & Dr. K B Tiwari
Primary Industry Application	Tractor Driven Implement Manufacturing Industry
Institution Name	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur
	akrai_jnau@yahoo.co.in
Uniqueness about the Technology	The technology is low cost and affordable by farmer. This type of device is not available in India
Comparison with existing solutions	Precision seed drill is costly and not manufactured in India. This will be a partial replacement for the precision seed drill device. Cost is very low and easy to use
IP Ownership	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur
Patent status	Patented
Technology Status	Ready for commercialization

Technology Description

The seed cum fertilizer drill is a tractor driven implement for the purpose of sowing seeds and application of fertilizers in the field. It drops the seed and fertilizers at specified rate with pre-set arrangement for placement. The main problem with most of the presently available seed cum fertilizer drills are that they get intermittent obstruction in sowing and fertilizer applications due to the blockage of channels. This cause non-uniform distribution and also reduces the yield. The above problem is more serious when sowing is done during night times.

The innovated device eliminates the above said problems by online monitoring of seeding activity and removal of choking channels whenever it occurs. The improved seed cum fertilizer drill choke indicator will be an attachment to the seed cum fertilizer drill available in the market. This innovation enhances the accuracy of seeding and fertilizer placement of the classical seed cum fertilizer drill.

Detailed Picture of Innovative Device


Demonstration of an improved seed drill choke indicator at "JNKVV Kishan Mela on 01/10/2015" in the presence of Farmers Welfare and Agriculture Development Minister M.P., DDG (Engineering) ICAR, New Delhi, dignitaries, visitors and farmers.

AN IMPROVED SEED DRILL CHOKE INDICATOR FOR TRACTOR DRIVEN SEED DRILL

TECHNOLOGY: ANNADARPAN SMART- A MACHINE VISION SOFTWARE FOR MULTI-CROPS ANALYSIS

Key Facts	
Team	Dr. Nabarun Bhattacharyya, Mr. Amitava Akuli, Mr. Abhra Pal, Tamal Dey, Mr. Gopinath Bej, Mr. Sabyasachi Majumdar, Mr.Angshuman Chakraborty
Primary Industry Application	Agriculture Market; Research Laboratories; Agri/ Food Quality Control Laboratory
Institution Name	Centre for Development of Advanced Computing (C-DAC), Kolkata
Email	nabarun.bhattacharya@cdac.in
Uniqueness about the Technology	• Large sample handling in single operation. • Wide range of quality analysis like Good, Immature/Broken, Admixture, Chalky grains, Red grains, • Damaged/Discoloured grains. • Foreign matter etc for rice and other pulses. • Uniform illumination with built in light arrangement. • Faster image aquisition and analysis. • High resolution image capture for accurate image analysis. • Portable system solution for easy field-operability.
Comparison with existing solutions	To the best of our knowledge there is no such instrument available for multi-crops analysis.
IP Ownership	Centre for Development of Advanced Computing (C-DAC), Kolkata
Patent status	Not Filed
Technology Status	Prototype Developed

Technology Description

ANNADARPAN SMART is a computer operated, portable device for appearance based quality analysis of multiple crops such as Rice, Paddy, Tur, Wheat, Bengal gram, Moong, Barley, Soybean etc. Image analysis solution for rapid objective assessment of crop quality has been developed by capturing and analyzing images using a scanning device. The imaging device is interfaced with a computer using a universal serial bus (USB). Sample is required to be spread manually on a sample handling tray which is placed under the imaging device kept inside an enclosed chamber. Crop specific, separate software has been developed for appearance based quality analysis.


Annadarpan Smart
A Machine Vision Solution for Multi-Crop Quality Analysis
Developed By
C-DAC, Kolkata


Principle Grain Length (PGL): 6.68 mm
Batch No: Test | Total Wt 19.47 gm
Size (mm) Wt(gm) Wt%
>7.5 1.96 10.06
>6.6<=7.5 0.54 2.80
>0.75*PGL<=6.6 12.98 66.66
>0.25*PGL <=0.75*PGL 3.90 20.01
>0.125*PGL <=0.25*PGL 0.05 0.27
Others 0.04 0.21
Shape Wt(gm) Wt%
GradeA 14.71 75.56
Common 0.81 4.17
Others 3.95 20.28
Quality Wt(gm) Wt%
Sound 14.34 73.68
SmlBrk 0.05 0.27
BigBrk 3.74 19.22
Chalky 0.02 0.09
Red 0.06 0.28
DC 0.39 2.01
DM 0.09 0.44
Admix 0.78 4.02
F.Mat 0.00 0.00

TECHNOLOGY: BIOMASS HOT AIR GENERATION SYSTEM INTEGRATED WITH SOLAR TUNNEL DRYER (HYBRID BIOMASS-SOLAR DRYER WITH AUTO-CONTROLLER)

	Dr. R.Mahendiran , Ms. G.Saravanapriya
Primary Industry Application	Drying Copra, turmeric and other agro-products in the temperature range of 55-60° C during sunshine hours by solar mode and off-sunshine hours by biomass mode with auto-temperature and humidity controller
Institution Name	Department of Bioenergy, Tamil Nadu Agricultural University, Coimbatore
	maheephd@gmail.com, bioenergy@tnau.ac.in
Uniqueness about the Technology	• Facilitates continuous drying operation (24x7) with controlled drying environment under two modes of heat source; solar and biomass. • Efficient biomass combustor suitable to various biomass as fuel such as coconut husk, coconut shell and wood logs with heat exchanger has higher efficiency (19 %) than conventional combustors (10 %). • Auto-control mechanism developed for both biomass hot air generation system and solar tunnel dryer for maintaining desired temperature and relative humidity levels inside the dryer to obtain better quality products • Single drying chamber utilize the heat effectively from solar mode during sun shine hours and biomass mode during off-sun shine, rainy and cloudy hours • Suitable to dry copra, medicinal plants, turmeric, other agro and food products with hygienic environment and enhanced quality compared to conventional open sun drying method.
Comparison with existing solutions	• Frequent supervision and monitoring is not required during drying operation compared to open sun drying method. • Savings in drying time of about 35% than solar tunnel drying and 70% than open sun drying method. • Cost of drying is about Rs.1.8 per kg of copra in Biomass Solar integrated dryer, compared to Rs.5.6 per kg and Rs.2.4 per kg of copra in open sun drying and solar tunnel drying,. • Copra yield and oil recovery are 3-4% higher than conventional method and curcumin content of turmeric increases 0.1% in hybrid dryer when compared to open sun drying.
IP Ownership	Department of Bioenergy Agricultural Engineering College and Research Institute
Patent status	To be filed
Technology Status	Ready for commercialization

Technology Description

In order to facilitate hybrid and bulk drying with reduced drying time, enhanced quality and without fungal contamination of agro-products, integration of two modes of heat source is developed with auto-control system. Biomass hot air generation system consists of efficient combustion chamber cum heat exchanger and hot-air distribution ducts. Biomass consumption rate is 15-17 kg/h with coconut husk as feedstock. Solar tunnel dryer consists of semi cylindrical tunnel shaped drying chamber with trays and movable trolley structure for loading copra and turmeric about 1.5-2 tonnes per batch. The auto-controlled mechanism will maintain the constant drying environment (desired temperature and relative humidity) throughout the drying period, by utilizing heat gain from solar dryer during sunshine hours and from biomass hot air generation system during off-sunshine hours and rainy days.

BIOMASS HOT AIR GENERATION SYSTEM INTEGRATED WITH SOLAR TUNNEL DRYER (HYBRID BIOMASS-SOLAR DRYER WITH AUTO-CONTROLLER)

TECHNOLOGY: CIAE ALOEVERA GEL EXTRACTION EQUIPMENT

Key Facts	
Team	Dr. Ravindra Naik
Primary Industry Application	Aloevera processing industries
Institution Name	Central Institute of Agricultural Engineering, Coimbatore
Email	naikravindra@gmai.com
Uniqueness about the Technology	Aloevera whole gel is extracted
Comparison with existing solutions	Gel extraction is mostly carried out by women workers in an unhygienic condition and uncomfortable sitting position by using sharp knife. The developed equipment is women friendly and helps in hygienic extraction of gel.
IP Ownership	CIAE, Coimbatore
Patent status	Complete patent filed
Technology Status	Under commercialization

Technology Description

Continuous feed aloevera whole gel extraction equipment consists of top and bottom pair of rubber pressure rollers assembly fitted with high carbon steel blades below the upper roller and above the lower roller driven by power source (either motor or by manual rotation) through a gear transmission mechanism. The capacity of the equipment is about 200 - 225 kg/h (900 - 1000 leaves/h) when motorized and 100 kg/h (400 - 450 leaves/h) when operated manually. The saving in time and cost over conventional method is up to 70% and 50%.

CIAE ALOEVERA GEL EXTRACTION EQUIPMENT

TECHNOLOGY: CONTINUOUS WET CUM DRY GRINDER FOR FOOD

Key Facts	
Team	Dr. K. Venkatesh Murthy
Primary Industry Application	Useful for wet and dry grinding of any food material, both at small and large scale.
Institution Name	Central Food Technological Research Institute, Mysore
Email	venkatshk@cftri.res.in
Uniqueness about the Technology	Has industrial as well as domestic application.
Comparison with existing solutions	Current wet grinders are batch type. This is a unique machine that is useful for continuous wet and dry grinding of food.
IP Ownership	CSIR-CFTRI
Patent status	Applied
Technology Status	Ready for commercialization

Technology Description

The present invention relates to a table top continuous wet cum dry grinder for grinding of wet and dry food materials such as cereals, pulses, spices etc. The product processed by this device has uniform particle size and are processed under hygienic condition in a continuous manner and results in reduction of human drudgery.

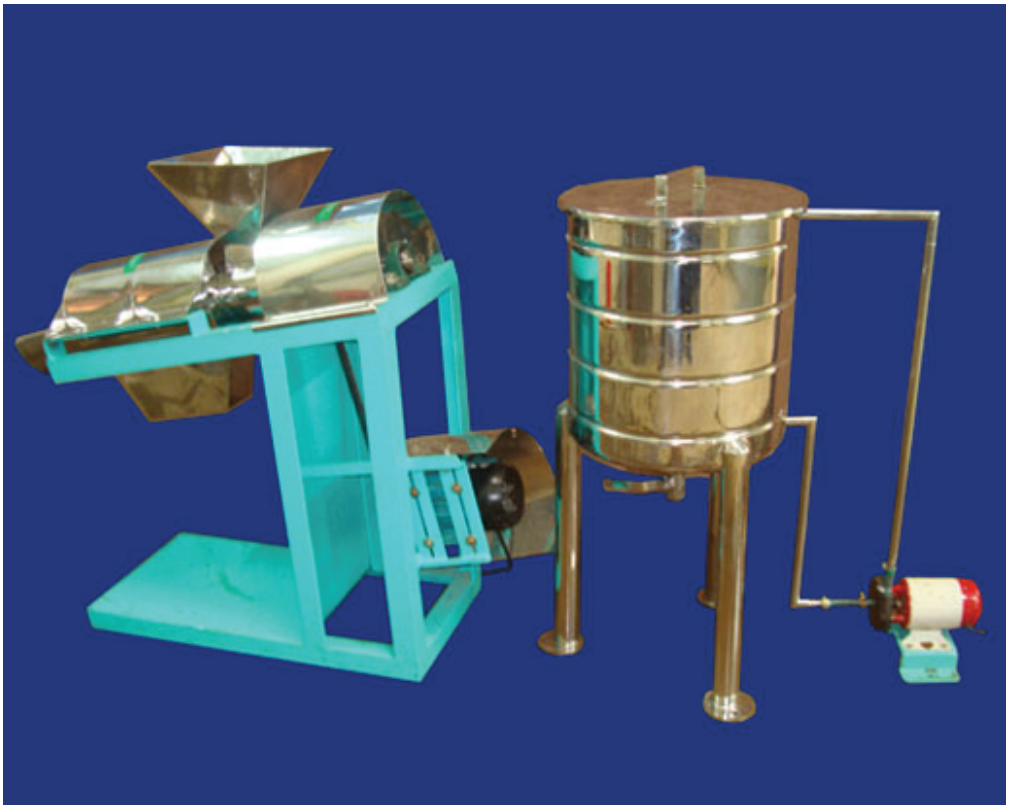
CONTINUOUS WET CUM DRY GRINDER FOR FOOD

TECHNOLOGY: MECHANICAL UNIT FOR PRODUCTION OF WHITE PEPPER FROM GREEN PEPPER

Key Facts	
Team	Dr. E. Jayashree, Dr. R. SuseelaBhai, Dr. T. John Zachariah & Dr. Ravindra Naik
Primary Industry Application	Food Industry
Institution Name	ICAR-Indian Institute of Spices Research , Kozhikode
Email	ejayasree05@yshoo.com, jayasree@spices.rec.in
Uniqueness about the Technology	Hygenic method of white pepper production using mechanical device.
Comparison with existing solutions	Traditionally this is achieved by soaking the pepper in flowing water for few days and then rubbing it manually. As the flowing water is not easily available now a days, traders have resorted to several unhygienic practices for the removal of outer skin using chemicals. In the present work, a mechanical unit developed was evaluated for production of white pepper from green pepper/black pepper.
IP Ownership	ICAR & DST
Patent status	To be filed
Technology Status	Ready for commercialisation

Technology Description

White pepper is the value added form of pepper which is obtained from either green or black pepper after removal of the outer skin. In the present work, a mechanical unit developed was evaluated for production of white pepper from green /black pepper. The prototype unit developed for production of white pepper consists of two parts - the fermentation unit and the pulping unit.



