Gujarat Knowledge Society

Government of Gujarat
Department of Education

SSIP
STUDENT STARTUP AND INNOVATION POLICY

PROCEEDINGS

OF

SSIP ANNUAL CONFERENCE

ON

STUDENT INNOVATION, STARTUPS AND ECOSYSTEM-2019

6th & **7**th
JUNE 2019

ORGANIZED BY: GUJARAT KNOWLEDGE SOCIETY

Entrepreneurship
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#startupindia

Title: **Proceedings of SSIP Annual Conference on Student Innovation, Start-ups and Ecosystem – 2019**

Contact: Dr Satya R. Acharya (satya@ediindia.org)

Vijay Rupani
Chief Minister, Gujarat State

Apro/Jm/2019/05/29/jp

Dt: 29-05-2019

MESSAGE

In the rising startup culture of India today, Gujarat has emerged as one of the most progressive startup destinations of the country. The state has instituted several proactive measures to create a conductive ecosystem for students-led startups and innovations. An able framework with a union of Government, industry and institutions and a strong network of mentors, angel investors and venture capitalists have erected a robust foundation in the state. Taking a lead in Hon'ble Prime Minister Shri Narendra Modi's vision of **'Startup India'**, it is a matter of pride that Gujarat has become the first state in the nation to formulate and implement a policy dedicated to startup and innovation-Student Startup and Innovation Policy (SSIP). The policy aims at enhancing the startup propensity among students and facilities recognition in innovative opportunities by students, supports innovations, helps them create prototypes and file patents.

The SSIP Annual Conference on Student Innovation, Startups and Ecosystem organised by Gujarat Knowledge Society, Education department is a vibrant platform to deliberate on many aspects including challenges and opportunities of the startup phenomenon in Gujarat. I am sure this conference and proceedings documented here will constructively contribute in developing the roadmap for making Gujarat the innovation hub and a startup capital of India.

I take this opportunity to urge all startup enthusiasts and the facilitators of this movement to give their best. I congratulate everyone involved in making this conference a grand success.

(Vijay Rupani)

BHUPENDRASINH CHUDASAMA

No.Edu(P&S),H&T,L&J,L&P./   /2019

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Date: 29 / 5 / 2019

MESSAGE

With proactive policies undertaken by Government of Gujarat, the state is moving ahead in its journey towards innovation-led development. With initiatives from Education Department like Student Startup and Innovation Policy (SSIP), Smart Gujarat for New India Hackathon and Gujarat Industrial Hackathon, the youth has found a startup-friendly cohesive environment and ecosystem to rise and shine. Because of which, in the past few years there has been a significant rise in the number of start-ups and patents filed.

The start-up initiatives of the state have paved the way for a stronger, technically-advanced and entrepreneurially-sound society. I urge all the students to step forward to benefit from a scenario where accelerators, innovators, incubators, policymakers, corporates and academia work in tandem to float a viable start-up-laden economy.

The deliberations, paper presentations, exhibits and talks from experts of this field during SSIP Annual Conference will surely lead to impactful output in cultivating a bright startup culture in our state. The well-documented proceedings collating research articles and paper presentations will indeed help in the direction of strengthening the startup regime in the state. I appreciate the efforts put in by Education Department in shaping up this conference.

I extend my best wishes for the grand success of the event.

(Bhupendrasinh Chudasama)

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MESSAGE

Gujarat is rejoicing in its growing entrepreneurial fervour. Gujarat has ably instituted a vigorous structure comprising skill-training, incubation centres, funding solutions and receptive policies. Over the years, the state has adopted a pro-growth approach, encouraging and promoting an innovative start-up society. With holistic approach by Government of Gujarat in accelerating startup-centric growth, Gujarat is home to a progressive innovation and startup ecosystem today. The successful implementation of Student Startup and Innovation Policy (SSIP) by Education Department is a giant step in the same direction.

In this scenario, the future appears bright with several replicable growth models that would witness start-ups crossing milestones and achieving landmarks. The SSIP Annual Conference on Student Innovation, Startups and Ecosystem organised by Gujarat Knowledge Society, Education Department, is a great achievement in reflecting bright opportunities for the youth of Gujarat.

I appreciate the team efforts of Education Department in successfully collating and releasing the proceedings of reviewed papers in this document. I congratulate everyone who participated in this conference and in turn participating in Gujarat's vibrant journey of startups and innovations.

(Vibhavari Dave)

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FOREWORD

Over the years, Education Department of Government of Gujarat has undertaken several initiatives to support young startups, innovators and entrepreneurs of the state. One of the key milestones in this direction is Student Startup and Innovation Policy (SSIP) that has effectively bolstered the startup revolution in Gujarat.

As Gujarat strives to become a startup capital of India, incubators and accelerators play a major role by providing mentorship, nurturing ideas, guidance, technical support and help in generating funds. Initiatives like i-Hub promises all that it takes to build a robust startup framework for the state.

Gujarat Knowledge Society, under Education Department, Government of Gujarat has organised SSIP Annual Conference on Student Innovation, Startups and Ecosystem with comprehensively planned interactive and engaging sessions and discussions across two days. Papers were invited on subjects like Design Thinking/Prototype Testing, IPR, Entrepreneurial Ecosystem/Venture Financing and Best Practices in promoting Student Innovation. Out of total submissions of over 287 papers, after reviewing, 27 of these are incorporated in this document. These papers will indeed guide us to develop a cohesive and sustainable environment for student-startups and innovations in the state.

I am certain that the deliberations of this conference on student-startups, innovations and ecosystem will carve the way ahead for the rising startup culture of Gujarat and contribute in accelerating innovation-led development in the state.

Ms Anju Sharma
Principal Secretary
Higher and Technical Education
Education Department
Government of Gujarat

ACKNOWLEDGEMENTS

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PREFACE

SSIP Annual Conference on Student Innovation, Start-Ups and Ecosystem – 2019

Education Department, Gujarat has done series of interventions to create end-to-end ecosystem for student innovation and start-ups. The interventions being attempted here have got attention from academia, industry and public policy makers at national and international level. Every year a lot of efforts are also being made in different academic innovation systems and incubators in Gujarat and whole nation. It's quite important that the learning from all such efforts at state, national and global level need to be codified so that best practices can emerge and benefit all.

This two-day Conference has been organized on Student Innovation, Start-ups and Ecosystem. In this Conference, researchers across India and abroad who are working on student innovation and entrepreneurship dimension in academia are invited to share their learning and present research papers. Student Startup and Innovation Policy (SSIP) grantee institutions and universities in Gujarat are also welcomed to present and share their research and insights. This Conference is hosting programs like academic paper/poster presentations, round table, plenary sessions and panel discussions, startup exhibition, pitch/ demo day boot camps, and allied things. The core idea of this endeavour is to give platform to academic researchers, practicing professionals and others to present their research and ideas around the broad themes of entrepreneurial ecosystem, venture financing, design thinking, product design and innovation, intellectual property right and best practices in promoting student innovation.

In total, 287 papers were received and after the thorough review process, 27 papers were selected for publication. We would like to extend thanks to the team for contributing in the development of the conference proceedings, Mr. Hiranmay Mahanta, Advisor, SSIP; Dr. Satya Ranjan Acharya, Acting Chairperson (PGPs), Dr. Naman Sharma and Dr. Yamini Chandra from Entrepreneurship Development Institute of India, Ahmedabad; Prof. Rajesh Thakkar and Prof. Mansukh Savaliya from Vishwakarma Government Engineering College, Ahmedabad and Prof. Manish Thakkar from L. D. College of Engineering, Ahmedabad. We are also thankful to the Emerald Group Publishing (India) Private Limited for timely publication of the proceedings.

Preface of Technical Papers

The technical track titled, **"Entrepreneurial Ecosystem/Venture Financing"** consists total of nine papers highlighting the various contemporary issues present in startup/entrepreneurial ecosystem of the country and issues related to venture financing. The paper titled, *"Survey of Pharmacy Students of Gujarat to envisage their Potential to Innovate"* by Seemran Maharana and her co-authors sheds light on the need of innovation-oriented pharma industry in the country. This empirical study based on 198 respondents discusses finding on issues like creative problem solving, forward thinking, design thinking etc.

Another paper titled "*Stakeholder Engagement for Development of Innovation Ecosystem: An India perspective"* by Rahul Wagh and his colleagues took up an exploratory study based on literature review of past studies in start-up ecosystems of the country. The paper summarizes the strengths and weakness of an ecosystem and the role of various stakeholders in building it.

"Impact of SSIP Policy Implementation on Stake Holders of Tribal Areas" by Umang S. Wani along with his co-workers is a sincere attempt to highlight the achievements of SSIP policy of Gujarat state in tribal areas. The study involves an exhaustive multi-level survey conducted at faculty, management, school and SSIP coordinators level.

The next paper, *"Strategies and Policies for promoting Students towards Innovations and Start-ups"*, by D. Indira and colleagues compares the strategies and policies related to student innovations and start-ups in India with that being practiced in various parts of the world. The paper in the end provides recommendations on what is needed to be done in this space.

"Macro and Micro Level Strategy for Creating Innovation Ecosystem on Campuses" by Rajul K. Gajjar and Amit Rathod elaborates on the strategies for effectively creating innovation ecosystem for higher education students. The paper recommends a three-stage mentoring to help students identify innovative ideas and to implement them.

The next paper titled *"Mapping of Indian University Based Incubation Ecosystem- Analysis of Gaps"* by Devanshi Mehrotra and Partha Sarathi Roy aims to identify the gaps in University based Incubation ecosystem in India. The study highlights the services provided by UBIs based in different zones of the country.

Dipan Kumar Sahu in his exploratory study titled *"Grassroots Innovation in Informal Economy and Inclusive Innovation System: Informing Phenomenon"*elaborates that pluralism also exists with grassroots innovation in informal sector and is different than what is observed in formal sector. The paper thoroughly describes the characteristics of grassroot innovations, development models, policy initiatives etc.

Satya Ranjan Acharya and Yamini Chandra in their study *"Fostering Entrepreneurship: An Analysis of General Enterprising Tendency and Pedagogical Intervention in Building Entrepreneurship Education"* highlights the students" analysis based on their preferred stream during the entrepreneurship programme. The paper presents a connected model of nurturing the competencies of students, creating an individual learning environment while imparting an understanding and insights on the entrepreneurial propensity of the students.

Preface of Technical Papers

The next study in the track titled, *"Technology Entrepreneurship: Role of Government in Enabling Startup Support Ecosystem"* by Satya Acharya and Tonisha Dixit covers the role of nodal institutions in supporting growth of incubatee.

The technical track of **"Intellectual Property Right"** consists of two papers: *"Intellectual Property for Technology Startups: The Growth and Expansion via IP License"* and *"Startup Ecosystem: Bringing Financial Synergy by Effective Intellectual Property Utilization"*. While the former discusses the IP for technology startups in country, the latter elaborates the general IP strategies; startups must follow to increase their chance in dealing with the competitive environment prevalent today in this space.

Another key technical track for the conference is **"Best Practices in Promoting Student Innovation".** It consists of four papers. *"ProjectSel: Web Base System for Selection of Project and Implement New Innovation"* by Alpesh A. Vaghela and colleagues elaborates the benefits of Web Base Application (ProjectSel) in capstone project of the students. The papers stress that a proper implementation of the same will result in more and better student innovations.

Another paper titled, *"Implementation of Problem Based Learning Concept in Engineering Academic Curriculum for Development of Entrepreneurial Attitude"* by Manan Y. Pathak and his co-workers stressed the importance of implementing Problem Based Learning (PBL) in academic curriculum for developing interest towards entrepreneurship. The study focus on findings obtained from the sample of Silver Oak Group of Institutes.

K. M. Makwana along with his colleagues in the study, *"CREATO: A Project Competition for Diploma Student Venture of Building Innovation Amongst Students through Competition"* shares how organizing competitions for students may develop an interest in them towards innovating. The paper highlights the achievement of CREATO project competition for diploma level students in Gujarat State.

The last paper in this track titled *"CTSE – A Case Study to Encourage Startups and Skill Development among Engineering Students"* by Mahendra Sethi and his co-workers is a case study discussing the performance and contribution of CTSE. It also discusses the future plan of CTSE towards promoting student innovations.

The biggest track for the conference **"Design Thinking, Product Design and Innovation",** consists total of 12 papers discussing the breakthrough product designs/ ideas/ innovations and prototypes. In its paper titled *"Implementation of Triboelectric Charging on Chalkboard for Reduction of Chalk Dust Particles"*, Mrugesh J. Shah, discussed his idea that could benefit in making future chalkboard entirely dust less. The paper discusses the various health hazards of chalk-dust particles and summarizes how use of ionized chalkboard can help reducing these health hazards for the users.

Mansi P. Rajyaguru, Riddhi P. Govindiya and J. H. Markna in their paper titled *"Prickly Pear as a New Natural Dye for Dye-sensitized Solar Cells (DSSC) with Thin Films Composed of TiO_2 / ZnO"* elaborates on the potential of Dye-sensitized solar cells (DSSC) technology as a substitute for traditional silicon-based solar cells. The paper investigated the performance of dye-sensitized solar cells using a natural dye.

"Design and Construction of a Multipurpose Robot and their Military Applications" by Rabari Mayuri G. and co-authors presents a base for designing a multipurpose robot that can be used in future for its defense sector utilities.

Kaustubh A. Vyas and his colleagues in their study, *"Development of A New GUI Using MATLAB for Performance Evaluation of Power Transmission Lines"* provides user access for a 765 kV EHV AC Transmission line using MATLAB programming and offer insights for efficient handling of transmission lines.

The paper titled *"Feasibility of MBBR with Activated Carbon as Biofilm Carrier"*, by Priyanka Mehta and Rutvi Chavda focusses on the treatment of sewage water. The paper recommends that the MBBR technology could be used as an ideal and efficient option for the treatment of domestic and industrial waste water.

The next study titled *"Design of FPGA based Synchronized Power Supply Controller for Automation in Research Laboratory"*, by Mona Jani and co-authors discuss the design of in-house Field Programmable Gate Array (FPGA) based add-on board for automation of multi-channel analog power supply. The paper concludes on the development of LabVIEW based graphical user interface (GUI) for setting and monitoring of various parameters of the system.

The study, *"Exploring an Option to the "Conventional Canal Lining" by Evolving "Moulded Plastic Troughs"- as a Pragmatic Solution"*, elaborates on the advantages and disadvantages of conventional canal lining replacing with the concept of plastic trough including economic viability. The next paper by Jinal Patel and his co-authors, titled, *"Development of FPGA and DDR memory based Fast Event Recording and Data Storage System for Machine Vision Applications"* shares the development of FPGA based event recording system for monitoring of glass window fabricated for one of the vacuum chambers. The paper presents the details of hardware architecture, software development and subsequent results.

The study, *"A Survey on Capsule Networks"* by Anusha Mehta and Viral D. Parmar presents an extensive review on the concept of capsule networks. The various characteristics, advantages as well as limitations of capsule networks are discussed in the study.

In their study, *"Performance Analysis of Avalanche Photo-Diode Detector based Low Noise Optical Receiver"*, the authors Bhumika M Isarani, Vishnu Chaudhari, Usha Neelakantan, and H.C. Joshi, introduce the in-house proto-type circuit with APD for the detection of photons given from the fibre-optic with laser diode as optical source in laboratory.

The study, *"TCAD Calibration and Simulation of Mosfet Device"* by Krupa Kumbhani and Milind Shah presents the calibration of MOSFET device using a commercially accessible Technology Computer Aided Design (TCAD) device simulator.

The next research article titled, *"Design and Implementation of Packet Routing Algorithm with Packet Error Detection Logic for NOC and Verification in System Verilog"*, by Vicky Gheewala and colleagues focus on router input-output convention (protocol) structure. Proposed framework incorporates virtual slice through instrument for close loop communication.

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The Student Startup and Innovation Policy: The Robust Driver of Entrepreneurial Ecosystem in Gujarat

Extending Entrepreneurship in Gujarat's DNA

It is universally acclaimed that innovation and entrepreneurship are the two key tools essential not only for the prosperity of a nation but also for its sustainable growth. India's consistent endeavor in this respect is proved by its rising rank in the global innovation index, now at 51, a steady increase from the 81 in 2015.Striving to escalate the same spirit Gujarat's Student Start-up & Innovation Policy (SSIP) is one such initiative that has been at forefront in the province of student innovation start-up ecosystem development.

Upholding the culture of innovation and entrepreneurship that is embedded in the DNA of Gujarat, the state government pioneered policies and institutions to promote innovation and entrepreneurship at several layers, especially at the grassroots of the society in synchronization with various central initiatives and agencies, such as Make In India, Startup India, Atal Innovation Mission, National Innovation Council etc. Notably, Gujarat has been one among the few states in India to have scouted and recognized innovations even in informal sectors since as early as the year of 2000. This includes engagement of public systems, private sector stakeholders and the civil society at large, collaborating in nurturing a holistic innovation ecosystem in the state. The state's innovation strategy has been inclusive of all target groups and domains.

Tapping the Youth for Nation Building

With about 65% of India's population under 35 years of age, India has to leverage on this most dynamic segment of the population for future growth. In Gujarat, a large number of projects and innovative ideas emerge every year from over 1.4 million students spread across 65+ universities in Gujarat. This source of innovations and startups catering to new products and services formed the foundation requiring an ecosystem of innovation policy in the state. Having witnessed dozens of talent-mavericks across campuses in recent times, the Education Department of the state has taken bold measures to create an end-to-end innovation support ecosystem through the Student Start-up & Innovation Policy (SSIP), with resource commitment of INR 200 crores.

Supporting the Innovation Life-cycle

In order to facilitate and pre-incubate innovative ideas to go through a stage of proof of concept, prototype, product, testing & trial, redesign and development of utility, the Student Startup and Innovation Policy (SSIP) forms a framework to institutionalize innovation and pre-incubation processes across the higher education ecosystem of the state.

The Student Startup and Innovation Policy

During five-year period of the policy, it aims to nurture 500 student-led startups. Through this policy, grants are being made available to institutions and innovators across the state. While institutes can avail up to INR 40 lakh and universities up to INR 1 crore each year for developing ecosystem in respective campuses, student innovators are able to secure grants of up to INR 2 lakh for creating proofs-of-concept. The policy is unique among state-led interventions, supporting early stage student innovators and start-ups by across colleges and schools.

Through the policy, universities and institutions are also being given resources to establish internal innovation and startup ecosystems through initiatives such as setting up fabrication labs, co-working spaces, start-up MOOCs, hackathons, etc.

The Key Beneficiaries of Student Innovation Support programmes are:

- Universities: State and private universities including affiliated universities, sector-specific universities, and deemed universities in Gujarat.
- Educational /academic institutes: Public and private academic /educational institutes affiliated to any university in Gujarat.
- Student / innovators / pre-incubation start-ups: Students, student innovators and pre-incubation start-ups run by students belonging to eligible universities and educational institutes shall be supported under this scheme.

Key goals of Student Startup and Innovation Policy (SSIP) are:

- All universities and institutes to execute innovation and pre incubation agenda by 2021.
- Aims to create 1% graduates as job creators by innovation and allied means.
- Support at least 1,000 student-led innovations per year and aim to file 1,000 IPRs from universities in the state every year.
- Harness 500 student start-ups in the next 5 years, and upscale.
- Build capacity for at least 200 educational institutes in the state to have a robust pre-incubation support.
- All universities and institutes in the state to develop full-fledged incubators in the next 5 years.

Reaching Out to 2,50,000 Students: Impact of SSIP

As of September 2018, a total of 74 academic institutes comprising 23 universities and 43 institutions have been sanctioned a financial support amounting to INR 19.5 crore. This financial support has translated into 3075 student innovations supported through collective efforts of all the grantee institutions. A total of 791 student teams working on innovative ideas have been given financial support for developing prototypes and taking their ideas to the next stage, while over 365 patents have been filed through support of this pioneering policy.

Notably, over 2,50,000 students were imparted basic awareness about innovation process across the state, making SSIP one of the largest efforts to reach out to young minds across disciplines in order to harness their creative potential.

SSIP Summary

Sr. No.	Overall	Actual data
1	Total no of student outreached under awareness Activities	2,78,639
2	Total no of student project supported	3,541
3	Total no of student POC supported	1,109
4	Total no of IPR filed	402
5	Startup registered	183

Sr. No.	Type (count)	Total no of student project supported	Total no of student project supported	Total no of student POC supported	Total no of IPR filed
1	Institute (43)	91,024	1,460	627	315
2	Polytechnic (8)	3,444	4	7	0
3	University (23)	1,84,171	2,077	475	87
	Total	**2,78,639**	**3,541**	**1,109**	402

Tools of Engagement

Under the policy, the state government has also rolled out several flagship initiatives such as the Summer Innovation Challenge, Smart Gujarat for New India Hackathon, Student Open Innovation Challenge and allied interventions, in which thousands of students have actively taken part. The aim was to nurture startup entrepreneurs who eventually will be job creators.

➢ To leverage creative potential of young innovators in Gujarat, the state has developed a unique program to engage youth in problem solving and innovation through the "Gujarat Hackathon". At this unique initiative, over 200 problem statements were shared by over a dozen and a half government departments with a total of 1450 teams registered to solve these problems.

➢ Earlier in 2018, the SSIP team organized the Gujarat Industrial Hackathon, with participation by 1874 teams, solving over 154 challenges.

➢ The state government designed the 'Summer Innovation Challenge' program in which both school and college students participate to develop solutions in given themes. During the Summer Innovation Challenge 2017, 329 teams participated to solve challenges across sectors, and 8 winning teams had the opportunity to be recognized by the Chief Minister of the state, whereas the 2018 edition of the pro-

gram saw participation by 355 teams, with 16 teams winning and being recognized by the CM.

➢ The state government has also unveiled the Student Open Innovation Challenge (SOIC), which is the first such program that aims to attract student innovators from across boundaries, intended to promote collaboration among stakeholders. Shortlisted teams under this challenge shall be offered support of up to INR 2 lakhs under the policy. An additional financial support shall be offered for patents in addition to pre-incubation support at the State Innovation Hub.

Shielding Intellectual Property Rights

The education department, in its efforts to support startups, innovations and entrepreneurs, has also developed guidelines on Intellectual Property for academia in Gujarat, in order to introduce a comprehensive strategy to create, protect and exploit intellectual property of young innovators across academia. While student innovators are being supported through necessary grants for IP protection domestically and internationally, in tandem intellectual property facilitation centres at the state and university level are being established in order to create a single point of support for students, innovators and other stakeholders.

The Innovation Hub

To hand hold initiatives across universities and provide them with world class innovation support system, the state is also developing an Innovation Hub (i-Hub) for supporting student innovation and startups and taking them to the next stage. With a dedicated budget of INR 20 crore, the state government is in the process of developing a world-class integrated infrastructure in the heart of Ahmedabad city, the financial capital of the state, to establish end-to-end support systems to students, innovators and early, as well as, mature-stage startups. The Gujarat State Innovation Hub is also slated to house sectoral incubation facilities in diverse domains along with common facilities such as a fablab, in order to help innovators conduct rapid prototyping to validate their ideas. With an extended budget of INR 6 crore being provisioned, extension facilities of incubation, fablab and design centres shall be created in various regions of Gujarat, including Surat (South), Rajkot (West) and Vadodara (Centre).

It is only fitting that a state renowned for its entrepreneurial spirit is establishing new avenues through this pioneering policy, and enabling a paradigm shift in youth innovation and societal support.

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