



II-B. Technology Development and Innovation Programme

The programme has two sub-components, viz. (i) Technology Development and Demonstration Programme (TDDP) to support technology development efforts of industry R&D system and (ii) Technopreneur Promotion Programme (TePP) to nurture the innovative spirit of individuals.

1. TECHNOLOGY DEVELOPMENT AND DEMONSTRATION PROGRAMME

1.1 Preamble

Technology Development and Demonstration Programme (TDDP) is a component programme of 'Technology Promotion Development and Utilization (TPDU) Programmes. The genesis of TDDP is PATSER Scheme, which commenced in VIII Five Year Plan in 1992. The PATSER Scheme continued in the VIII and IX Plan and was designated as TDDP in the X Plan. TDDP aims to support technology development efforts of industry R&D system.

1.2 Objectives

The programme aims at strengthening the interface between industry, R&D establishments and academic institutions and provide catalytic support for development and demonstration of innovative product and process technologies, traversing the journey from proof of concept or laboratory stage to pilot stage, rendering them fit for commercialization in all sectors leading to industrially useful applications. The objectives of the programme are:

(a) Development and demonstration of

innovative need-based technologies for making industry competitive, and

(b) Strengthening the interface between industry, R&D establishments and academic institutions.

1.3 Activities

The Department provides, on a selective basis, partial financial support to research, development, design and engineering (RDDE) projects proposed by industry in the following areas:

- (a) Development of a new or improved product resulting in prototype development and ending with demonstration in commercial environment.
- (b) Development of a new or improved process resulting in establishment of process know-how, development of process equipment and demonstration of yield, efficacy etc in a pilot plant.
- (c) Absorption and up-gradation of imported technology.
- (d) Priority technology development projects of PSUs in consultation with and co-financing from economic ministries. Under this, consortium projects for development of technologies of common interests for group of industries or associations to be undertaken by industrial units, national laboratories, user industries in important focused areas such as Electronics and Communications, Railways, Drugs, Chemicals and Fertilizers etc.

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- (e) Development and demonstration of technologies for common use by industry clusters.
- (f) Development and demonstration of technologies for government's flagship and mission mode projects.

The partial financial support by DSIR in the above areas primarily covers prototype development and pilot plant work, testing and evaluation of products from such R&D, user trials, etc. Bulk of the cost of the project is met from the purpose industry's resources.

The Department, under this programme has so far supported about 200 R&D projects of Industrial units. These projects cover products and processes in various important industries such as metallurgy, electrical, electronics, instrumentation, mechanical engineering, earth moving and industrial machinery, chemicals and explosives, etc. Around 50 technologies developed under the scheme have been commercialized or are under commercialization and royalty amounting to Rs. 12.28 crore has been received so far.

The list of technologies commercialized is given at **Annexure 8**. During the period of report more than 40 projects supported under the programme were reviewed and carried forward.

1.4 Status of the Projects Supported During the Eleventh Plan

Microbial production of Arachidonic acid, an Omega-6 polyunsaturated fatty acid essential for Human health by M/s ABL Biotechnologies Limited, Chennai

Arachidonic Acid (ARA) is a precursor of eicosanoids, a group of compounds that play an essential role in varied processes such as homeostasis, blood clotting, gastrointestinal functions and immune system. A range of disorders such as rheumatoid arthritis, multiple sclerosis, schizophrenia and pre-menstrual syndrome may be caused in the absence of polyunsaturated fatty acids, such as ARA. It is also essential for the healthy development of the brain in infants. This fatty acid, therefore, is a recommended ingredient

in infant food formulae together with another polyunsaturated fatty acid (PUFA), the docosahexaenoic acid (DHA). In the present project the commercial source of this fatty acid is a group of fungi belonging to the genus *Mortierella*. This project aims on the commercial production of an important nutraceutical for infant and adult health care, namely the essential, omega-6 fatty acid, arachidonic acid.

In the present work, 13 strains of *Mortierella* have been screened for biomass, lipid production and ARA content to select the best strain for further development. ARA was extracted on a lab scale and being analyzed for purity. In addition to this, the total crude lipid production (g/l) and percentage of lipids in dry biomass was estimated. Scale-up studies (20L Fermenter) are also being carried out.

The project is under progress.

Development of Process for manufacture of nano-labelled DNA/RNA compounds by M/s Ogene Systems (I) Pvt. Ltd (OSPL), Hyderabad

The rapid growth of biotechnology has triggered an increasing demand for modified oligonucleotides dedicated mostly to diagnostic and therapeutic applications. Labeled oligonucleotides and nucleic acids find various applications in detection of amplification products of polymerase chain reaction, solid phase DNA sequencing, hybridization probes etc. Application of DNA/RNA probes in the diagnosis of infectious diseases is a recent alternative to the established isolation and determination of micro-organisms by cultural and serological methods. Design and development of labeling reagents, with exponential magnitude for high sensitization, which will allow detection of even single molecule in diagnosis and life science area using the nanomaterials in this advanced area. This is also useful in vivo imaging and detection of small size tumors.

M/s Ogene Systems (I) Pvt. Ltd. has successfully completed the project activities on the synthesis of 6-carboxy-tetrachlorofluorescein, 6-carboxy-hexachlorofluorescein and the cyclohexyl backbone for the requirement of Bio-genex. During the synthesis of the above products Cyanation



reactions were upscaled to 1000gms, synthesis of cyclohexyl backbone was completed and achieved 95 per cent purity with 3-isomer impurity less than 5 per cent. Reaction of trimethoxypropoane aminisilane with fluorescein moiety was carried out and this coupled product was conjugated with nanosilica. The incorporation of fluorecein moiety on silica nano particle was also carried out.

The project activities were successfully completed except for release of final installment.

Development of Novel Therapeutics based upon Natural Products from Indian Medicinal Plants, Joint Project by Chemistry Department, Delhi University, and VP Chest Institute, University of Delhi, Delhi

The project proposes to identify natural product based molecules which have better efficacy than the compounds already identified till now. It also includes medicinal chemistry analysis on potential anti-inflammatory/anti-platelet aggregation and vasorelaxation compounds already identified by them.

In the project, various classes of rationally selected compounds were synthesized (more than 1000 acyloxy derivatives of coumarins, flavones, xanthenes, chalcones, quinolones, cinnamates, furanones, benzopyridinones, pyrimidinones, etc. have been prepared), screened and investigated in detail for their anti-platelet activity. Out of the two lead molecules, PRA-6 and EPA-1 having best anti-platelet activity, PRA-6 was found to be very effective molecule that can stand competition with the existing anti-platelet drugs in the market. In depth studies including comparison of PRA-6 with similar existing drugs in the market, viz. aspirin, clopidogrel, amlodipine, etc. were undertaken on the lead molecules both *in vitro* and *in vivo*. PRA-6 was found worthy to compete with the existing antiplatelet drugs (clopidogrel, amlodipine, etc.) in terms of efficacy as well as cost effectiveness.

In the area of anti-inflammatory drug lead identification, several libraries of compounds (more than 500 compounds) belonging to the rationally identified classes, *i.e.* cinnamates; thiocinnamates and thionocinnamates; esters and amides of hydroxy- and aminobenzopyrans, hydroxyl-

benzopyrancarboxamides, N-protected isatin derivatives and spiro-(indoline-isoxazolidines) were synthesized. Evaluation studies of these compounds were carried. Quite a few of these compounds screened under the project have shown very high per cent inhibition of ICAM-1 and VCAM-1 values (in the range of 93-97 per cent) and MTD values of above 200 m moles with very low IC₅₀ values, in the range of 10 – 15 m moles, which are lower than those of many commercial anti-inflammatory compounds. In the anti-inflammatory/asthma area, the compound EPA1 significantly inhibited the Protein Kinase C (PKC) lymphocytes of asthmatic patients. In addition, EPA1 was also found to cause the inhibition of COX2. These observations characterized EPA1 as a possible candidate drug for asthma, a disease known to involve PKC, the levels of PKC are known to increase in asthmatic conditions. In the project, several Indian Patents and PCTs on antiplatelet compounds and anti-inflammatory compounds have been/are being filed.

The project activities were successfully completed except for completion of patent filing activities and release of final installment.

Development of Dorzolamide HCl, by M/s Sequent Scientific Ltd., Mangalore

Glaucoma is the third most common cause of blindness in the world. Dorzolamide hydrochloride is an optically active compound which is being used as a sterile ophthalmic solution for glaucoma. It is still being used both as a mono-therapy as well as, for better efficacy, in combination with timolol.

In present project M/s Sequent Scientific Ltd., has successfully completed a pilot scale study to standardize the protocols for manufacturing the product based on a modified process in one of the routes by the replacement of LAH by NaBH₄ in one of the reductive processes and also replacement of oxone and boron trifluoride etherate/NaBH₄ instead of hydrogen peroxide and boron dimethylsulfide respectively for the oxidation and reductive processes. In doing the successful scale up trials from 100 gm, 1.8 Kg up to 10 Kg batches, the company has achieved average yield of 79.07 per cent and maximum yield of 79.60 per cent in Pilot trials of 10 Kg x 3 batches and average purity

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of 99.84 per cent. The Company successfully achieved final product complying USP/EP specifications in the scale up trials resulting in quality product at competitive price.

The project was successfully completed.

Development of 90 KW Brushless Eddy Current Clutch Gear Unit for Radiator Cooling Fans in Diesel Electric Locomotives of Indian Railways by M/s Eddy Current Controls (I) Ltd., Chalakudy, Kerala

The Radiator Fan is used in Diesel Electric Locomotives to bring down the temperature of the Diesel Engine cooling water to the desired level. Drive between the Engine and Radiator Fan consists of an Eddy Current Clutch (ECC) which is capable of providing variable speed and a suitable Gear Box which provides mechanical coupling between the Clutch and the Fan. Eddy Current Clutch Gear units presently being used by Diesel Locomotive Works (DLW), Varanasi for Indian Railways, are brush type couplings with rotating winding and copper coated drums and are inherently prone to frequent breakdowns. Brushless Eddy Current Clutch Gear Units for Radiator Cooling Fans, due to non-contact type technology, have relatively lower maintenance costs and longer life.

In the present project, M/s Eddy Current Controls (I) Ltd. have undertaken the design and development of 90 KW Brushless Eddy Current Clutch Gear Unit for Radiator Cooling Fans with the additional constraints imposed by the limited space available and high ambient temperature environment prevailing in the engine space where presently ECC is housed. The company, improving upon the initial prototype could overcome the problem of excessive heating of drum, clutch voltage saturation etc. and has developed 90 KW Brushless Eddy Current Clutch Gear Unit. The testing of the prototype as per the specifications and field requirements is under trial.

The project is under progress.

Process Development and Pilot Plant Trials towards Commercialisation of (i) A Pentapeptide with a Natural Triterpenoid Conjugate (ii)

Extraction of Pterostilbene from Pterocarpus Marsupium and Conversion to Resveratrol by M/s Sami Labs Ltd., Bengaluru (SLL).

Several pentapeptides have been found to have collagen blocking properties that retard skin ageing. The company have attempted at combining the pentapeptide with triterpenic acid – a naturally available anti-inflammatory agent commonly found in olive leaves. This new molecule, (triterpenoyl-pentapeptide) when tested for anti-elastase, anti-collagenase and anti-hyaluronidase activities, has exhibited 5-6 times higher potency and effectiveness vis-a-vis similar compounds like Matrixyl available in the market. In doing the scale-up trials of 15 gm, 30 gm, 50 gm, 100 gm and 200 gm batches, the firm has achieved the overall yield of 11-12 per cent and purity of 73-75 per cent. Company successfully achieved a feasible and economical 'solution-phase' process for synthesis of oleanoyl pentapeptide conjugate, which is a new molecule, by taking up several scale-up trials. From the biological tests conducted, it appears that the final product is a better molecule for anti-wrinkle activity than Matrixyl and is also cost effective. It would be an alternate option for Botox treatment without its side effects.

Resveratrol is a powerful antioxidant that is used as a food supplement and is also being tried as an anti-cancer agent. The company has developed a process of O-demethylation of poly-O-methyl ethers to get poly-phenolic compounds. Using this process they have been able to get Resveratrol from pterostilbene. After screening many promising plants, the company has identified 'Pterocarpus marsupium' locally known in Hindi as 'Bibla' or 'Vijayasar' or 'Bijasar', as a source for many stilbenoids including pterostilbene. In the process Pterocarpus marsupium wood is processed to obtain pterostilbene and then finally resveratrol. In doing the successful scale-up trials, in the first process for isolation of Pterostilbene from Pterocarpus marsupium for 50 Kg, 100 Kg, 250 Kg, 500 Kg, 1250 Kg and 3000 Kg batches, they achieved an average yield of 0.47 per cent with purity of 95-97 per cent. The recovery improved to 0.52 per cent by doing 3000 Kg trial batches. In case of second process involving conversion of Pterostilbene to Resveratrol, the scale up trials of 500 gm, 1.0 Kg, 2.5 Kg, 5 Kg, 10 Kg and 20 Kg



batches, the company achieved an average yield of 63.5 per cent and purity of 95 per cent to 98 per cent. The yield improved to 65 per cent with purity of 97 per cent to 98 per cent in 10 Kg and 20 Kg batches. Company successfully achieved a feasible pilot plant process for extraction of Resveratrol from *Pterocarpus marsupium* which is either matching or better in some aspects than Resveratrol of Chinese origin.

The project activities were successfully completed except for release of final installment. Plant and machinery used in the R&D are shown in figs 1 and 2.



Fig 1: SS – Reactor cum Crystallizer



Fig 2: Centrifuge System

Development of small PV-Wind hybrid power plant for rural application by M/s Rajasthan Electronics and Instruments Ltd., Jaipur (REIL)

The concept of hybrid power plants has been tried in many countries and in some of them this has

received huge acceptability. Solar Photovoltaic (SPV) modules and system is a well known and proven technology in the field of lighting and electricity generation. SPV technology is based on silicon (amorphous, crystalline and thin film), whereas a typical wind power plant system consists of a Wind Generator, a Generator controller, a Battery Bank and an Inverter.

In the present project, the company envisages to design, develop and integrate small hybrid power plant (172 W, SPV–Wind) for rural applications which is economically viable and meets the power requirement of the common man. It was proposed to fabricate substantial number of prototypes for field trial runs to study system efficacy and improvement. The company, improving upon the initial prototype system by incorporating inverter system, efficient load design, maximum power tracking characteristic etc., has fabricated and installed ten systems at different locations for carrying the optimization of system performance (fig 3).

The project is under progress.



Fig. 3: Small PV-Wind Hybrid Power Plant for Rural Application

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Glargine Process Improvement by M/s BIOCON Ltd., Bengaluru

Glargine, similar to Aspart and Lispro, are newly developed human insulin analogs. Their manufacturing process involves fermentation of methylotrophic yeast, followed by cell harvesting. Purity abolishes and overcomes insulin resistance. Hence, the purer the insulin the better it is for clinical efficacy and safety profile.

In the project, M/s Biocon has taken up to improve the purity of Glargine developed to levels higher than 99.5 per cent at pilot scale to evaluate the process during scale up. During the scale-up trials the process parameters are studied at development scale for improvement of process yields and reduction of cost of goods. Process improvements inferred by optimizing, process conditions have scaled-up to pilot scale. The scale up experiments performed at pilot plant, with proposed process improvements, were studied for process robustness and consistency. The increase in purity of final product from 97.5 per cent to purity of >99.0 per cent have resulted in producing Insulin Glargine of purity equivalent to innovators in Market. The final product complying USP/EP specifications would be the first step towards regulatory requirement.

The project was nearing completion.

Development and Demonstration of process for manufacture of Hydrogel at Pilot Plant Scale by M/s Earth International Pvt. Ltd., N. Delhi

Hydrogels also known as Super Absorbent Polymers (SAP), are substances that have a unique 40,000 to 50,000 per cent water absorption capacity. This property can be a boon for agriculture since absorbed water along with nutrition and other desirable substances can continuously provide all requirements of the plants. Hydrogel is a cross-linked polymer, which when put in water traps the water and forms swollen networked structures, forming a gel like substance. The hydrogels developed in Indian Agriculture Research Institute (IARI), in its dry form are capable of absorbing 400-500 times its weight of water, can withstand up to 50°C temperature, have repetitive

gelling character, biodegradable with a shelf life of 2 years. These hydrogels besides meeting water demands of the plant improves germination and minimizes soil erosion. These hydrogels in combination with drip irrigation can transform the barren land to a productive one.

The performance trials and test runs on various crops in different climates are in progress by the company. The company is scaling up the lab process up to pilot scale (initially in a batch of 5 kg with the maximum of 25 kg) and developing field trials data for commercialization of the lab scale technology on use of Hydrogels.

The project is under progress.

Development of Indigenous Radiotherapy Simulator (RTS) for Radiation Treatment of Cancer by M/s Elim Meditech Pvt. Ltd., Kanyakumari, Tamil Nadu.

Radiotherapy (Radiation treatment) plays a major role in multidisciplinary cancer treatment. Delivering accurate radiation dose conforming to the tumour is one of the most important needs in Radiotherapy. To achieve this radiation conformal treatment for all types of cancer, Radiotherapy Simulator (RTS) is the basic hardware equipment. RTS is basically a Radiological Imaging System, mimicking all the mechanical functions of a Teletherapy treatment machine (telecobalt Machine or Linear Accelerator), which is used for radiation treatment of cancer. With Radiotherapy Simulator it is possible to create all types of image reconstruction, storage, networking and result output.



Fig. 4: Radiotherapy Simulator for Radiation Cancer Treatment



The project of M/s Elim Meditech Pvt. Ltd. made progress in assembling all the hard ware mechanical sub-system of the old RTS system and developed new electronics sub systems and software controls for the design, development and demonstration of Indigenous Radiotherapy Simulator for Radiation cancer treatment (fig 4).

The project is under progress.

1.5 New Project Proposals

During the period under report, against open advertisements in leading daily newspapers, more than 30 new proposals were received which are under process.

2. TECHNOPRENEUR PROMOTION PROGRAMME (TePP)

2.1 Objectives

- To promote individual innovators to become technology based entrepreneurs (Technopreneurs)
- To encourage students having nascent creative ideas for translating into working model/prototypes
- Nurturing individual innovators through extended TePP Outreach centres (TUC's) network and mentoring technical support.

2.2 Activities

TePP through its network partners, provides financial grants to individual innovators having original ideas to convert these into working models, prototypes etc. The supported projects cover wide range subjects such as agriculture, nano-technology, mechanical engineering, bio-technology, electronics/electrical engineering, information technology, chemical engineering and so on. The department has supported sixty eight (68) new projects during the period under report. TePP Phase II funding was also initiated during this period with a maximum support of 45.00 lakhs. Six project proposals were recommended by the TePP Screening Committee. The details of the completed, on-going and approved projects supported under TePP programme are given in

Annexure 9. Brief description of some of the completed and ongoing projects supported under the programme are as follows:

COMPLETED PROJECTS

Worm Composting to Treat Medical Waste

Shri Arunav Misra from Vadodara has developed a bioreactor to treat medical waste (fig 5). The worm composting is an alternative option which is safe and environmental friendly technology to treat medical waste economically by using a bioreactor. The novel bioreactor is based on aerobic system of biodegradation in a closed container duly incorporating oxygen transfer, pH, moisture and temperature controlling arrangements. Organic medical waste is loaded from top and compost is released from bottom end. Worm and other micro-organism are populated inside the vessel providing food and useful supports. The mechanism helps in faster processing that has a compound effect on the levels of pathogens namely E.coli, Faecal Coliforms and Salmonella sp. with more than 99.9 per cent possible reductions. Worm composted material exhibits greater pathogen reduction than achieved with conventional composting.



Fig 5: Pilot Plant (Bio-reactor)

Pedestal wet Grinder

Shri Shyam Kumar S. from Thiruvananthapuram, Kerala has developed a wet grinder (fig 6) which is pedal powered instead of using electricity. This machine simply uses human power for rotating the grinding wheels of the grinder which in turn grinds the grain. The pedestal grinder consists of seat, pedals, transmission system, chain drive, grinder drum, drive shaft, grinding wheels, frame and handle. It simply looks like an exercising cycle used in gysnasiums. When a person starts pedaling the power is transmitted to the gear box through chain

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drive. Gear box increases the RPM and it transmits power at an angle 90°. For this purpose, bevel gears are used in gear box. From the gear box power is transmitted to grinder drum through drive shaft. It is coupled by using a T-slot in grinder. When the shaft rotates, the drum also rotates and starts grinding operation. The design of chain drive and gear box is quite simple and easy to assemble.

Mobile Crime and Accident Reporting Platform (MCARP)

Shri Sanjay Vijay Kumar from Thiruvanthapuram has successfully demonstrated the concept of 'Mobile Crime and Accident Reporting Platform (MCARP)'. The innovator has developed the prototype, tested and had done trial demonstration with police department of Kerala. The MCARP is based on a Mob share Platform that allows police personnel to take photos of an offence, like accident or traffic violation, in a high-end camera phone and send it to the control room as MMS. These phones will be given email IDs to the platform. The personnel can send the picture to the ID corresponding to the nature of the offence. Images can be sent only from the numbers that have been white-listed and can be accessed/monitored only by authorized officers. The MCARP has been successfully implemented by Kerala police



Fig 6: Pedestal wet Grinder

at Kochi city and they have started using this extensively in day to day handling of law and order, crime and accident management/ reporting. The working of the system has been shown in fig 7.

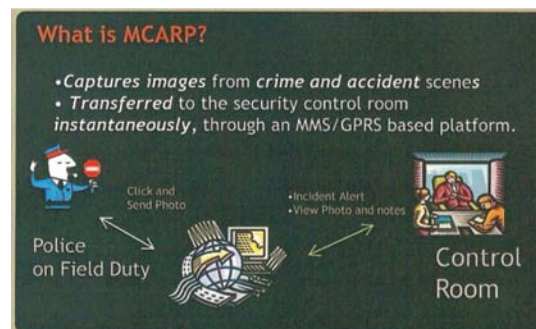


Fig 7: Working of MCARP System

Laboratory Scale Process for Environment Friendly Printing Ink

Shri Sidhartha Kumar Bhimania from Delhi has developed vegetable oil based environmental friendly inks containing unsaturated drying oils. This ink polymerise in presence of atmospheric oxygen leading to drying. These inks can also be washed with mild alkali solution. Complete product range (all four colours) has been developed. Thus it leads to almost zero volatile organic compounds emission. The ink has many benefits such as:

- Drying and washing of these inks is free of the emission of volatile organic compounds.
- Vegetable oil based inks are economically attractive as rise in crude prices of raw materials used in conventional inks makes put pressure on the costs.
- The mildly basic wash solution for vegetable oil based inks reduces operating costs compared to costly hydrocarbon based wash solutions used with conventional inks.

Development of Geometric Instrument comprising a center Leg Assembly and Various Plotter Bodies

Ms. N.M. Hamsa Nandhini from Tiruchirapalli has developed a user friendly Geometric Instrument comprising a center Leg Assembly and Various



Plotter bodies. In the conventional practice with the existing geometrical instruments, it is essential to measure each activity separately by using the scale or protractor, prior to drawing the lines circles, arcs, and angles etc. Instead, by not doing any measuring activity the same may be drawn for the major measurements, directly through the small plotter holes, those are provided in the body of the instrument itself with suitable size, shape, location, degrees and with complete foolproof mechanism (fig 8).

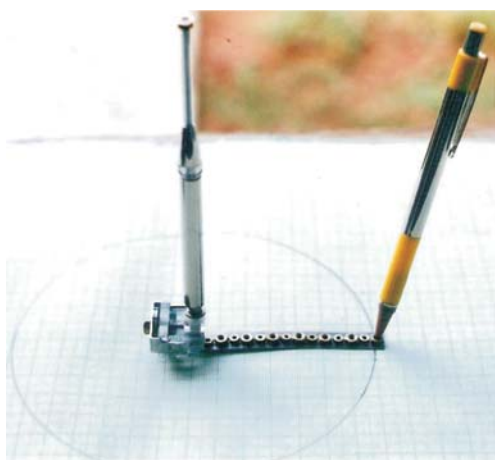


Fig 8: Geometric Instrument

Prototype of Heating/Cooling Apparel

Shri Kranthi Kiran Vistakula from Hyderabad had developed a novel heating/cooling apparel. The development of third stage prototype of apparel, "ClimaGear™", is an innovative, user-controlled, cooling and heating jacket that keeps the user comfortable and safe in harsh environments. ClimaGear allows the user to select the temperature that comforts him or her. ClimaGear is a novel patent-pending synthesis of established, off-the-shelf thermoelectric and heat transport technologies using evaporative cooling and heat pipes. Thermo-electrics have been widely used in cooling and heating applications. The major drawback of the thermo-electrics is that their efficiency depends on the heat removal from the hot side of the thermoelectric. To achieve higher efficiency, large heat sinks are required and this makes them unsuitable for use in apparel. The innovator's unique way of combining thermo-electrics with novel heat sinks that use evaporation

as a mechanism for heat transfer makes it ideal to be used in apparel. Innovator's novel heat sink uses latent heat of evaporation of water in tandem with conduction and convection to remove heat efficiently thereby increasing the efficiency of the thermo-electrics and reducing the weight of the entire setup.

Intelligent Ground Vehicle

Shri Saurav Kumar from Delhi has developed a crude model of Intelligent Ground Vehicle. The innovator is an engineering student of Delhi College of Engineering, Delhi. The innovator has developed a fully autonomous vehicle having its own artificial vision so that it could maneuver the traffic following traffic rules. It will automatically search for the shortest and safest path to reach its destination. It will be free from human errors and will be able to work under any terrain or any climatic condition. Major research work will be done in its path planning, artificial intelligence and its machine vision so as to make it totally risk free vehicle.

Low Cost Automatic Cash Depositor

Shri Rajiv Shankar Sinha from Kanpur has developed a Low Cost Automatic Cash Depositor (fig 9). The innovator has developed a low cost teller machine where users can deposit cash. The machine accepts notes of all denominations starting from Rs.10. The machine can be used by commercial banks to facilitate banking services. Apart from this, there are many other potential end users, like fee deposit, train ticketing, tax collection etc. This machine can also be installed in highly populated areas (slums) where poor people can save their money because of unavailability of saving channels.

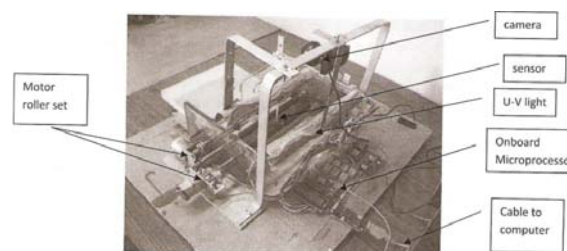


Fig 9: Low Cost Automatic Cash Depositor

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Hybrid System for Solar Distillation and Drying Application

Prof. Chandak Ajay Girdharilal from Dhule successfully developed a prototype for increasing utilisation of 'Solar Concentrators' for new applications like water distillation combining with solar drying process (fig 10). The invention utilizes solar concentrators for generating steam and condensation of steam will result in distilled water that has commercial value. During condensation of steam, the latent heat released may be used for drying process which otherwise is wasted in normal circumstances. End product i.e. distilled water has market value for various uses such as schools, colleges, laboratories, automobile batteries, pharmaceutical industry, food processing industry etc. Products from solar dryer have market such as food product, dried/preserved vegetables and fruits for use in lean season.



Fig 10: Hybrid System for Solar Distillation and Drying Application

Hydroponics Device Prototype

Dr. R. Mohankumar from Chennai has developed a kitchen device for garnering the root exudates from the plants (fig 11). This device has an enormous application in Nutraceuticals areas, as well as in medicinal field. Plant roots produce a number of chemicals, which are not utilized in the normal cultivation methods. The plants are harvested to get the desired nutrients – similar to killing the goose that lays the golden egg! In order to conserve the plants and also derive maximum benefit from them a new device has been designed with the idea of harvesting the root exudates from the plants using Hydroponics device. This device

can serve as a Nutraceuticals kit, which would be an ideal kitchen commodity, easy to operate and maintain.



Fig 11: Hydroponic Device Prototype

ONGOING PROJECTS

Cabinet of Personal Computer

Ms. T. Bhargavi from Chittoor, Andhra Pradesh is working on the project titled cabinet of Personal Computer (fig 12). This PC cabinet is a single unit instead of two separate units as in the existing system, viz. CPU and Monitor. The innovator got this idea while cleaning the house. The existing system has too many cables which restrict the cleaning and it may damage/disturb the system also. The proposed cabinet is having the base at bottom in which Hard disk and CD ROM/DVD writer is positioned. On this base, moveable cabinet is positioned containing the LCD screen in front side and mother board, switch mode power supply system at the back. This cabinet is fitted with the pivot mechanism at the base. The key board is designed to protect the LCD/TFT Screen from damage when it is not used.



Fig 12: Cabinet of Personal Computer



Phantom Power Eliminator

Shri Nelvin Joseph from Cochin is developing a self controlling system called Phantom Power Eliminator (fig (13) which would eliminate phantom power losses in electronic devices that accounts for nearly 26 per cent of the world's power losses. The phantom power is the power consumed in a passive way by the device even after the device is switched off. The product once completed in terms of production and testing, can be sold to companies as well as households to curb power losses. The main advantage of the system is to save the energy which would be beneficial to both the consumers and the government. The proposed product is based on current scientific knowledge and principles. The proposed system is capable for turning off a switch electrically to fully avoid the phantom power wastage.



Fig 13: Phantom Power Eliminator

2.3 TUC Network

To expand the reach of TePP among common mass, **twenty-nine (29) TePP Outreach Centres** have been set up by DSIR. These are located at Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur (W.B.); Society for Innovation and Entrepreneurship (SINE), IIT Bombay; ERDC-Hartron, Ambala Cantt. (Haryana); Acharya Nagarjuna University, Guntur (A.P.); Technopark, Trivandrum (Kerala); Foundation for Innovation and Technology Transfer (FITT), IIT Delhi; Shri Siddhartha Institute of Technology (SSIT), Tumkur (Karnataka); Science and Technology Entrepreneurs' Park (STEP)- National Institute of Technology (NIT), Surathkal (Karnataka); TREC-STEP, Trichy (T.N.); JSSATE-STEP, NOIDA (U.P.); PSG-STEP, Coimbatore (T.N.); Vellore Institute of Technology- Technology Business Incubator (VIT-TBI), Vellore (T.N.); Central Glass Ceramics Research Institute (CGCRI), Kolkata (W.B.); Institute Industry Partnership (IIP) Cell, IT-BHU, Varanasi

(U.P.); SIDBI Innovation and Incubation Centre (SIIC), IIT Kanpur, Kanpur (U.P.); Intellectual Property Rights (IPR) Cell, IIT Roorkee (Uttarakhand); College of Technology and Engineering, Udaipur (Rajasthan); National Institute of Technology (NIT), Silchar (Assam); Institute of Himalayan Bio-resources Technology (IHBT), Palampur (H.P.); Central Mechanical Engineering Research Institute (CMERI), Durgapur (W.B.); Central Scientific Instruments Organisation (CSIO), Chandigarh; National Environmental Engineering Research Institute (NEERI), Nagpur (Maharashtra); Shri Padmavati Mahila Vishwavidyalayam (SPMVV), Tirupati (A.P.); International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad (A.P.); Central Electronics Engineering Research Institute (CEERI), Pilani (Rajasthan); NEIST, Jorhat; TBI-e-Health, Bengaluru (Karnataka); Chhattisgarh Swami Vivekanand Technical University (CSVTU), Bhilai (Chhattisgarh); Technology Business Incubator- University of Madras (TBI-UoM), Chennai.

2.4 Other Activities

A number of other activities planned/participated by TePP during the year to sensitize academia, network partners and impact generation among common masses:

- Panel discussion on Project Funding and Technical Consulting of Innovative Ideas on 30th May, 2009 at Amity School of Engineering and Technology, NOIDA, UP
- Innovative Idea competition on 14th July, 2009 during Industry-Academia Conclave held at Yeshwantrao Chavan College of Engineering, Nagpur
- TePP Exhibition during Asia-Pacific Conference on Business Incubation, 6th-7th August, 2009 at Coimbatore, (fig 14).
- TUC Coordinator's meet on 10th August, 2009 at Ooty
- 5-days entrepreneurial training for TePP Innovators at S.P. Jain Institute of Management and Research (SPJIMR), Mumbai, 21st – 25th October, 2009.

- IGEM-2009 for participation in International Competition at MIT, USA by students of IIT Bombay, 30th October – 2nd November, 2009
- Participation of Student Innovators in GE - Edison Challenge, 6th November, 2009
- Technopreneurship Awareness Camps in Jammu and Kashmir States
- Participation of TePP in NAVONMESH – a business plan competition organised by Shailesh J. Mehta School of Management, Indian Institute of Technology Bombay, 31st October – 1st November, 2009
- Participation in Indian Science Congress at Thiruvananthapuram in January, 2010.
- Feature Articles/advertisements in TechnoFirst – a monthly magazine published from Cochin.

The purposes of these activities were to disseminate information on TePP to the larger mass of the populace.



Fig 14: A view of TePP Exhibition at Coimbatore

To diffuse the achievements of TePP innovations, a publication entitled “**CREATIVE INDIA, Vol. V**” consisting of profiles of start-ups and innovators are being compiled for its publication.

To diffuse the activities of TePP to a larger mass, it has been planned to publish Annual Calendar consisting of profiles of TePP Outreach Centres.