MECHANICAL UNIT FOR PRODUCTION OF WHITE PEPPER FROM GREEN PEPPER

TECHNOLOGY: MILK PROTEIN ESTIMATOR

Key Facts	
Team	Prof. V. Lakshminarayanan, Dr. N.S. Dinesh & Dr. K. Sankaran
Primary Industry Application	Food industry & testing labs, big/medium level farmers, food outlets, food inspectors, and public health officials.
Institution Name	National Hub For Healthcare Instrumentation Development (NHHID), Chennai
Email	narayan@rri.res.in, dinesh@cedt.iics.ernet.in & ksankrn@yahoo.com
Uniqueness about the Technology	Sensitive three digit colorimeter provides accurate protein concentration using simple procedure. Technology with unique and rapid clarification of milk. Portable device with easy operating protocol.
Comparison with existing solutions	Instantaneous sample preparation using novel clarification agent, sensitive device to provide accurate measurements.
IP Ownership	NHHID
Patent status	Patent applied
Technology Status	Under field validation

Technology Description

Estimation of true protein value of raw milk is challenging due to milk's turbidity and multistep sample processing. The milk protein estimator is a sensitive three digit colorimeter, which has been developed using a novel and instantaneous clarification agent for rapid and accurate protein estimation in any milk sample (cow/bufallo/packed). It is a portable device useful for field validation with easy operation and provides quick and reproducible results for multiple sample readings.

MILK PROTEIN ESTIMATOR

TECHNOLOGY: SYNTHETIC MILK TESTING METER

Key Facts	
Team	Prof. V. Lakshminarayanan, Dr. N.S. Dinesh & Prof. K. Sankaran
Primary Industry Application	Food industry & testing labs, big/medium level farmers, food outlets, food inspectors, and public health officials.
Institution Name	National Hub for Healthcare Instrumentation Development (NHHID), Chennai
Email	narayan@rri.res.in; dinesh@cedt.iisc.ernet.in; ksankran@yahoo.com
Uniqueness about the Technology	Simple-to- use, hand-held gadget which can be carried anywhere. Unlike other testing kits, it doesn't require addition of chemicals and reagents before measurement and doesn't alter the milk composition.
Comparison with existing solutions	No similar technology solution available
IP Ownership	Joint ownership (NHHID, Raman Research Institute (RRI) and IISc Bangalore)
Patent status	Under process
Technology Status	The technology is transferred to industry and is expected to hit the market very soon.

Technology Description

The technology is a innovative electrochemical concept to detect synthetic milk adulteration. This simple "dip-and-read" device can be used to rapidly assess the purity of milk and rapidly screen milk samples in collection centres. It is hand-held and battery operated. A probe is dipped in the milk sample and read in the meter. Synthetic milk adulteration is suspected when the reading is above a range. The probe can be easily renewed by just washing and rinsing.

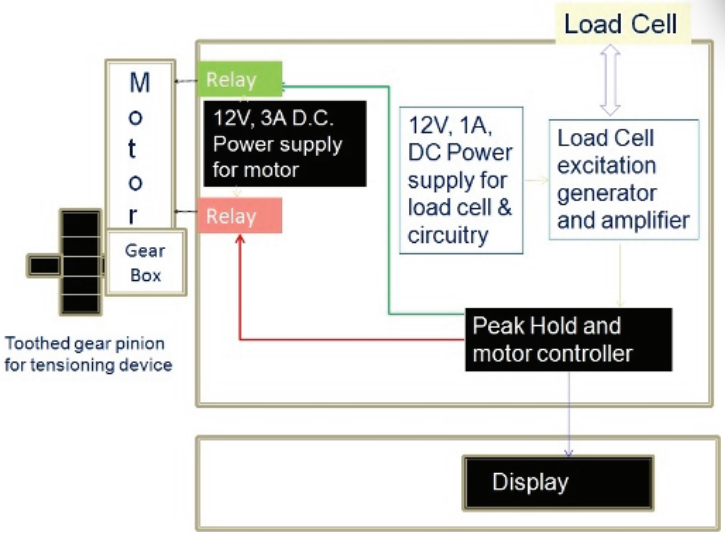
SYNTHETIC MILK TESTING METER

TECHNOLOGY: PORTABLE JUTE FIBER STRENGTH TESTER

Key Facts	
Team	Dr. Sandip Bose
Primary Industry Application	Assessment of raw jute quality in Jute Industry
Institution Name	Indian Jute Industries' Research Association, Kolkata
Email	sbasu@ijira.org
Uniqueness about the Technology	Quick and accurate raw jute fibre bundle strength estimation with a portable instrument
Comparison with existing solutions	Long testing time with possibility of inaccurate strength estimation
IP Ownership	Indian Jute Industries' Research Association
Patent status	To be filed
Technology Status	Completely Developed, Three Instruments Deployed in Commercial Setting

Technology Description

In order to correctly grade a jute fiber, quantitative assessment of its strength is essential. The instruments available to quantitatively assess the jute fiber strength are neither user friendly nor portable for field assessment. The current innovation is a lightweight, inexpensive accurate jute bundle strength tester with a simple and rapid testing procedure. To suit the need of the farmers and jute industry, two variations of the instrument are developed. The manual-driven version of the instrument is less expensive & portable The second version is motor-driven for quick and accurate strength estimation.



PORTABLE JUTE FIBER STRENGTH TESTER

TECHNOLOGY: PDKV DE-SEEDING MACHINE FOR CUSTARD APPLE PULP

Key Facts	
Team	Dr. P. H. Bakane
Primary Industry Application	Separation of seeds from custard apple pulp
Institution Name	Department of Agricultural Process Engg, Dr. PDKV, Akola
Email	pramodbakane@gmail.com
Uniqueness about the Technology	Manual separation of seeds from custard apple pulp is replaced by this machine.
Comparison with existing solutions	Exisiting process is manual which time consuming and unhygenic.
IP Ownership	Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola
Patent status	Applied
Technology Status	Developed technology is commercialized

Technology Description

Existing method of de-seeding of custard apple pulp is manual which is time consuming and tedious job. The innovative de-seeding machine for custard apple pulp was the requirement of custard apple growers and processors. De-seeded pulp contains more number of flakes and the market value of pulp depends on the number of flakes present in the pulp. Developed deseeding machine gives 98.16% pulp extraction efficiency and 82.85% flakes recovery. This technology reduces the post-harvest losses of custard apple and farmer and processor gets more benefit.

So far twenty machines have been sold by authorized manufacturer and are running successfully.

PDKV DE-SEEDING MACHINE FOR CUSTARD APPLE PULP

TECHNOLOGY: VACUUM FRYING SYSTEM

Key Facts	
Team	Dr. Sukumar Debnath
Primary Industry Application	Food Industry
Institution Name	CSIR-Central Food Technological Research Institute (CFTRI), Mysore
Email	director@cftri.res.in; ttbd@cftri.res.in
Uniqueness about the Technology	• Indigenous • Preparation of low fat snack food • Preparation of snack food rich in bioactive molecule • Preparation of snack food with improved quality characteristics • Reduces the degradation of oil during frying and increases oil turnover • Inhibits the formation of carcinogenic compound (e.g., acryl amide) during production of potato chips
Comparison with existing solutions	Existing fryers produces high fat snack products, causing health hazards
IP Ownership	CSIR-CFTRI
Patent status	Applied
Technology Status	Ready for commercialization

Technology Description

The vacuum frying system (max.10 kg/batch) is fabricated using ss304 material. It is operated at low oil temperature under reduced pressure. It consists of oil heating chamber, frying chamber, condenser, chiller and vacuum pump. The frying chamber consists of frying basket and spinning arrangement. The vacuum frying system has PLC with PC interface for easy programming of process parameters of various unit operations involved during frying process. This vacuum frying system is capable of reducing oil absorption of fried product up to 50-60%.

FIG. VACUUM FRYING SYSTEM DEVELOPED AND INSTALLED AT CSIR-CFTRI, MYSORE, KARNATAKA

VACUUM FRYING SYSTEM

TECHNOLOGY: WIRELESS EMBEDDED SYSTEMS FOR MONITORING THE ENVIROMENT OF WARE HOUSE AND GREEN HOUSE

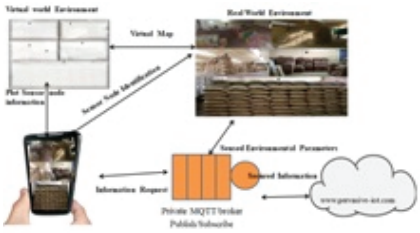
Key Facts	
Team	Dr. A Balaji Ganesh
Primary Industry Application	Green House & Ware House
Institution Name	Velammal Engineering College, Surapet
Email	abganesh@velammal.edu.in
Uniqueness about the Technology	Wireless sensor network enabled- network coded cooperative communication
Comparison with existing solutions	No commercial instruments are available
IP Ownership	Velammal Engineering College, Surapet
Patent status	To be filed
Technology Status	Prototype models developed

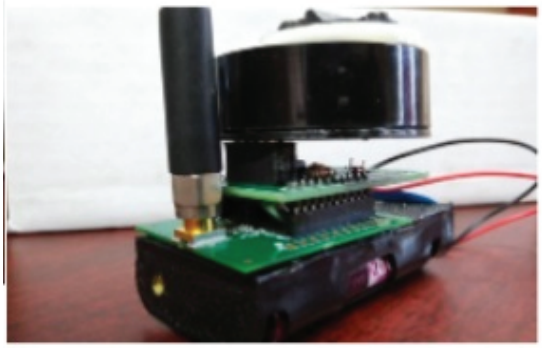
Technology Description

The wireless sensor node development phase started with the selection of micro-controller and wireless radio for low cost and satisfying all the technical requirements. Here cc2530 SOC is selected for its ultralow power consumption as well as to minimize the cost of an external radio chip. Since the wireless sensor node is battery powered, in order to reduce the overall power consumption of the sensor node ultra-low power COZIR sensor is chosen for sensing the co2, temperature and relative humidity. The PCB layout design of the 2.4ghz RF board is prepared using orcad cad tool with the consideration of EMI and it is fabricated as a two layer PCB design.

Information Kiosk or hand held system

The handheld type measuring instrument was designed to evaluate the condition of stored food grain manually at the required place of interest inside the warehouse. It was designed on top of Ti'S 16-bit msp430 micro-controller. The handheld instrument was supported with a 16x2 ICD display for make it possible to monitor the conditions locally. It was interfaced with a COZIR sensor for inspecting the carbon-di-oxide, relative humidity and temperature of the stored food grain samples. The instrument was also loaded with a CC3200 Wi-Fi soc to achieve the wireless remote data logging and simcom900 based GSM alerting system.





WIRELESS EMBEDDED SYSTEMS FOR MONITORING
THE ENVIROMENT OF WARE HOUSE AND GREEN HOUSE

Medical & Healthcare

TECHNOLOGY: ANTIBIOGRAM DEVICE

Key Facts	
Team	Dr. K. Sankaran
Primary Industry Application	Hospitals & Diagnostic laboratories
Institution Name	National Hub For Healthcare Instrumentation Development (NHHID), Chennai
Email	ksankran@yahoo.com
Uniqueness about the Technology	It replaces current microbiological method that takes 2-3 days and can be operated by semiskilled worker and in peripheral laboratories.
Comparison with existing solutions	No similar technology available in the market
IP Ownership	NHHID
Patent status	To be filed
Technology Status	Prototype developed and under validation.

Technology Description

The antibiogram device is a portable optoelectronic gadget designed for determining the antibiotic susceptibility or resistance within 7-10 hrs or before the second dose of antibiotics so that doctors could decide the safe and effective antibiotic treatment. The device which is under field trial and productization will enable doctors to view the lab results on their tablets/computers to rationalize their antibiotic treatment and save lives. This indigenous product being developed with the participation of a reputed Indian medical devices manufacturer and will make antibiogram determination more accurate than current method and highly affordable.

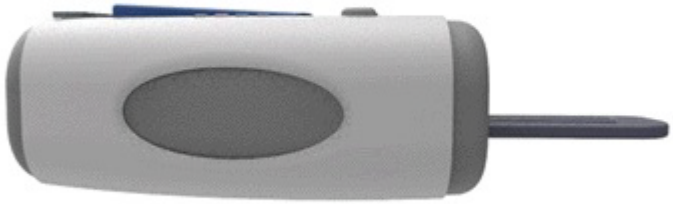
ANTIBIOGRAM DEVICE

TECHNOLOGY: ALBUMIN TO CREATININE RATIO STRIPS AND READER

Key Facts	
Team	Prof. Rohit Srivastava IIT Bombay, Dr. Mayur Sadawana ,Dr . Abhishek Sen, Biosense Technologies Pvt Ltd, Thane
Primary Industry Application	Healthcare
Institution Name	Department of BSBE, Indian Institute of Technology, Bombay
Email	rsrivasta@iitb.ac.in
Uniqueness about the Technology	• A low cost, accurate dipstick, which can be used to estimate urine albumin in the range of 30-300 mg/l and measure urine creatinine. • A low cost, accurate instrument which works with the above said dipstick and estimates the albumin to creatinine ratio
Comparison with existing solutions	The results showed more than 91% sensitivity and 83% specificity, with a positive predictive value of about 87% and a negative predictive value of about 90% compared to Hospital Gold Standard Instrument.
IP Ownership	IIT, Bombay and BioSense Technologies
Patent status	IDF filed
Technology Status	Transferred to Industry

Technology Description

In India chronic renal disease (CRD) has a prevalence of amount 800 per million. CRD progression to end stage renal disease can be prevented by measuring raised urinary albumin/creatinine ratio in susceptible patients. The solution is a indigenous, low cost, albumin//creatinine ratio dipstick along with a phone based strip reader (uchek), modified to read the strips, and act as a mass-screening tool thus preventing CRD to take its course. The strips and device performed well with respect to the predicate device and showed a sensitivity of 91% with a specificity of 83%. The device and strip has a PPV of 87% while a NPV of 90%.



ALBUMIN TO CREATININE RATIO STRIPS AND READER

TECHNOLOGY: CHEAP DISPOSABLE URINARY LEAK SENSOR

Key Facts	
Team	Prof. Peush sahni
Primary Industry Application	Healthcare (improvement in quality of life)
Institution Name	Department of G.I.Surgery, All India Institute of Medical Sciences , New Delhi
Email	peush_sahni@hotmail.com
Uniqueness about the Technology	• Comprises of Disposable Sensor + indicator. • Raw material locally available in the market . • No external power source. • Easy to incorporate in any commercially available diaper. • Low manufacturing cost of the sensor with no requirement of a special setup. • Can be customized as per user need.
Comparison with existing solutions	No such product is available in the market
IP Ownership	Department of G.I.Surgery, All India Institute of Medical Sciences, New Delhi
Patent status	To be filed
Technology Status	Ready for commercialization

Technology Description

- The leak sensor (based on an urine activated cell) embedded in diaper drives an alarm.
- In physically active patients suffering from urinary incontinence, triggered vibrator strapped to the patient's body alerts the patient.
- For alerting babysitters / patient attendants, the leak sensor output drives a small buzzer or triggers an arduino (open source) having a Bluetooth module to remotely activate an alarm on any android based phone having bluetooth connectivity.
- The sensor is tagged to the inner / outer wall of the diaper depending on use.
- It has the potential of being used as a wearable diagnostic device with suitable modification.

TECHNOLOGY: CMCDAQ

Key Facts	
Team	Dr. Suresh Devasahayam
Primary Industry Application	Training tool for Medical & Engineering Institution, Clinical Research and Diagnosis, Physiological Research
Institution Name	Christian Medical College, Vellore
Email	surdev@cmcvellore.ac.in
Uniqueness about the Technology	Portable device, long duration recordings, electrically safe, animal and human use, USB interface to PC and user-friendly GUI.
Comparison with existing solutions	NA
IP Ownership	Christian Medical College, Vellore
Patent status	Patent filed
Technology Status	The device is being marketed as training tool in medical and engineering institutions. It will be marketed for clinical use after obtaining CE marking.

Technology Description

CMCDAQ is a small, versatile recording system that is designed for physiological data. It is suitable for human recording as it has full electrical isolation. The entire system can be held in the palm of a hand and therefore can be used easily even in a crowded recording area. It can be used with a desktop, laptop, notebook or similar computer system with standard Microsoft Windows. The device ensures high quality recording.


CMCdaq
Technology Supported by-
AU-NHHID, DST-TDT
TMI
NHHID
Ch1
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8

TECHNOLOGY: ELECTRO-OPTICAL INSTRUMENTATION PLATFORM FOR BACTERIAL DETECTION USING FLUORESCENCE TECHNIQUE-FLUOROPATH

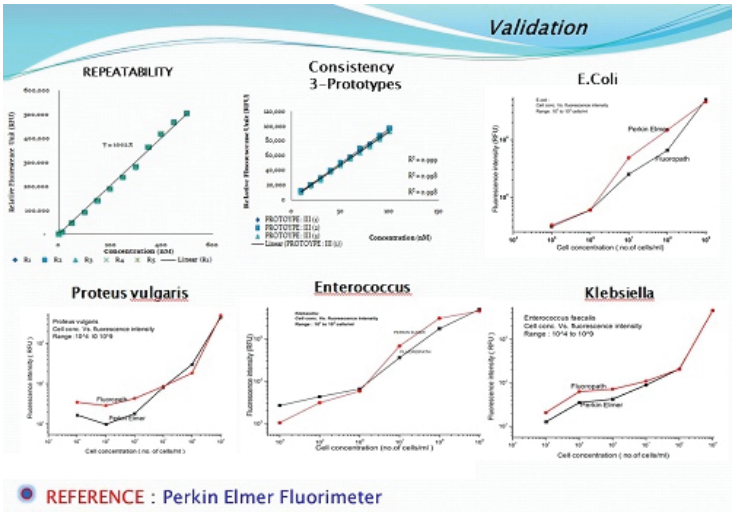
Key Facts	
Team	Mr. Kota Srinivas, Mr. Robert Sam, Prof. S. Prabhakaran
Primary Industry Application	Diagnostic Laboratories
Institution Name	Central Science Instrument Organisation
Email	sriniwaskota@gmail.com
Uniqueness about the Technology	FLUOROPATH is a portable electro-optical device in which the intensity of fluorescence emission changes in accordance with the amount of pathogens (bacteria/virus) content in micro-liter volume samples and it has internal data logging software which store patient history. The developed device serves as a rapid screening tool allowing highly sensitive quantitative detection of E. coli, Kiebsiella, Proteus Vulgaris, Enterococcus faecalis and chickungunya in liquid samples for detection and monitoring of selected diseases. End users stand to save space, time and reagent cost involved for *in-vitro* assays.
Comparison with existing solutions	Currently available imported devices such as plate reader and PCR are bulky and too expensive to be adopted for routine quality control or monitoring. There is no substitute for indigenous development of a less-expensive instrument for quantitative detection of above pathogens.
IP Ownership	Joint ownership (NHHID & CSIO, Chennai)
Patent status	To be filled
Technology Status	The technology is validated and on the process of transfer to Kriti kare India Pvt. Ltd, Chennai

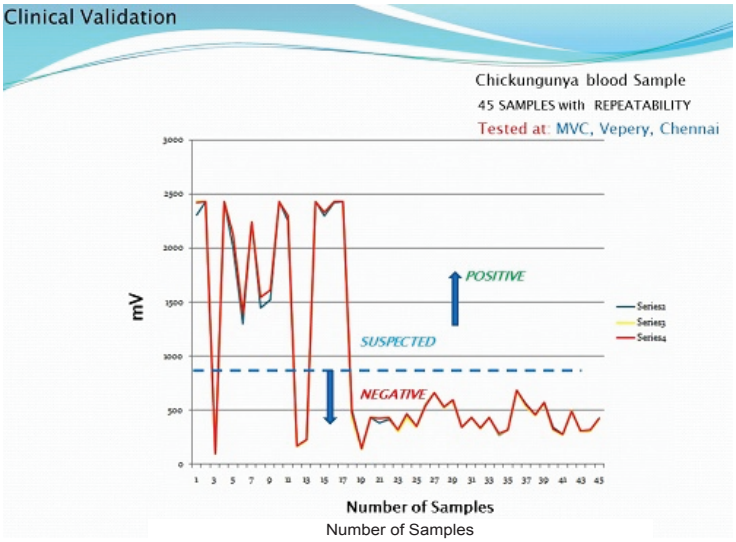
Technology Description

FLURopath is an affordable, sensitive fluorometer device designed for quick, easy and accurate measure of fluorescent tagged/stained pathogenic cells in the range of 104 to 106 of e. coli, kiebsiella, proteus vulgaris and enterococcus faecalis and chickungunya in micro-liter volumes samples. The fluropath provides sensitivity in the range of 10 – 500 nm of fluorescein dye in 100 µl samples and easy to obtained the results within a minutes. Two-point calibration saves time and the single-channel design allows performing assays with the touch of a button. The device has internal data logging software which heip in storing patience history and can be shared via USB.

Specification

SOURCE	Monochrome LED	: Blue (485nm)
	Input Voltage	: 3.5V to 5V (pulse waveform)
	Operating Temperature	: -40 to +110°C
DETECTOR	Diode	: Si - Photodiode
	Input Voltage	: ± 12V DC
	Operating Temperature	: -20 to +60 °C
	Output Voltage	: 13V D
GENERAL	Sample Volume	: 25µl
	LCD Display	: 2 * 20 Alpha-numeric LCD
	Fluorescence	: Excitation:485nm/Emission:515nm
	Range	: 10nM-500nM
	Readout	: Relative Fluorescence Unit (RFU)
	PC Interface	: RS232 –USB
	Power Requirements	: 230v AC, 50Hz
	Dimensions (L x W x H)	: 15cm x 20cm x 5.5 cm
	Weight	: 1.065Kg





Number of Samples

ELECTRO-OPTICAL INSTRUMENTATION PLATFORM FOR
BACTERIAL DETECTION USING FLUORESCENCE TECHNIQUE-FLUOROPATH

TECHNOLOGY: FLUOROSCENCE BASED IMAGING PLATFORM FOR BACTERIAL / PARASITE DETECTION

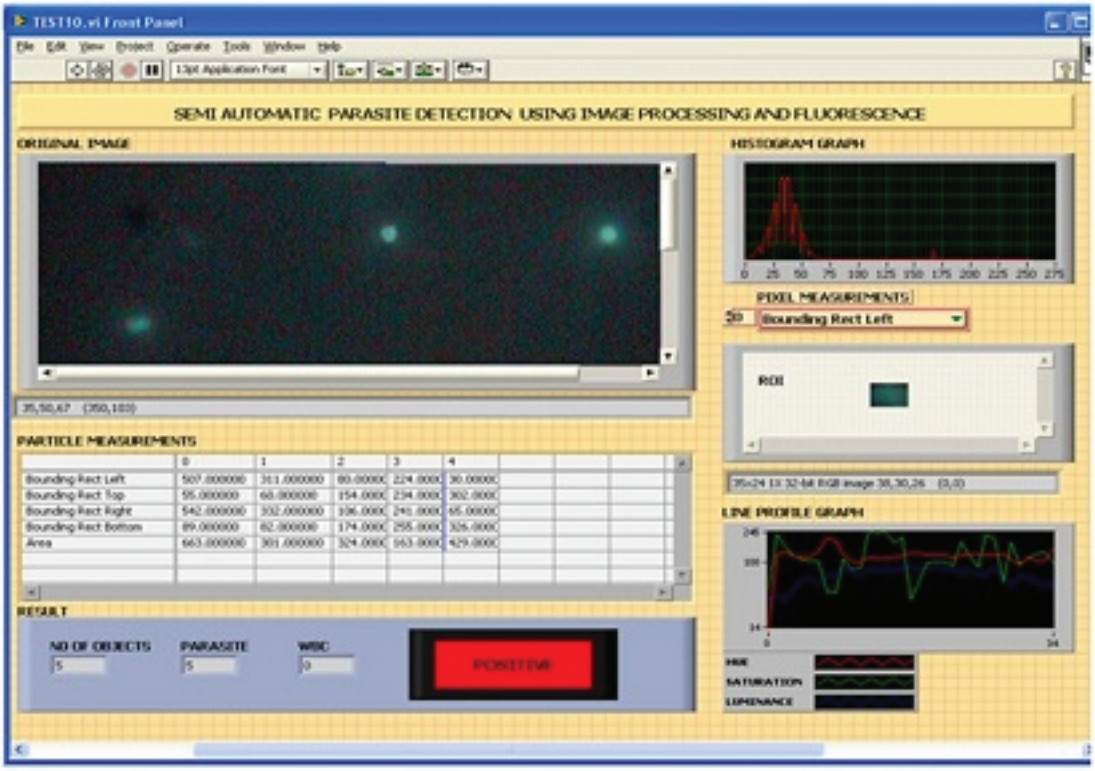
Key Facts	
Team	Mr. Kota Srinivas, Mr. Robert Sam, Dr. S. Prabhakaran
Primary Industry Application	Diagnostic Laboratories
Institution Name	Central Scientific Instruments Organisation
Email	sriniwaskota@gmail.com
Uniqueness about the Technology	The developed automation system achieves 91% of sensitivity, 85% of specificity with positive prediction rate of 88%.
Comparison with existing solutions	There is no substitute for indigenous development of image processing algorithm. Enabled instrument for quick, quantitative detection and classifying the objects as parasite/ wbc.
IP Ownership	Joint ownership (NHHID & CSIO, Chennai)
Patent status	To be filed
Technology Status	Application software is validated and interacted with prospective industries for technology transfer .

Technology Description

The developed fluorescence based imaging platform consists of automated image processing algorithm using computerized method to detect parasites in images acquired from peripheral JSB stained (thick) blood samples using light microscope leica dm1000 which is interfaced to a leica DFC 295 camera using IEEE 1394. The slides are examined under oil immersion with 1000x magnification maintaining a constant image size of 640x480 pixels.

The image analysis involves three main phases: pre-processing, where the JSB stained thick smear images are corrected for luminance and transformed to a constant color space. A histogram based image segmentation processing where the maximum artifacts and over stained objects are avoided. Finally, feature extraction along with a multi-layer, feed forward, back propagation neural network was employed for classifying the objects as parasite/wbc.

In order to classify the detected objects, 23 image features such as area , standard deviation, kurtosis, skewness, number of connected components, compactness, convexity, form factor and diagonal mean are extracted from the labeled objects for training the system. The developed automation system achieves 91% of sensitivity, 85% of specificity with positive prediction rate of 88%.



	Network 1	Network 2
FEATURES	23	23
NO OF CLASSES	3	3
NO OF DATA /OBJECTS	117*3=351	333*3=999

	NETWORK 1			NETWORK 2		
Class	FN	FP	TP	FN	FP	TP
Parasites	8.547	15.384	91.453	7.21	1.47	92.79
WBC	9.401	5.128	90.598	9.91	4.5	90.09
Noise/ Artefacts	13.675	11.111	86.324	1.5	1.29	84.98

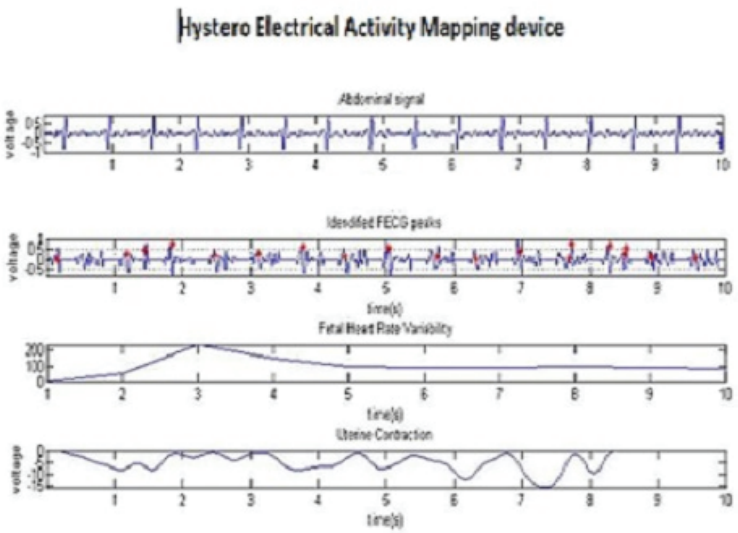
TECHNOLOGY: HYSTERO ELECTRICAL ACTIVITY MAPPING DEVICE

Key Facts	
Team	Dr. S. Shenbaga Devi
Primary Industry Application	Gynaecology & Obstetrician
Institution Name	National Hub For Healthcare Instrumentation Development (NHHID), Chennai
Email	s_s_devi@annauniv.edu
Uniqueness about the Technology	An integrated system for acquiring and analyzing the Electrohysterography (EHG) and Foetal Electro Cardiogram (FECG) simultaneously in a fully non invasive manner from the abdomen of the mother.
Comparison with existing solutions	N.A
IP Ownership	Anna University
Patent status	Patent Granted
Technology Status	Ready for commercialisation

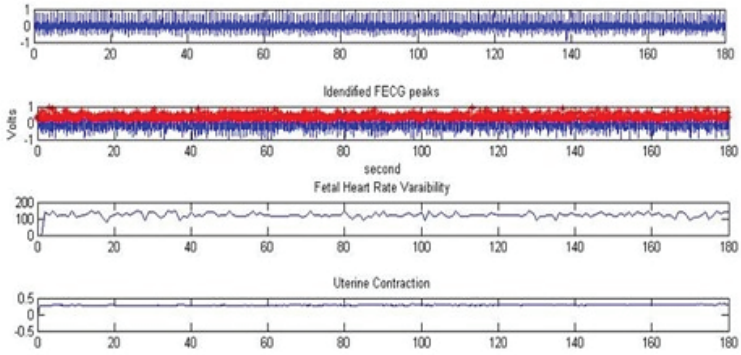
Technology Description

Monitoring the uterine activity and foetal electro cardiogram (fecg) are the important tools for the obstetrician to assess the progress of labour and the condition of the foetus.

Taking the utility in the clinical area and the extent of sophistication needed in acquiring and processing these signals, a new integrated system is developed to acquire and process the ehg and fecg signals totally non invasively. The system is designed such that it gives information of the foetal heart rate variability and the uterine contraction. Thus the system helps the obstetricians to decide about the course of action to be taken in case of foetal distress during labour. This can be used as a diagnostic tool by the obstetrician in reducing the foetal mortality.



Processed Fetal Heart rate varibility and uternine contraction signal for 10 sec.



Processed Fetal heart rate variability and uterine contraction signal for long duration

TECHNOLOGY: LEPTOSPIROSIS DETECTION KIT

Key Facts	
Team	Dr. G. Dhinakar Raj
Primary Industry Application	Testing labs & hospitals
Institution Name	National Hub for Healthcare Instrumentation Development (NHHID), Chennai
Email	dhinakarraj.g@tanuvas.ac.in
Uniqueness about the Technology	Amenabale to Mass Production: Multiepitope antigen cloned and expressed in bacteria, recombinant bacteria can be grown in fermenters. Multi Epitopic: Antibodies Against Eight Epitopes (Two Epitopes Each In 4 Antigens, Lipl32, Lipl41, OMP AND LIGA/B) Detected Ensuring High Sensitivity of Assay Ease of Operation: By Semiskilled workers in Diagnostic Clinical Labs. Cost: The leptospirosis test today costs Rs. 11,000/Plate and as a routine test in today's medical practice will benefit a lot from the lower cost of Rs. 3,400/Plate
Comparison with existing solutions	Existing technology uses antigen from Leptospira biflexa cultures and norecombinant antigen based kits are available
IP Ownership	Joint ownership (NHHID & MVC, TANUVAS)
Patent status	Patent applied
Technology Status	The technology has been transfered to industry.

Technology Description

The incidence of Leptospirosis is increasing and the doctors regularly prescribe the test. Therefore a reliable test developed by the referral lab (TANUVAS) for quicker diagnosis is a boon to clinical community and patients.

An enzyme linked Immunosorbent Assay (ELISA) based diagnostic kit for determination of Igm antibodies to recombinant leptospira multi epitope antigen in human sera.

LEPTOSPIROSIS DETECTION KIT

TECHNOLOGY: MASS SCREENING GADGET FOR OPHTHALMIC LESIONS

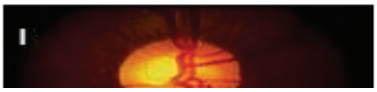
Key Facts	
Team	Dr. S. Shenbaga Devi
Primary Industry Application	Ophthalmology
Institution Name	National Hub for Healthcare Instrumentation Development (NHHID),Chennai
Email	s_s_devi@annauniv.edu
Uniqueness about the Technology	Software that can identify the lesions in the eye using fundus images and detect glaucoma and diabetic retinopathy and hence useful for screening purpose
Comparison with existing solutions	No similar technology solution available
IP Ownership	NHHID
Patent status	NA
Technology Status	The technology is transfered to a industry and is expected to hit the market very soon.

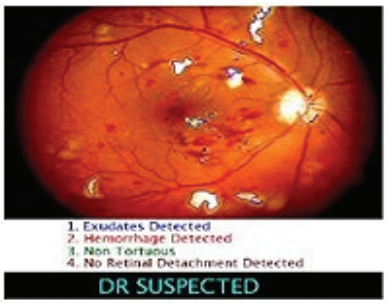
Technology Description

Glaucoma and diabetic retinopathy affect the eye and if untreated, leads to permanent vision loss. The software developed is such that, it detects the lesions in the eye using fundus images and helps to identify glaucoma and diabetic retinopathy in an automatic manner. It can be used in tertiary hospitals for mass screening and can be extended using telemedicine .

Fig. Initial Screen

Fig. Result for processing a normal image





Result for processing a diabetic retinoparthy condition

TECHNOLOGY: RITAMP™-CHKV-RT-LAMP KIT

Key Facts	
Team	Dr. A. Raja
Primary Industry Application	Testing Labs & Hospitals
Institution Name	National Hub For Healthcare Instrumentation Development (NHHID) , Chennai
Email	au.nhhid@gmail.com, draraja@rediffmail.com
Uniqueness about the Technology	• Affordable compared to other nucleic acid based diagnostic kits. • 100% sensitive & 90% specific • Minimum training is required to carry out the test in a less resourced laboratory • Results can be obtained within 2 hours • Requires only a laboratory dry heat block or a water bath • It can be easily carried out in rural areas .
Comparison with existing solutions	No similar technology solution available
IP Ownership	Joint ownership (NHHID & MVC, TANUVAS)
Patent status	Technology is under patenting process
Technology Status	Ready for commercialization

Technology Description

The RITAMP-CHKV- RT-LAMP kit is a simple-to- use amplification kit and can amplify target chikungunya RNA by the lamp method(RT-LAMP). By employing the enzyme mix (containing reverse transcriptase and DNA polymerase), reverse transcription and DNA amplification can be accomplished at a specific temperature(60 to 65 0 c)in a short time(1 hr. for standard in one-step and the result can be read by visualizing the tube with naked eye).

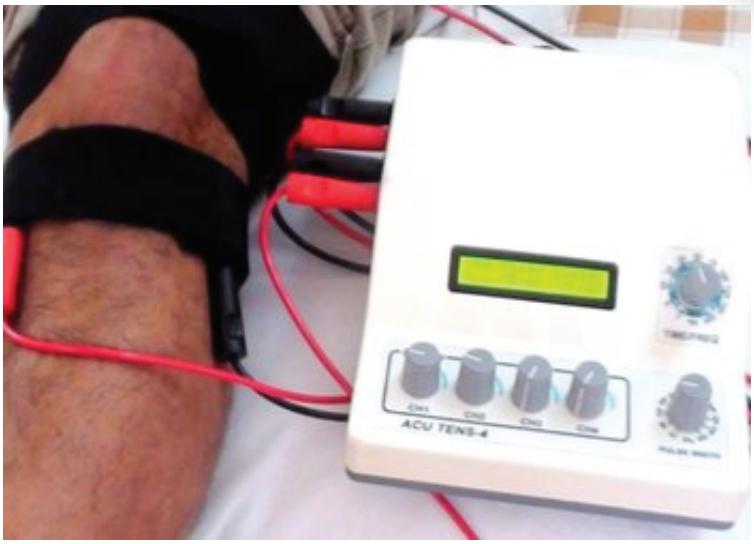

ISOTHERMAL AMPLIFIER
TIMER
LID TEMP
BLOCK TEMP

TECHNOLOGY: PAIN RELIEVING INSTRUMENT

Key Facts	
Team	Dr. G Arun Maiya
Primary Industry Application	Healthcare
Institution Name	School of Allied Health Sciences, Manipal University
Email	Arun.maiya@manipal.edu
Uniqueness about the Technology	Combination of low and medium frequency in a single unit. Safe and easy to use medium frequency device to be used at community level. All these 3 features are not available in other devices which are used in electrotherapy.
Comparison with existing solutions	Cost effective and simple measure
IP Ownership	Dr. G Arun Maiya Manipal University
Patent status	Under Review
Technology Status	In Process with Industry partner

Technology Description

- This is the first device developed and clinically validated in India with a combination of low and medium frequency currents in a single device.
- The final equipment with the user manual is ready after clinical study.
- This instrument will improve patient care in terms of pain relief from musculoskeletal pain, post-operative and cancer pain.



PAIN RELIEVING INSTRUMENT

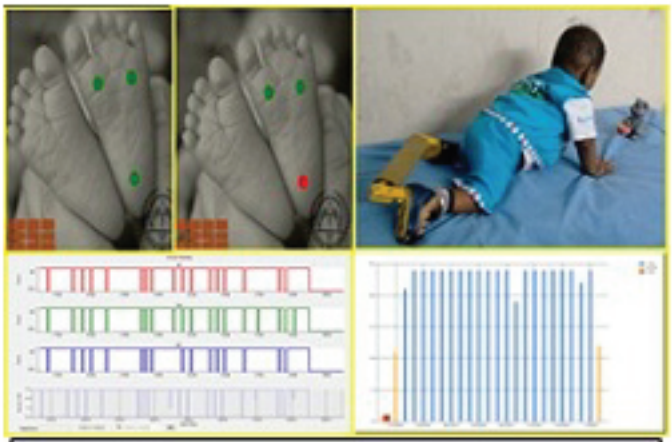
TECHNOLOGY: PADMA PADA- COMPLIANCE MONITORING CLUBFOOT BRACE

Key Facts	
Team	Dr. Vrisha Madhuri & Dr. N S Dinesh
Primary Industry Application	Healthcare
Institution Name	Christian Medical College Vellore and Indian Institute of Science, Vellore
Email	madhuriwalter@cmcvellore.ac.in ns.dinesh@yahoo.co.in
Uniqueness about the Technology	• Innovative connecting rod with 4 bar linkage mechanism providing high degree of freedom to the child • lower limb in 3 planes. • Brace application data acquisition once in an hour. • Data tagged with date and time information from real time clock. • Electronic hardware embedded in to the shoes usart port provides for pc communication. • Graphic user interface for interaction with a PC.
Comparison with existing solutions	Existing braces fix the child's both lower limb together and does not allow free mobility and they do not have compliance monitoring device. Discomfort in the currently used braces causes intolerence for the brace causing non compliance (> 50%) to the bracing protocol causing recurrence (>30%). Padma Pada allows free mobility of the lower limb and provides comfort to the child. Data for 104 children are available showing significant reduction in the noncomplinace (13%) and recurrence (5%).
IP Ownership	Christian Medical College, vellore and Indian Institute of Science, Bangalore
Patent status	Applied
Technology Status	Undergoing multicenter trial

Technology Description

Padma Pada clubfoot brace is designed for use by children with clubfoot in the maintenance phase of their treatment. The clubfoot deformity after correction requires full time wear of brace for 3 months with a maximum of 1 hour off the brace in a day. Following this intermittent brace wear is required every day for up to 14 hours a day extending up to 5 years. Padma Pada brace is designed to monitor efficacy of brace wear by making sure that the child?s sole of the foot rests on the sole of the shoe which is fixed to the brace. This contact is evaluated by multiple sensors placed under the sole of the shoe on medial and lateral side and the heel. The shoe fixed to the brace is not allowed by the property of the brace to go into undesirable positions of plantar flexion, internal rotation and varus. This foot abduction brace also allows the child to have several degrees of freedom in horizontal plane, coronal plane, sagittal plane and vertical plane thus making the brace more child friendly and tolerable. Adherence to the brace wear protocol is monitored by recording this foot contact with the sensors mounted on the electronic plate embedded in the sole. The data is logged every hour for a minimum of 3 months and can be downloaded using software designed by the originators. The shoe width and height in the padma pada have been modified as per the foot size of Indian children.

A) When in contact the point on the sole turn green and when not in contact they show as red. B)The data is depicted as foot contact at each site and C) brace wear for number of hours every day D)The child with clubfoot crawling with the brace



A) The Padmapada brace as marketed. B)Special features in foot plate allow free external rotation. C) The electronics are housed in the foot plate. E) The brace can be connected through USB port to the computer to download the data at each visit

TECHNOLOGY: SMART FUNCTIONAL ELECTRICAL STIMULATOR (FES)

Key Facts	
Team	Dr. Dinesh Bhatia, Dr. Suresh Verma, Mr. Rajeev Kumar, Mr. Rahul Sultane, Ms. Shilpi Mathur, Ms. Manvinder Kaur
Primary Industry Application	Healthcare
Institution Name	Department of Biomedical Engineering, North-Eastern Hill University, Shillong and DRK Test Solutions Llp, Pune
Email	bhatiadinesh@rediffmail.com, rajk65@gmail.com
Uniqueness about the Technology	• The device provides 16 channel stimulation. • It is light weight and easy to use. The patient can wear it like a belt. • The feedback is provided through FSRs. • Patient Classifier Algorithm (PCA) provides an idea of the degree of paralysis in the patient. • The inbuilt graphical user interface (GUI) named as signum for the detection and analysis of acquired myogram (EMG) signal. The same is compared with available control data fed into the system to decide the level of activity of muscles.
Comparison with existing solutions	Portable in size and can be operated by minimally trained professional.
IP Ownership	NEHU & DRK Test Solution
Patent status	Under process
Technology Status	Testing and trails being undertaken by industrial partner in hospitals and clinical set-up.

Technology Description

The FES system consists of stimulating electrodes, pressure sensors (placed in patient's shoe) and a controller. The controller is venclosed in a portable case outfitted with two belt clips. Shoe (insole), a transmitter is also placed inside the patient shoe. The receiver is attached to the electrical stimulation circuit. When the patient tries to walk and lifts his or her foot, the receiver senses the signal and sends a triggering signal to the stimulator circuit in the controller via a radio frequency link. The controller then sends the selected amount of stimulus signal to patient' s muscles.

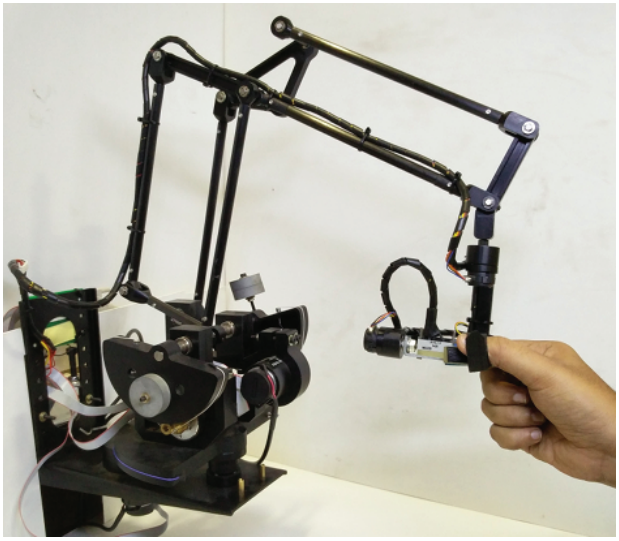
SMART FUNCTIONAL ELECTRICAL STIMULATOR (FES)

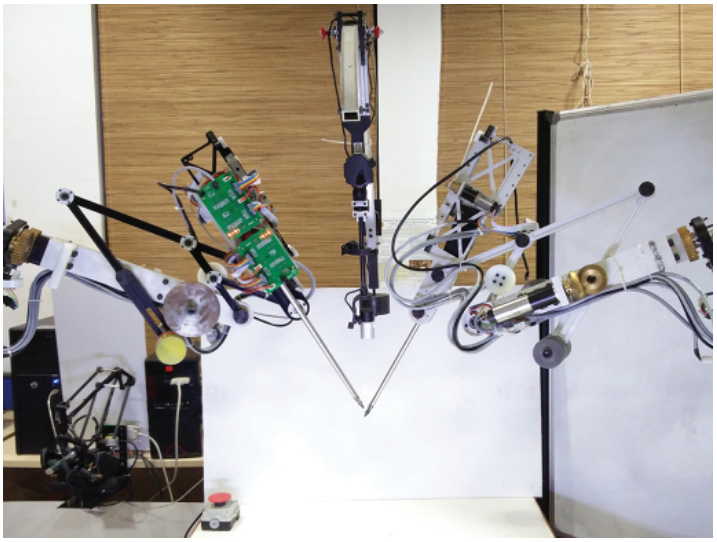
TECHNOLOGY: TELESURGICAL ROBOTIC TRAINER - SUSHRUTA

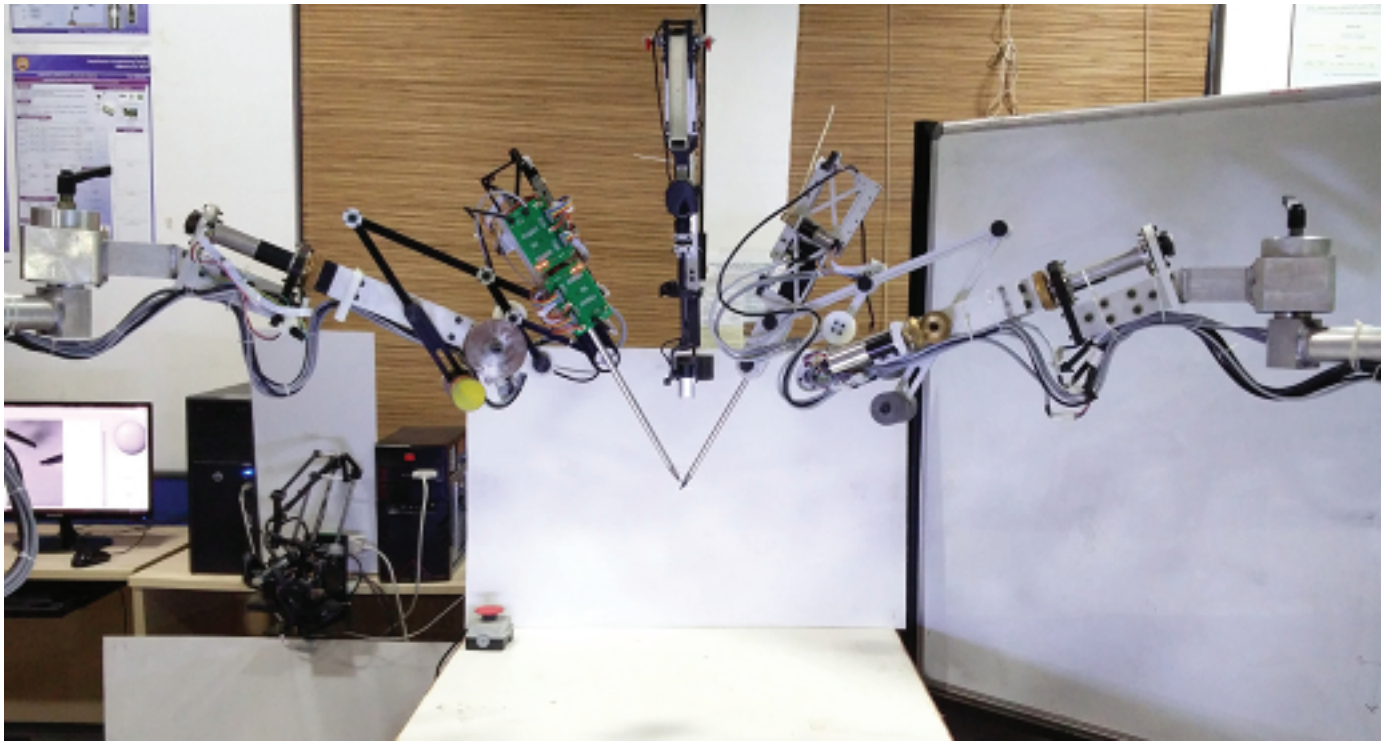
Key Facts	
Team	Dr. Asokan Thondiya
Primary Industry Application	Hands on training of budding robotic surgeons who are familiar with laparoscopic surgery but new to robotic surgery
Institution Name	Indian Institute of Technology, Chennai
Email	asok@iitm.ac.in, asok.iitmadras@gmail.com
Uniqueness about the Technology	Robotic assisted minimally invasive surgical training. Tele-robotic surgical technology completely developed in house. Real biological tissues can be used for training instead of computer models.
Comparison with existing solutions	One tenth of the cost of currently available surgical robots in the market. Ability to be adapted to the needs of Indian Doctors. Flexibility to incorporate, add on surgical tools and 3D camera. The trainer robot can be upgraded to a real robot with additional features.
IP Ownership	Indian Institute of Technology, Chennai
Patent status	Filed two Indian patents
Technology Status	One proof-of concept prototype developed and tested. Technology proven in laboratory environment.

Technology Description

There is currently only one surgical robotic system available in the world - the da vinci robotic system. Only a handful of these systems are available in India. The system costs around 12 crores. It is exorbitantly expensive for training new Doctors as the consumables per surgical procedure is around Rs.30,000/-. With the intent of training budding robotic surgeons at low cost without compromising the features of robotic surgery like tremor compensation and motion scaling, we have developed a telesurgical robotic training system. Phantom and biological tissue can be used instead of a 3D computer model to train Doctors. This gives realtime experience for the surgeons using the system. The system can also be incorporated with a 3D vision system for better visualisation of the operating field for the Doctor. Since the technology is developed in house the consumable costs are just a fraction of the costs of the real robot.







TELESURGICAL ROBOTIC TRAINER - SUSHRUTA

TECHNOLOGY: WIRELESS SENSOR BASED COMMUNICATION FOR MULTICHANNEL EEG RECORDING

Key Facts	
Team	Dr. S Subha Rani, Dr. V Krishnaveni, Dr. T Kesavamurthy
Primary Industry Application	Healthcare
Institution Name	STEPS Knowledge Services Pvt. Ltd., Coimbatore / PSG College of Technology , Coimbatore
Email	ssr@ece.psgtech.ac.in
Uniqueness about the Technology	• No movement artifacts observed. • On the Electro Caps, Single Electrode can be replaced & ease of maintenance. • Mobility is enhanced and added specific advantage when measurement is taken for children, elderly person and psychiatrist patients.
Comparison with existing solutions	• Eliminates many constraints such as displacement due to cough. • Eliminates improper wire continuity by wireless technology
IP Ownership	PSG College of Technology & STEPS Knowledge Services Pvt. Ltd. Coimbatore
Patent status	To be applied
Technology Status	Prototype ready

Technology Description

EEG Electro-Cap with 10-20 Electrodes is an innovative technology that can monitor alertness, coma and brain death, locate area of damage following head injury, stroke, tumor, etc. The technology can test afferent pathways (by evoked potential), monitor cognitive engagement (alpha rhythm), produce biofeedback situations, alpha, etc. It also controls anesthesia depth (“servo anesthesia”), investigate epilepsy and locate seizure origin.

WIRELESS SENSOR BASED COMMUNICATION FOR MULTICHANNEL EEG RECORDING

Textile

TECHNOLOGY: FILTRATION TEST RIGS FOR TESTING CLEANABLE FILTER MEDIA IN FLAT & TUBULAR FORM

Key Facts	
Team	Dr. Arunangshu Mukhopadhyay, Dr. A K Choudhary, Mr. Kamal Dhawan
Primary Industry Application	• Help in assessment of performance of existing material as well as development of new filter media. • Develop better understanding of the way in which various process parameters determine filtration performance. • Help in proper adjustment of operating parameters.
Institution Name	Department of Textile Technology, Dr. B Ambedkar National Institute of Technology, Jalandhar
Email	www.nitj.ac.in
Uniqueness about the Technology	**Flat form:** • Operating parameters during filtration test can be kept similar to the industrial situation. • Design of the apparatus (Pulse-jet filtration test rig) is such that the direction of aerosol, dust inlet, pulse flow during cleaning in relation to filter media, and shock absorption during pulse cleaning, all are similar to industrial situation. • The workability of the instrument is simple due to its lower height and other simple features like mounting of filter media etc, and filtration performance can be studied over long time duration without interrupting the process. **Tubular form:** • Operating parameters during filtration test can be kept similar to the industrial situation. • Design of the apparatus (Industrial test rig) is such that the mounting of filter bag is very easy and quick. • Filtration performance can be studied over long time duration without interrupting the process.
Comparison with existing solutions	Nil
IP Ownership	Dr. B R Ambedkar National Institute of Technology, Jalandhar
Patent status	Under Process
Technology Status	Commercialized

Technology Description

An apparatus has been developed for testing cleanable filter media in flat form for the assessment of filtration performance of filter media challenged with aerosol. Another apparatus can assess the performance of the cleanable filter media in tubular form similar to industrial set up maintaining clean air requirement. The important measurable characteristics of both the test rigs are as follows:

- Filtration efficiency
- Size distribution of emitted particles
- Differential pressure drop characteristics across the filter media
- Filtration performance of filter with time

The utility of both the apparatus are selection of filter media, design, development and quality assurance of filter media and setting the operating parameters (during industrial filtration) at appropriate level.

Rear view of the apparatus for testing cleanable filter media in flat form

Front view of the apparatus for testing cleanable filter media in flat form

An apparatus for testing cleanable filter media in tubular form

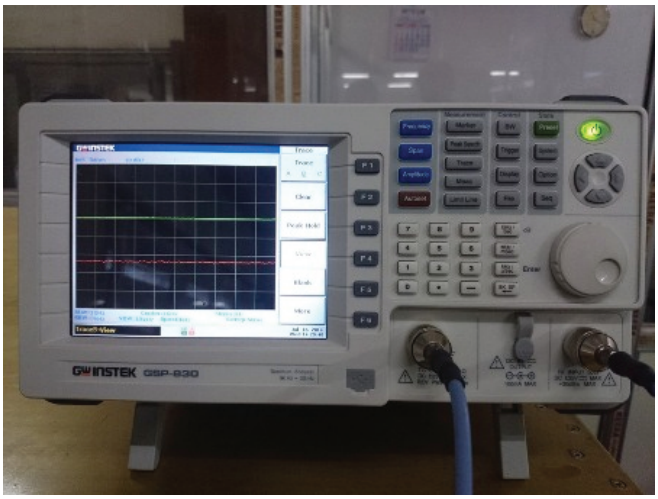
FILTRATION TEST RIGS FOR TESTING CLEANABLE FILTER MEDIA IN FLAT & TUBULAR FORM

TECHNOLOGY: EQUIPMENT FOR MEASURING ELECTROMAGNETIC SHIELDING ABILITY OF TEXTILES

Key Facts	
Team	Dr. U. K. Gangopadhyay & Dr. Ravi Prakash Singh
Primary Industry Application	Textile Testing Laboratory, Research Institutions, Conductive Textile Manufacturing Industry and Hospitals etc.
Institution Name	The Synthetic and Art Silk Mills' Research Association (SASMIRA), Mumbai
Email	sasmira@vsnl.com ed@sasmira.org
Uniqueness about the Technology	Simulates real electromagnetic exposure situation and is dedicated to textiles
Comparison with existing solutions	At present EMI shielding of textiles has been assessed as per ASTM D4935. It mentions co-axial transmission of the radiation, so testing samples are exposed to parallel waves, which is possible only when source of radiation is far-off. But in real life this is not the situation always. Developed instrument is not based on parallel wave exposure of the textiles contrary it is close to the real life exposure situations. ASTM D4935 is accurate only up to 1.5GHz while developed instruments covers 800-2600 MHz frequency band in which CDMA, GSM and 3G network operates.
IP Ownership	Yes
Patent status	In Process
Technology Status	Developed completely

Technology Description

Developed equipment tests the electromagnetic shielding ability of textiles. It simulates the real life radiation exposure situations, contrary to the co-axial transmission mentioned in the ASTM D4935. Parallel wave transmission is possible when source of radiation is far-off. But in real life such situation is quite rare. Effect of radiation diminishes as the distance from the source increases. So prediction of a test sample (based upon parallel wave transmission) in real application may be difficult and inaccurate. The developed instrument takes the relative measurement. Measurement accounts the signal strength detected without and with test sample. Relative attenuation in the signal is assessed on the basis of both the values. Equipment is quite Versatile; measurement can be performed over wide range of frequency band between 30 MHZ – 3 GHZ.



EQUIPMENT FOR MEASURING ELECTROMAGNETIC SHIELDING ABILITY OF TEXTILES

TECHNOLOGY: FABRIC FEEL TESTER

Key Facts	
Team	Dr. Apurba Das
Primary Industry Application	Textile and apparel industries
Institution Name	Indian Institute of Technology, New Delhi
Email	apurbadas65@gmail.com
Uniqueness about the Technology	The instrument is able to measure the subjective fabric feel perception and is expressed by objective numerical value.
Comparison with existing solutions	The existing KESF system is very complex and requires different modules. The cost of complete KESF equipment's is more than Rs. 1.5 crores. The present developed instrument is very simple and its market price is around Rs. 1.75 lacs.
IP Ownership	M/s Texlab Industries Ltd., Ahmedabad
Patent status	Filed Patent Application
Technology Status	Technology has been transferred to M/s Texlab Industries Ltd., Ahmedabad, and the product is commercially available.

Technology Description

Write Fabric feel is a generic term for the textile sensations associated with fabrics, and it markedly influences the consumer preferences of textile products. Although fabric handle is still being judged subjectively to a large extend, the need for objective method to measure the fabric handle has always existed. The proposed instrument is very helpful to the industries who are dealing with the production, evaluation and application of textile fabrics for process, quality and quick decision making.

Purpose of Instrument

- To measure fabric softness, feel directly
- To select the optimum fabric finish treatment by comparing feel
- To check change in fabric feel after chemical or mechanical treatment
- To develop newer fabric with better feel

Users

- In dyeing & finishing industries
- In weaving industries
- In garment manufacturing industries
- In testing laboratories
- In academic and research institutes

FABRIC FEEL TESTER

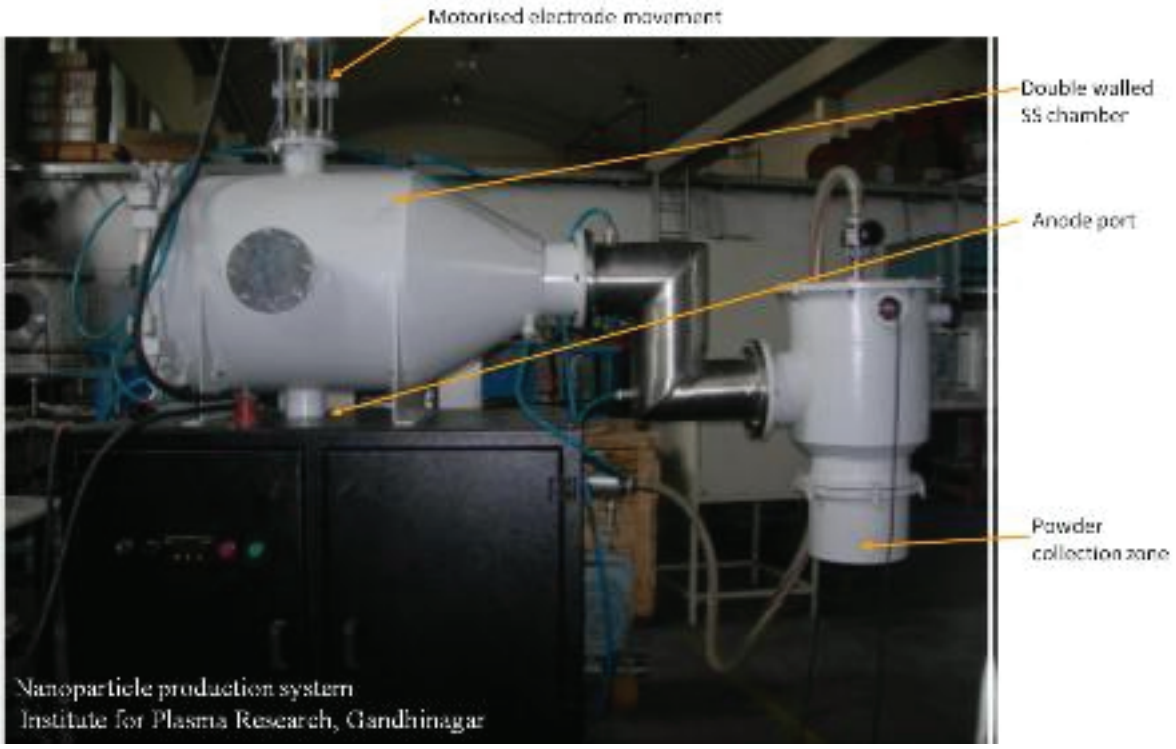
TECHNOLOGY: NANOTITANIA PRODUCTION FOR SELF CLEANING FABRICS

Key Facts	
Team	Dr. Balasubramanian, Mr. Adam S, Mr. Chirayu Patil, Dr. S. Mukherjee
Primary Industry Application	Large quantity production of titanium dioxide nanoparticles for self cleaning textile fabrics
Institution Name	FCIPT Division, Institute for Plasma Research, Gujarat
Email	balac@ipr.res.in, mukherji@ipr.res.in
Uniqueness about the Technology	An indegenous, integrated one step process for production of nano titania at industrial scale
Comparison with existing solutions	The technique in simple,cost efficcient & fully automated
IP Ownership	FCIPT-IPR
Patent status	Indian Patent filed
Technology Status	Technology transferred to M/s Plasma & Vacuum Technologies, Ahmedabad

Technology Description

The innovation in a system to produce nanoparticles of titanium dioxide by thermal plasma process. The produced particles are tested and found to remove turmeric and coffee stains on both silk and cotton fabrics by exposing the fabrics to few hours of sunlight.

Thermal plasma process is an efficient way to produce industrial scale nanoparticles. The system designed is unique and integrated which not only produces but also collects the nanoparticles. The entire system is fully automated, production as well as collection.



Nanoparticle production system
Institute for Plasma Research, Gandhinagar

TECHNOLOGY: PLASMA SURFACE TREATMENT OF ANGORA WOOL & POLYMER FABRIC AT ATMOSPHERIC PRESSURE

Key Facts	
Team	Dr. S. K. Nema, Mrs. N. Chandwani, Mr. R. Rane, Mr. A. Sanghariyat, Dr. S. Mukherjee
Primary Industry Application	Textile
Institution Name	FCIPT division, Institute For Plasma Research, Gujarat
Email	nema@ipr.res.in, mukherjii@ipr.res.in
Uniqueness about the Technology	First inline cold plasma surface modification system in the country
Comparison with existing solutions	Eco-friendly
IP Ownership	Institute for Plasma Research, Gujarat
Patent status	Two Indian Patents applied
Technology Status	Technology transferred to M/s Inspiron Engineering, Ahmedabad

Technology Description

Angora fibres are very smooth and warm. It has been observed that when woolen clothes are made using 100% angora fibres, shedding of fibers take place with time. This results in loss of fibres and quality product cannot be developed. Atmospheric pressure air plasma treatment improves coefficient of friction and cohesion among fibers of angora wool. The plasma modified angora fibers are spun to develop 100% angora wool products. FCIPT has commissioned 3 large size (1 meter wide web) plasma treatment systems in the country which include weaver's society, kullu, Hifeed, Ranichauri and SHHDC, Sikkim using DST funding. One plasma treatment system has been commissioned at Mantra, Surat through DST'S financial support to activate the surface of polyester/nylon fabric for improving adhesion with laminating coating.

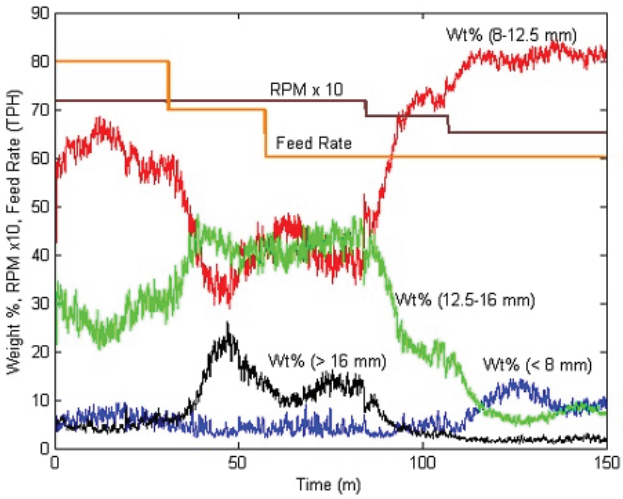
Test & Measuring Instrument

TECHNOLOGY: EYE-ON-PELLET: ONLINE PELLET SIZE MONITORING SYSTEM

Key Facts	
Team	Dr. Santosh Kumar Behera, Dr. Debi Prasad Das, Mr. Srinibas Bhuyan, Dr. Satyajit Rath, Dr. Santosh Kumar Mishra, Dr. Surendra Kumar Biswal, Mr. A. Srinivasa Prasad, Prof. Barada Kanta Mishra
Primary Industry Application	Pelletization Industry
Institution Name	CSIR-Institute of Minerals & Material Technology,Bhubaneswar
Email	madhuriwalter@cmcvellore.ac.in, ns.dinesh@yahoo.co.in
Uniqueness about the Technology	• The system can provide pellet size distribution trend online from the disc discharge. • The size distribution can be displayed, stored or transmitted • Quick installation time • Non invasive method • Indigenous technology (made in India)
Comparison with existing solutions	Laboratory based size analysis is not online, time consuming and needs lot of manpower and are not accurate
IP Ownership	CSIR-IMMT, Bhubaneswar
Patent status	Filed in India
Technology Status	• System prototype demonstration done at JSW, MSPL, ESSAR, BRPL, Minera. • Technology transferred to M/S SVNT InfoTech Pvt. Ltd. Hyderabad for production and marketing.

Technology Description

The “EYE-ON-PELLET” system can be fitted with an existing palletization disc and generate the size distribution trend on a display panel. This size distribution trend is very useful for the operator to control the process parameters to maintain the desired size range and reduce recycling load. The system has been successfully field trialled in a number of industries in India and a patent related to this is filed in India. The technology is also transferred to M/S SVNT InfoTech Pvt. Ltd. Hyderabad for production and marketing.



EYE-ON-PELLET: ONLINE PELLET SIZE MONITORING SYSTEM

TECHNOLOGY: INDUCTION MOTOR EFFICIENCY MONITORING SYSTEM (IMEMS)

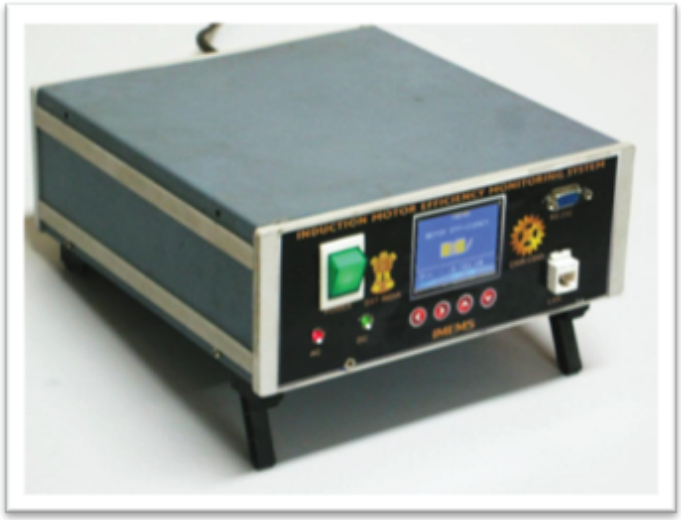
Key Facts	
Team	Mr. AYYAPPAN. GS , Dr. Chenthamarai Selvam, Prof.Kota Srinivas, Ms. Geetha.R
Primary Industry Application	Energy Conservation on Motors, Energy Auditors & Managers for Motor Performance Analysis
Institution Name	CSIR-CSIO, Chennai
Email	ayyappangs@csircmc.res.in, ayyappan1972@gmail.com
Uniqueness about the Technology	Measures motor efficiency on-line, on-site & in-situ without detaching the motor from the shaft and torque measurement
Comparison with existing solutions	Cost-Effective, Portable, in-situ
IP Ownership	CSIR-CSIO
Patent status	NIL
Technology Status	Commercialized

Technology Description

CSIR-CSIO Chennai centre has developed the Induction Motor Efficiency Monitoring System (IMEMS) under the Grant-in Aid support from Instrument Development Program - DST, New Delhi & M/s. BETA Technologies India (P) Ltd. has actively participated as manufacturing agency. The IMEMS displays the operating efficiency of motor by monitoring the electrical power input (like voltage, current & power) and shaft speed of the motor. The IMEMS determine the operating efficiency of motors without removing the motors from the field and without the need for measuring the output power or torque. The system uses few sets of data coupled with the special algorithm for evaluating the motor parameters instead of using the no-load and blocked rotor test results. The applications of IMEMS are as below

- The IMEMS can be used to operate the motor at its Best Operating Point (BOP).
- The system could be suitable for conducting on-site energy audits of existing motors which provides scientific data to replace or refurbish the existing motor.
- IMEMS can be used to check the performance of the motor after rewinding.
- The system could also be used for Life Cycle Assessment (LCA) of motors being used.

This helps in replacing the existing energy-inefficient motor with new motor.



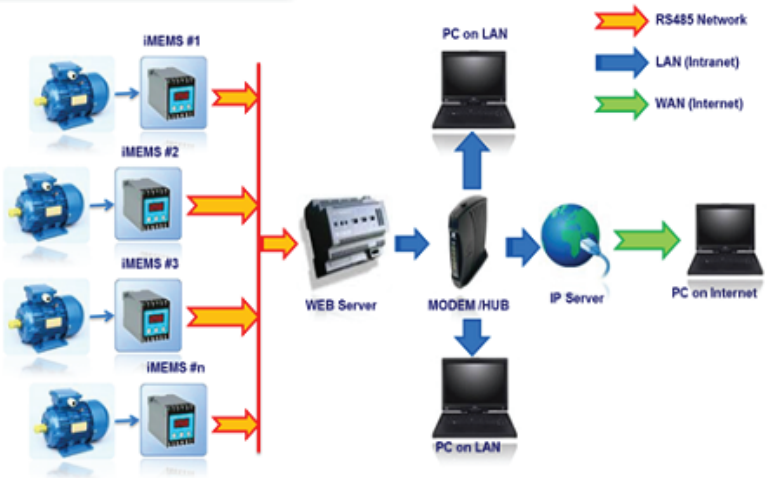


Figure 1.7: Block Diagram of the developed NIMEMS

TECHNOLOGY: LPG LEAK HUNTER

Key Facts	
Team	Dr.Hiranmay Saha, Mr. Sugato Ghosh, Prof.Indranil Das
Primary Industry Application	Detects from LPG and Stove
Institution Name	Indian Institute of Engineering Science and Technology Shibpur & DST-CSIR Sensor Hub CGCRI, Kolkata
Email	sahahiran@gmail.com
Uniqueness about the Technology	• Reliable leak detector of LPG gas in kitchen • User friendly - Single button operation • Different colours of light indication depending on the gas concentration • Coded buzzer alarm • Light weight - 120gm (Without battery) • Low power signal conditioning unit and suitable packaging for different applications • Detects the leakage from LPG Cylinder in Kitchen • Portable (70mm X 135mm X 30mm) • 3V operation (2 Nos. of AA battery) • Low power consumption (60mW for circuit) • Fast response time (15 Sec)
Comparison with existing solutions	It is a completely indigenous development and no such commercial product of Indian origin using semiconductor sensor is available in the market.
IP Ownership	IIEST, Shibpur
Patent status	To be filed
Technology Status	Demonstrated and transfered to a local entrepreneur

Technology Description

LPG Leak Hunter" has been developed for the workers who repair domestic gas burners and stoves. Generally they use matches and paper to find any leak is present or not in the system. But unfortunately the method is itself very dangerous and any kind of accident may happen any time. LPG Leak hunter can detect the leak of the systems and alert the workers. There are three levels of safety indications with buzzer (Red, Yellow, Green light). In this gadget primarily an imported gas sensor has been used. But this can be replaced with MEMS based metal oxide sensor for low power consumption. This has since been developed and demonstrated at the Sensor Hub. Two AA rechargeable battery (1.5V X 2 = 3V) has been used for power supply.

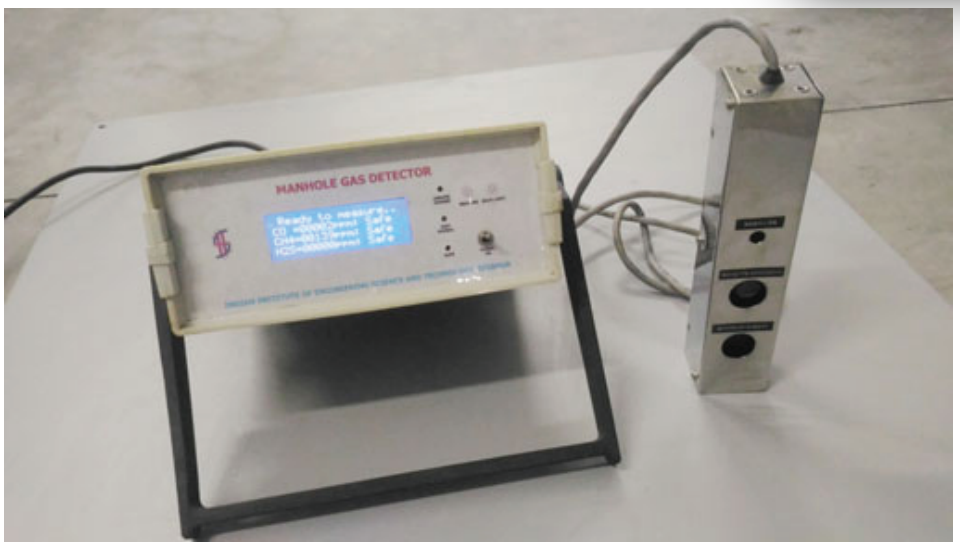
LPG LEAK HUNTER

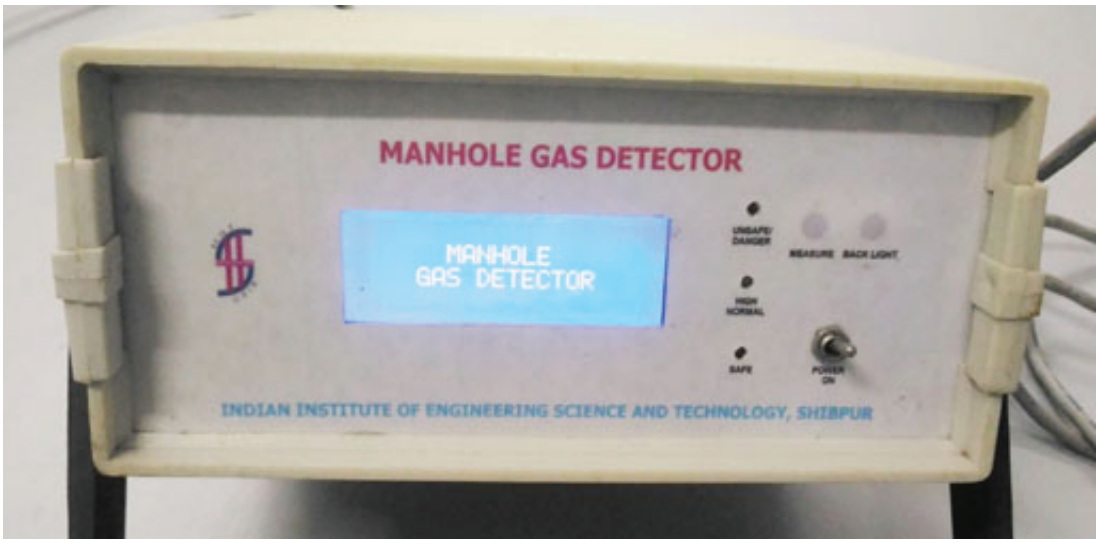
TECHNOLOGY: MANHOLE GAS DETECTOR

Key Facts	
Team	Dr. Hiranmay Saha, Mr. Sugato Ghosh, Prof. Indranil Das, Prof.Paramartha Dutta
Primary Industry Application	Manhole and other confined area gas sensing
Institution Name	Indian Institute of Engineering Science and Technology Shibpur, & DST-CSIR Sensor Hub CGCRI, Kolkata
Email	sahahiran@gmail.com
Uniqueness about the Technology	The explosive gases Generate alarm if any of the gas is beyond its threshold limit. A reliable signal conditioning unit has been developed inside the gadget.
Comparison with existing solutions	It is a complete indigenous development and no such commercial product of Indian origin using semiconductor sensors are available in the market.
IP Ownership	IIEST, Shibpur
Patent status	Patent attorney is preparing the necessary document
Technology Status	Demonstrated and transfered to a local entrepreneur

Technology Description

- Portable, light weight and compact
- Rechargeable battery operation
- Detachable probe assembly
- Simple in operation and interpretation
- Reliable and accurate
- At present three gases can be measured at a time (Future up gradation is possible) like Methane, Hydrogen sulfide and Carbon monoxide
- Three level of LED indication with coded buzzer alarm and display the concentration in ppm (4 line LCD Screen)
    - o Green LED > Safe
    - o Yellow LED > High Normal
    - o Red LED > Danger
- Portable Light weight
- Body: (255mm X 100mm X 240 mm) & 1900 gm (with battery)
- Sensor: (40mm X 40mm X 200mm) & 250 gm





MANHOLE GAS DETECTOR

TECHNOLOGY: METHANOMETER

Key Facts	
Team	Dr.Hiranmay Saha, Mr. Sugato Ghosh, Prof. Indranil Das
Primary Industry Application	Mining and in confined area gas sensing
Institution Name	Indian Institute of Engineering Science and Technology, Shibpur & DST-CSIR Sensor Hub CGCRI, Kolkata
Email	sahahiran@gmail.com
Uniqueness about the Technology	Methanometer can detect upto 10000 ppm methane quantitatively. The gadget has a display unit with the light indication (Red, Yellow, Green light) and buzzer.
Comparison with existing solutions	It is a completely indigenous development and no other such commercial product of Indian origin using semiconductor sensor is available in the market.
IP Ownership	IIEST, Shibpur
Patent status	To be filed
Technology Status	Demonstrated and transfered to a local entrepreneur

Technology Description

- Reliable prediction of methane concentration in hazardous area like under ground coal mine
- Capable of measuring concentration of methane / LPG gas
- Low power signal conditioning unit and robust packaging for different applications
- Extended probe to find out the leak in narrow area
- 16 x 2 LCD screen to display the gas concentration present in hazardous area
- Three levels of led indication (green, yellow & red) with buzzer depending on the concentration of gas (safe, moderate and danger)
- Two pencil battery (1.5v x 2)
- User friendly & easy to operate
- Portable (70mm x 135mm x 30mm)
- Low power consumption (60mw for signal conditioning unit)
- Fast response time (15 sec)

METHANOMETER

Industrial Process

TECHNOLOGY: PLASMA NITRIDING

Key Facts	
Team	Dr. Alphonsa Joseph, Dr. S. Mukherjee, Dr. S. Gupta
Primary Industry Application	Impovement of service life of components of automotive, textile, die, plastic inject molds and powder metallurgy industries.
Institution Name	FCIPT Division, Institute for Plasma Research, Gujarat
Email	alphonsa@ipr.res.in, mukherji@ipr.res.in
Uniqueness about the Technology	Environment friendly technology for improving the service life of components by ehancing the wear and corrosion resitance in short time duration.
Comparison with existing solutions	No Post grinding operation is required; The process can be more accurately controlled; Can be performed at lower temperature; Less distortion; reduced time cycles; Eco-friendly process.
IP Ownership	Institute for Plasma Research, Gujarat
Patent status	Protected
Technology Status	Succesfully developed and transferred the technology to two industries.

Technology Description

Nitriding is a surface-hardening heat treatment that introduces nitrogen atoms into the surface of steel at a temperature range of 500 - 550°c. The purpose of nitriding is increases the surface hardness of the steel and improve its wear and corrosion resistance properties. Various nitriding methods, e.g. gas nitriding, liquid nitriding, plasma nitriding, have been applied to various ferrous alloys to achieve superior surface hardness. Conventionally gas or liquid nitriding are used - both of which are toxic in nature.

In contrast to these processes, plasma nitriding is carried out in a vacuum chamber where high-voltage electrical energy is used to form glow discharge plasma of the background gas (nitrogen and hydrogen) mixture. Ions from the plasma bombard metal surface leading to temperature rise, cleaning of the surface and provides nitrogen species which diffuses in the metal surface.

Waste Management

TECHNOLOGY: PLASMA PYROLYSIS TECHNOLOGY

Key Facts	
Team	Dr. S. K. Nema, Mr. Vishal Jain, Dr. S. Mukherjee
Primary Industry Application	Biomedical and hazardous waste disposal in safe manner
Institution Name	FCIPT Division, Institute for Plasma Research, Gujarat
Email	nema@ipr.res.in, mukherji@ipr.res.in
Uniqueness about the Technology	It is safe and environment friendly technology
Comparison with existing solutions	Clean technology that do not generate toxic pollutants.
IP Ownership	Institute for Plasma Research, Gujarat
Patent status	Indian Patent granted
Technology Status	Successfully demonstrated up to 1ton/day capacity and also demonstreated the low capacity (300kg/day) system at 11 locations in India.

Technology Description

FCIPT has successfully developed and demonstrated plasma pyrolysis technology for the safe disposal of biomedical waste of capacities 15 kg/hr. and 50 kg/ hr. In an environment friendly manner. MOEF & CC and CPCB has accepted the plasma pyrolysis/gasification as one of the alternative technology to incineration. However, as per MOEF & CC guidelines, biomedical waste must be disposed off at common biomedical facilities. Typically 200-300 kg/hrs. Waste disposal plants are required for common biomedical waste treatment facility. Therefore, applying home-grown environment friendly plasma technology has direct societal benefit.

The high temperature in a plasma torch disintegrates biomedical waste into smaller molecules such as methane, CO, hydrogen etc. The gases formed are combusted in the secondary chamber at 1200,^{o}C and subsequently quenched. The technology safely disposes biomedical waste and all emissions including dioxins and furans remain well under the standards set by CPCB/MOEF & CC and US EPA.


Specifications
Input Material: Angora Web
Width:1m
Speed:4.5 m/min
Gas Ambient Air

For further details, please contact:

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