Summary Report

About Department/Center/School: Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE) founded at Indian Institute of Technology (IIT) Kharagpur in the year 2010 aims to encourage entrepreneurial minds of the engineering students. The school imparts entrepreneurial culture and supports eco-system for venture creation and early start-ups.

1. **Academic Programs (Range of Degrees and Disciplines):**
   1. ***Dual Degree** (B.Tech (Hons.)+M.Tech in Engineering Entrepreneurship) – 5 years' duration*
   2. ***MS (through Project)***
   3. ***Ph.D**. in Innovation and Entrepreneurship*

2. **Major 4-5 Thrust Areas of Research:** Entrepreneurship, Energy Management, Business Analytics, Health Care Service Delivery.

3. **Curriculum and Courses & Teaching Environment**

Items	Ratio/ Number	Items	Number/%
Teacher-student Ratio	1:13.2	No. of students motivated (%) to opt of careers Eng/ Tech. Sectors UG/PG/PhD	NA/62/NA
No. of Faculty members	5		
No. of Tutorial Assistants	15	No. of teaching labs	1
No. of UG/DD students	00/51	Average No. of students per experiments in core courses	2
No. of PG students/PhD students	01/15	No. of Students' workshops/"Tinkering" Labs	12
Average no. of tutors with more than 100 students	02	No. of new courses introduced	1
Average Students placements (%) in the last five year (UG/PG/PhD)	NA/77/NA	No. of New program introduced	1
No of curriculum review in both UG & PG	Nil	Undergraduate Vs PhD strength expressed as Percentage	340%
No of UG lab developed	Nil	No of PG/Research Lab developed	1
No of E class rooms	5	No. of new teaching labs/research labs set up	1

4. Research and Development & its Environment

Items	Number	Items	Number	Items	No.
Total no. of Publications in Journals	14	Average no. of citation per paper	22.66	No of large interdisciplinary research projects	Nil
No. of Publications in Conf. & Symposium	11	Journal publication per per year	4	Number of int. conf./workshops attended by PhD students	3
Books & e-books (chapter)	1	h-Index of the dept. in the last five year, i.e., since 2008/overall h-index in Scopus	4	No. of PDF hired in the Institute	Nil
Total No. of Technology Developed/transferred	25	No. of recognitions & Awards, fellows etc to faculty/students (provide break up)	Nil	Number of international visiting researchers/faculty who stayed for at least a week.	5
Total Patents Filed/Obtained	2	Retention(%) of Young faculty for at least 10 years	NA	Number of courses/workshops /conf. with international participation	1 (planned in summer, 2014)
Total Copyright Filed/Obtained	Nil	No. