



Chandigarh



# Proposal for Startup Initiatives

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# **RashtriyaUchcharShikshaAbhiyan**

## **Centre for Innovation Driven Entrepreneurship & Startups (CIDES), Panjab University, Chandigarh**

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# RashtriyaUchcharShikshaAbhiyan

## Proposal to set up a Centre for Innovation Driven Entrepreneurship & Startups (CIDES)at Panjab University, Chandigarh

### Background

Panjab University abodesmajor Departments in engineering andnaturaland physical sciences. Faculty with expertise in computer, electronics, electrical, IT, mechanical, chemical sciences, biotechnology, microbiology, pharmaceutical sciences etc. run a variety of teaching and research programmes at PU.The university has a reputed Business School and a Department in Applied ManagementSciences, that closely interact with the technology departments to give the desired perspective to students for taking knowledge to market place. The University has a well-described Intellectual Property Right Policy and Rules for Consultancy that areadministered through a Centre for Industry Institute Partnership Programme (CIIPP). Recently, the DST has sponsored a Centre for Policy Research at PU, and the DBT (BIRAC) has supported PU as member of a University Innovation Cluster. A Centre for Skill Development & Entrepreneurship is also being plannedat PU. With these complementing components, training courses and technical expertise, the university has evolved a techno-entrepreneurship sensitized environment in Chandigarh region, and Panjab state. There is an effort by the University to bring together anumber of institutes in neighborhoodso as tofurther synergize the ecosystemfor research, technology and teaching. Several such institutes,supported by the central and state governments and industry have come together on a common platform, called Chandigarh Region Innovation and Knowledge Cluster (CRIKC). Panjab University is the Head Quarter of CRIKC. Functional heads from nearly 15 institutes and industries regularly meet on the forum of CRIKC to identify the areas of synergy for shared teaching, innovation and technology development.

Given the above background, Panjab University is in the desired ecosystem to upscale its research and teaching system for enhancing entrepreneurship development in the region. The present proposal hopes to open new opportunities for the students and faculty of PU to evolve Start Up on the campus. This should become a natural fall out of teaching and training at PU. Accordingly, the establishment of a **Centre for Innovation Driven Entrepreneurship &Start-Ups (CIDES)**is being proposed under the RUSAprogramme.

**Objective:** To roll out atleast ten Startups every year.

### Strategy :

Establish a governance system involving PU, State Council of S&T, neighborhood institutes in CRIKC, industry and financiers to invite, identify and support knowledge and technology driven leads to facilitate the establishment of Startup companies.

Areas of community needs and market potential will be identified by the Governing Body of CIDES through a process of due diligence to invite ideas, available leads and business plans suitable for promoting Startup companies. CIDES will promote the development of two types of projects :

- (i) **Projects selected after national competition;**
- (ii) **Projects selected after student competitions among CRIKC institutes.**

#### **Process to be followed for selecting the Startups at CIDES:**

A detailed process will be developed by the Governing Body of CIDES for due diligence to promote innovative ideas and leads to encourage the establishment of Startup companies. Detailed processes will be developed along the following broad suggestions.

1. Conduct periodical consultation workshops and student competitions to identify priority areas of local and national interest that need technology driven solutions and hold promise for commercialization or social good.
2. In the prioritized areas of national interest approved by the Governing Body, CIDES will advertise at national level to invite ideas for Startups.
3. In order to tap the synergy of students and faculty at the CRIKC institutes, CIDES will also invite student-faculty-industry driven Startup projects of local relevance.
4. The projects will be evaluated by Project Award Committees, consisting of technical experts, industrialists, academia and financiers. These will be guided by experts to develop business proposals. The selected proposals will be supported by an initial soft loan of say, up to Rs 50 lakh from CIDES for a period of up to one year under suitable MOU, to establish proof of concept in-house at CIDES.
5. After proof of concept, CIDES will establish a system for selection of Start Ups to be taken to higher level of support with assistance from angel investors, CII, FICCI, venture firms, DST, DEITY, CSIR, DBT, Startup India Fund etc.
6. Student level small idea based Start Up projects will be selected through small prize awards for encouragement. Promising projects will be refined, as may be required. As representative examples, the First prize may be, - Rs15000, followed by 10000 and 5000. These prize amounts will be given to spend only for developing the project further, jointly with help from faculty.
7. A national competition of prototypes will be held annually, say with First prize of Rs 1 lakh, second prize Rs 50 thousand and third prize 25 thousand. This prize money will only be released if the teams actually register a startup company.
8. In cases of students, proposals of high creativity and promise may also be provided grant in aid of up to Rs 10 lakh by CIDES, along with a contribution of 20% by the team of inventors.

9. If the teams fail to establish a start-up company then the prototype/ idea/ technology so developed by the team will be sold in open market.
10. Startups will be expected to register at this stage and if required, helped by finding industry partners.
11. All nationally selected and student centered projects will be reviewed every 3 months and recommended appropriately for further support and higher grant under the Start Up scheme of GoI.
12. In all cases, suitable Agreements and processes will be evolved to proportionately share the gains and risks. CIDES may develop a corpus by keeping certain proportion of the gains and the rest will be distributed to the teams and startups.
13. CIDES will facilitate the innovator for patenting the developed product or idea.
14. A well furnished office space and infrastructure will be provided to the inventors at CIDES. This space will be given at a reasonable rent for maximum 3 years to promote incubation of the idea, development of prototypes, validation and assessment of market response.
15. The CIDES will be headed by a Director who may be selected after open advertisement where PU faculty may also apply. This centre will have a secretarial office to liaison among various stakeholders and to maintain core infrastructure in-house. Major specialized infrastructure will be largely spread out among different departments at PU, and CRIC institutes. This will be made available to Startups under suitable payment terms and MOUs with CIDES.
16. In long run, CIDES will aim at becoming self-sustainable on the strength of membership contributions, consultations, training, technology fee, royalty etc. Its in-house facilities will be opened to the CRIC institutes against reasonable payment terms. CIDES may even take up in-house technology development, research or knowledge services of interest to industry.

### **Startups at Panjab University**

#### **Startups at University Institute of Engineering Technology, PU**

University Institute of Engineering and Technology (UIET) is the engineering department at PU, established in 2002. Students of UIET are trained for entrepreneurial skills through extensive in-house projects, and jointly with industry. UIET students have established Entrepreneurship Development Cell (EDC) that organizes panel-discussions, workshops, camps, competitions etc to promote the spirit of entrepreneurship. "Udyami", a Panjab University entrepreneurship summit is organised by EDC to bring together entrepreneurs, students, industrialists and investors and develop ideas for startups. The Summit includes competitions designed to test and enhance the entrepreneurial skills, workshops and panel discussions covering major fields of entrepreneurship. More than 50 Startup

companies have successfully rolled out of UIET. Partial list of the start-ups catalyzed at UIET is given below.

### Some Startup companies established by PU students

S. No	First name	Last name	Branch	Email	Start-up	Website
1	Vishal	Kohli	T & IT	vk@fisheyegroup.com	Fish Eye Group	<a href="http://www.fisheyegroup.com">www.fisheyegroup.com</a>
2	Ruchika	Sharma	Bio	ruchika.anju@gmail.com	Cosmic Bites	<a href="http://www.cosmicbites.com">www.cosmicbites.com</a>
3	Anish	Singla	T & IT	anish@valueadvisors.ca	TequityInc	<a href="http://tequityinc.com">tequityinc.com</a>
4	Nitin	Sharma	Biotech	nitinsharma@orbitbiotech.com	Orbit Biotech	<a href="http://www.orbitbiotech.com">www.orbitbiotech.com</a>
5	Nakul	Kumar	ECE	email.nakulkumar@gmail.com	ReGlobe	<a href="http://ReGlobe.in">ReGlobe.in</a>
6	Rohin	Jain	TIT	Rohinj@gmail.com	webAppMate-Fly on IT pty ltd	<a href="http://www.webappmate.com">www.webappmate.com</a>
7	Hitten	Dubey	IT	hitten101@gmail.com		<a href="http://www.queskey.com">www.queskey.com</a>
8	Ishan	Gupta	IT	ishanguptaa@gmail.com	IMARK infotech	<a href="http://www.imarkinfotech.com">www.imarkinfotech.com</a>
9	Arpit	Goel	BIO	arpitgl.since1988@gmail.com	Annu industries pvt ltd	<a href="http://www.jpimgroup.co.in">www.jpimgroup.co.in</a>
10	Ishana	Luthra	BIO	ishana.luthra@gmail.com	Pattraco	<a href="http://www.pattraco.com">www.pattraco.com</a>
11	Nitin	Bhaskar	Mech	nitinbhaskar@yahoo.com	Ariz Engineers Pvt. Ltd.	<a href="http://www.ariz.co.in">www.ariz.co.in</a>
12	Sahil	Kansal	EEE	sahilkansal88@gmail.com	M/S ESS KAY Engineers & Contractors	<a href="http://www.esskayconsultants.com">www.esskayconsultants.com</a>
13	Ritesh	Arora	CSE	aroraritesh@live.com	<a href="http://queskey.com">queskey.com</a>	<a href="http://www.quesky.com">www.quesky.com</a>
14	Kewal	Kishan	CSE	kewal.kishan.pu@gmail.com	Zillion Analytics	<a href="http://www.ZILLIOM.io">www.ZILLIOM.io</a>

15	Nitish	Bansal	MECH	nitish@accomb liss.com	Accombliss Professional s	<a href="http://www.accombliss.com">www.accombliss.com</a>
16	mayank	bansal	EEE	<a href="mailto:mayank696@gmail.com">mayank696@g mail.com</a>		<a href="http://www.unbornwolf.com">www.unbornwolf.com</a>
17	Prince	Jindal	CSE	prince.jindal8@ gmail.com	Healthy celeb	<a href="http://www.healthyceleb.com">www.healthyceleb.com</a>
18	Divyanshu	Malhotra	EEE	divyanshu.malh otra01@gmail.c om	UnCommo nSense Films Pvt. Ltd.	<a href="http://www.divyanshumalhotra.weebly.com">www.divyanshumalhotra. weebly.com</a>
19	Pradeep	Mittal	IT	pradeepmittal2 @gmail.com	WeMited Innovations pvt ltd.	<a href="http://www.wemited.com">www.wemited.com</a>
20	Hardik	Dhamija	IT	hardyrocks009 @gmail.com	EduRev	<a href="http://www.edurev.in">www.edurev.in</a>
21	Tanuj	Arora	IT	tanuj.fzr@gmail .com	Indiegeeks	<a href="http://www.indiegeeks.com">www.indiegeeks.com</a>

A structured support to this effort is required to bring about bigger, more competitive and innovative Startups at PU. The Centre for Innovation Driven Entrepreneurship & Start-Ups (CIDES) will be initiated on the campus of UIET in year 1 and expanded further in the next 2 years.

**Representative technical projects in progress at PU with promise to catalyse the development of Startup companies:**

A variety of research and technology development projects are in progress in several departments at PU. In some cases, well-networked projects with multidisciplinary collaborations are in progress, jointly among multiple departments and member institutes of CRIKC. Some of the most promising departments with leads from translational research include the University Institute of Pharmaceutical Sciences (UIPS), University Institute of Engineering Technology (UIET), Department of Physics, Department of Chemistry, Department of Microbiology and Department of Biotechnology. These are the pivotal departments whose strengths can be tapped to establish CIDES at PU, as proposed here. A variety of leads available at these departments and with promise to develop Startup projects are listed below. These are given only as representative examples for illustrating various domains in which core strengths of PU can be utilized for establishing future Startup activities in Chandigarh region.

**A) Design of Smart Aggregators for Electric Vehicle Charging and Discharging in Smart Grid Environment (Dr. Damanjeet Kaur, Prof. Sukhwinder Singh, Dr Savita Gupta, UIET)**

The automotive industry is heavily investing in plug-in hybrid electric vehicles (PHEVs) and fully electric vehicles (EVs) to reduce the CO<sub>2</sub> emissions and oil dependency. The vehicle electrification will have significant impact on the power grid due to increase in electricity consumption. The overall load profile of electric system will be changed due to the introduction of EV charging and discharging. The charging of a large population of EVs has a significant impact on the power grid. Intelligent scheduling for EV charging and discharging has become a vital step towards smart grid implementation. Therefore, an intelligent scheduling scheme needs to be developed for EV charging/discharging which will flatten load profile of the electric system by charging the EV battery from the grid at the time when the demand is low and discharging the EV battery to the grid when the demand is high. However, it is challenging to schedule the patterns of EV charging and discharging in an optimal way so that bidirectional energy flows: from the grid to the EV battery (G2V) and from the EV battery to the grid (V2G) can take place. The charging and discharging of vehicles is done in the presence of aggregators. An aggregator is a profit oriented entity, which acts as a mediator between the grid and the EV owners. It earns by selling and buying electrical power to/from the grid as well as the EVs.

EV driver can be smart consumers of smart grids by giving energy back to grid during peak hours. It will also increase the mobility of Electric Vehicles by availability of charging stations at remote locations. Startup could be established for developing smart aggregators and the data Centre could collect the data from these aggregators that could be used in a variety of ways.

#### **B) Video Analyzer Tool for Forensic investigations (Dr Naveen Aggarwal, UIET)**

With the advent of low cost video capturing devices, security agencies are asked to install CCTV cameras in different areas prone to security threats. People use mobile devices to capture real time multimedia and use fast peer to peer communication technologies and high capacity storage devices.

Most of video captured from the site of a crime cannot be produced directly as valid evidence during a criminal prosecution because of the possibility of the presence of malicious tampering which compromises its integrity. There are many different ways of tampering with a video and some of them are fairly simple. For instance, one may be interested in replacing or removing some frames (e.g. from a video-surveillance recording), replicating a set of frames, introducing, duplicating, or removing some objects from the scene. To enhance the trust in video as good evidence in the court of law, the presence of transitions in the video should be determined and the kind of each transition needs to be identified. Also, the presence of editing or post-production effects introduced intentionally to tamper with the actual contents of the video need to be determined.

A Startup is proposed around the technologies to detect tampering in video data. Such tool can be developed to identify different shots and temporal segments in video by detecting abrupt transitions and gradual transition (editing effects) in the

video sequence. The tool will distinguish between the transition effects from normal editing effects and camera movements for forensic analysis  
Such a video forensic analysis tool would be valuable addition to the video forensic domain.

**C) Development of adhesive tapes for different surfaces based on bio-mimics (Dr Prashant Jindal, UIET)**

Adhesive tapes/joining materials that would function under different challenges of physical conditions are in great demand. Examples from biology will be taken to develop the leads already available. Reptiles often move along different surfaces-smooth, slippery, rough, hot, cold etc. without any difficulty and carry their heavy loads along. Their feet structure and anatomy can be mimicked to develop adhesive tapes/joining materials that can be used and reused multiple times for multiple types of surfaces to suspend/carry/lift low to medium loads.

A Startup aiming at the use of nanomaterial adhesion and applications is proposed. The designing of new adhesive materials requires multi-disciplinary skillset involving-biologists, chemists,physicists are to team up for understanding of various atomic and nano-level adhesion properties and engineers to establish lithographic fabrication and characterization techniques. Development of efficient products that will function in different physical and chemical environments and cost effectiveness would be central to the Startups in this area.

**D) Carbon based hybrid tubes/shafts for engines and fluid applications( Prashant Jindal, UIET)**

Metallic and plastic tubes find a wide variety of applications for carrying different types of fluids from one point to another. However, owing to their inherent material properties the problems of corrosion, breakage, thermal instability and alteration in fluid properties are common. Carbon based hybrid composite materials having lower weight, better thermal insulation and chemical stability can be used to develop the complete assembly of tube, disk, washer, gaskets etc. to minimise these problems.

Similarly, engines always use tough material shafts as they transfer high power. This driving or driven shaft needs to withstand extreme temperature and stress conditions thereby encouraging the use of such hybrid shafts. Carbon being an important component for the shaft material has large thermal conductivity and high stiffness with a very small density, thereby providing a wide scope of improvement in these applications.

Tubes, piping and shaft industry caters to many applications related to automotive, industrial machinery, sewerage etc. Since the applications are widespread, breakdown and maintenance involves a lot of man hours, effort and money. So, any enhancement in this area, would be required commercially. Innovative methodologies for fabrication of hybrid composite material and its sustainability would require expertise in various science and engineering disciplines. Shafts and

tubes comprise several other parts like disk, gaskets etc. which also need specialized designing. A Startup in this area based on composite materials is targeted.

**E) Design and development of nanosensor based platforms for multiplexed detection of contaminants in water and food (Dr Nishima Wangoo & Dr Rakesh Tuli, UIET and Dr Rohit K Sharma, Deptt. of Chemistry, PU)**

A variety of pesticides and mineral ions are employed in agriculture to reduce damage to crops in field and during storage. Though these have been developed for relatively low toxicity and are degraded in soil, their residues in the soil and water are absorbed by plants, vegetables and fruits. The second major hazard to health that originates from agriculture is the toxicity of heavy metals, like arsenic, lead, mercury, chromium etc. Water and soil resources during crop production are contaminated with heavy metals from effluents, emissions and underground rocks. Once in food chain, these cause serious health hazards, including cancer, developmental disorders and metabolic interference. There is a major opportunity to develop rapid, sensitive and specific tools to detect agri-chemicals and heavy metals. It is proposed to develop a Startup on microscale technologies for chemical analysis. Biosensors based on nanoparticles and/or microfluidics will be developed at the proposed Startup for quantitative, multiplexed, sensitive, specific and high throughput analysis of target molecules in foods and agricultural produce. The technology for dipstick based qualitative method for the detection of multiple pesticides and heavy metal ions using gold nanoparticles and aptamers is ready to be converted into commercially useful tools. The next aim will be the development of visual multiplexed qualitative & quantitative systems for the detection of pesticides.

**F) Development of Vaccines Adjuvant (Dr. Deepak B. Salunke, Chemistry Deptt)**

Vaccines afford protection by the induction of immune responses, both humoral and cellular, specifically directed against the pathogen. Such adaptive immune responses are mobilized and amplified by engagement of the innate immune system. Unlike adaptive immunity, the initial innate immune responses rely on a limited number of germline-encoded pattern recognition receptors, which recognize specific molecular patterns that are broadly shared by pathogens but are sufficiently different so as to be distinguishable from host molecules. Innate immune afferent signals include those originating from Toll-like receptors (TLRs), as well as RIG-I-like receptors and Nod-like receptors (NLRs). The activation of TLRs by their cognate ligands leads to production of inflammatory cytokines, and up-regulation of MHC molecules and co-stimulatory signals in antigen-presenting cells as well as activating natural killer (NK) cells (innate immune response), which leads to the priming and amplification of T-, and B-cell effector functions (adaptive immune responses). The initial innate immune responses serve to marshal, focus, and amplify subsequent adaptive immune responses. There is considerable opportunity in utilizing TLR agonists as vaccine adjuvants. Currently, the only TLR agonist approved by the FDA as an adjuvant is 3-O-desacyl-4'-monophosphoryl lipid A, (MPL), a TLR4 agonist derived from hydrolytic treatment of lipopolysaccharide isolated from *Salmonella Minnesota* Re595.

Agonists of TLR2, TLR7, and TLR have been synthesized by the proposer and Structure Activity Relationship (SAR) with new chemotypes has been established. This can lead to the development of safe and potent vaccine adjuvants. These are emerging immunomodulatory small molecules and are not commercially available. Invivogen (<http://www.invivogen.com/>) is perhaps the only supplier of several such compounds and the prices listed are very high. The overall aim of the Startup will be to optimize large scale synthesis of these molecules and make them available commercially at relatively low price to several immunologists working all over the world.

**G) Design and Production of Cost-effective Water Purification units for use at the family and village levels (DrDevinder Mehta, Department of Physics, PU)**

The project is related to the production of cost-effective auto-controlled water purification units with oxygen-rich drinking water matching the quality of packaged drinking water BIS standard 14553. The water produced being oxygen-rich and free from particulate, chemical and microbial impurities is close to natural water. Prototypes of these units for use at the family and community/village levels have been designed and produced in collaboration with local industry. The design depends upon input water quality and requires water-testing laboratory.

A general design involves various modules, viz., Turbidity filter, Activated Carbon filter, Water softener, Micron filters, U.V. lamps, R.O. filters, Ozone/nascent oxygen Generator, Charcoal filter and Taste & odor filter, fitted with auto control systems. The design will also be adapted to alternate energy electric sources like Generator set and solar power. Most of the sensors and ozone units are being developed by students of PU to reduce the production cost. Water from Village level plant will be distributed to homes using smart cards for ensured delivery. The proposed Startup hopes to scale up the technology at PU, validate it on several different qualities of water and get regulatory clearance.

**H) Topical probiotic formulations for skin ailments (DrIndu Pal Kaur, UIPS & DrParveen Rishi, Microbiology)**

Skin is the largest organ exposed to various insults resulting in diseases ranging from acne to fungal infections and wounds. Available treatment options viz antimicrobials, retinoids, steroids, benzoyl peroxide and antifungals have limited effectiveness, high cost and side effects. Clinical and experimental research indicates a positive influence of topical probiotic application in favorable modulation of the skin homeostasis. Probiotics act by a variety of mechanisms including competition exclusion, antimicrobial production, reduction of pH, increased sphingolipid production and a protective shield against environmental and other stresses. However, formulating these agents in topical products in a viable form and activity

under aerobic conditions of application and safety are some concerns in developing probiotic preparations.

We propose to develop a Startup company based on probiotic formulations for skin care. A lead idea is to employ *Bacillus coagulans* (UNIQUE IS2 – MTCC5260) - which is a sporulating, aerobic, well-established and safe probiotic. Preliminary work has been done to develop, characterize and evaluate a gelatin based topical formulation with a water activity < 0.9, to ensure its maintenance as stable spores in the formulation. The formulation will be a patentable product. Once applied on skin the spores will germinate to manifest probiotic effects. Safety in terms of acute toxicity of the formulation is also established, however process and composition optimization, stability and scalability, followed by pre-clinical evaluation remain to be done.

Unique Biotech Limited (UBL), Hyderabad have indicated their inclination to collaborate on developing this product and thus, may be willing to be partners in the proposed Startup.

**I) Design and Development of Novel Nano-Structured Pharmaceutical Products for External Applications in Burns and Wounds (Dr. O.P. Katare, , Prof. Bhupinder Singh Bhoop,UIPS, DrSanjay Chhibber, Department of Microbiology, PU, Dr.SunilDogra, Department of Dermatology, PGIMER)**

The key focus of the proposed Startup will be to establish a technology platform relating to nanostructured and liposomal systems for topical applications. The group has been successful in taking lab-ready products to market place through industry collaborations viz. Psorosome™, Lipotar™ S and Lipotar™SS for skin diseases. This proposal is to develop skin formulations inclusive of bacteriophage to specifically kill target wound resident bacteria. This would hasten the process of wound healing and resolution. The Startup will suggestively attract partnerships of companies, like Lifecare Innovations Pvt. Ltd, Gurgaon and IPCA Laboratories, Mumbai. Formulations comprising some of the known antibacterials, like Fusidic acid and burn repair agents like, silver sulphadiazine along with bacteriophages will be deployed.

**J) Novel Nanocrystals of Tacrolimus and white curcumin for treatment of Atopic Dermatitis (DrVanditaKakkar,DrAmitaSarwal, UIPS)**

Atopic dermatitis (AD) is a chronic, relapsing inflammatory skin disorder characterised by intense itching and recurrent eczematous lesions. Affects children and adults with prevalence rates from 1-20% in different regions of the world. It has shown an increasing incidence in India in the last four decades.

The available treatment therapy for AD involves the use of topical corticosteroids (first-line) and/or topical calcineurin inhibitors (TCIs), and the use of first-generation antihistamines to help manage sleep disturbances and treat skin infections.

Long-term use of corticosteroids depresses immune system, increases risk of stomach and duodenal ulcers, thinning of bones etc. Tacrolimus causes burning sensation and pruritis and calcineurin inhibitors may be potentially carcinogenic.

The Startup will aim at developing a topical gel of a fixed dose combination of nanocrystals of Tacrolimus and Tetrahydrocurcumin to increase solubility and make these efficacious at several fold lower concentrations. The Startup will develop formulations to achieve synergism by combinations with antioxidants, antimicrobials immunomodulators and anti-inflammatory molecules.

Pharmaceutical Industries who may be partners in the Startup include, Panacea Biotec Ltd., Lalru, Punjab and Life Care Innovations, Gurgaon.

#### **K) Nutraceutical based yogurt for obesity (Dr Kanwaljit Chopra, UIPS)**

Women are highly prone to postmenopausal obesity and associated neurobehavioral and cardiovascular problems. Traditional Hormone Replacement Therapy are not satisfactory. The proposal is to establish a Startup based on our research findings in the area of obesity. Immediate opportunity is in developing a scientifically designed and validated functional food in the form of a nutraceutical yogurt. The target population for this product will be 65-70 million postmenopausal Indian women.

#### **L) Development of Target Controlled Infusion Syringe pump for infusion of drugs (Dr. Manu Sharma UIET and Er. Sukesh UIET)**

Syringe pumps are extensively used in hospitals to infuse drugs in patients. These infusion pumps are imported in India for usage in hospitals all over the Nation. Every speciality hospital uses lot of these pumps in operation theatres. Recently we have programmed one normal infusion pump of Fresenius company and made it Target Controlled infusion pump using Labview software. We made 3 compartment pharmacokinetic model of a human body. This model consisted of simple first order differential equations. These equations were solved in real time to decide drug infusion rate of the syringe pump. We wish to establish a start-up which programmes ordinary syringe pumps and makes them Target Controlled Syringe Pumps. This start-up will also in due course of time produce syringe pumps also. This syringe pump will consist of a stepper motor for piston movement, hall effect sensors for position sensing and microcontroller with RS232 interface.

#### **M) Development of Nanocarriers of Anticancer Agents with Enhanced Therapeutic Performance (Dr Bhupinder Singh Bhoop and Dr O P Katare, UIPS)**

Cancer, in one or more than 200 plus different known forms, claims over 8 million lives each year across the globe. Safety and efficacy of the currently available treatment approaches, including chemotherapy have a major opportunity for innovative technology and product development. This can be accomplished by just modifying the formulation strategies without altering the active drug *per se*. The team hopes to develop a Startup company in the area of novel nanocarriers for improved therapy against cancer, deploying the established anticancer agents.

Patentability, scale-up and subsequent tech-transfer issues of such nanocarrier systems will be taken up.

**Infrastructure proposed:**

In view of the high prospects of catalyzing and nurturing Startups based on engineering technologies, and the interplaying areas in pharmaceutical, biological, physical and chemical sciences, it is proposed to establish the office and core facilities of the Centre for Innovation Driven Entrepreneurship & Startups on the campus of PU. A convenient location in the beginning will be close to UIET. Depending upon the level of available funds, and keeping the future needs to expand, a larger area will be identified. In due course, the Incubation Labs and the Startup offices will be set up in different areas of expertise over an estimated area of 30000 sq feet to accommodate the following:

- i. Development of Incubation laboratories for university students, nationally selected entrepreneurs and Startup companies with domain specific infrastructure. The laboratories will provide clean, environment regulated workspace and safe disposal systems. These will establish core equipment and facilities for validation of ideas, development of prototypes, testing, techno economic studies etc. Domain specific laboratories will have their own specialized technical infrastructural needs. While engineering oriented incubation laboratories may be located at the CIDES building in UIET campus, specialized facilities in other disciplines and other scale up facilities may be built as part of the departments with respective expertise. Some such facilities may be located at other institutes in neighborhood (CRIKC).
- ii. Development of Office space for the entrepreneurs to facilitate their functioning in secure environment with confidentiality.
- iii. Facilities for closed room discussions, consultations and seminars
- iv. Consultation Chambers to give advice on issues related to intellectual property, licensing, networking and raising funds.

**Financials:-**

S.No	Description	Year 1 (Rs Lakh)	Year 2 (Rs Lakh)	Year 3 (Rs lakh)
1.	Capital cost for building lab space, work area, offices, power back up, AC, furniture etc	200	300	300
3.	Salaries : Director, office & technical staff	15	30	30
4.	Workshops, training, Advertisement etc	10	10	10
5.	Competitions, innovation associateships, research fellowships, , incentives, awards	20	40	40
6.	Honorarium for expert consultations from concept to business plan	10	20	20

7.	In house innovation labs, incubation labs, product & Prototype Development, analysis, testing facilities, softwaresetc	50	100	100
8.	Consumables for in-house technology optimisation	20	50	50
9.	Outsourcing tooling, regulatory, analytical, synthesis, scale up jobs etc	20	40	40
10.	Funds for soft loans to StartUps	100	300	300
	Total	450	890	890

**Grand Total for two years :Rs 22. 30 crores**

The above funds, except #10 above, are required for setting up a core infrastructure and governance system at CIDES where students, young innovators and faculty at PU will do early laboratory work to establish proof of principle. All Startup proposals, including those received from the university will be evaluated for competitiveness, prospects of success, time milestones, return on investment etc. in form of business proposals. Under #10, provision has been made for supporting such business proposals. This amount will be given as soft loan against the business proposals duly approved by technically competent expert committees. Terms of soft loans will be evolved, aiming at nurturing the risks inherent to innovativeness, while also ensuring that the loans are returned to CIDES, as per the Agreements. In due course of time, CIDES should become self-sustainable.

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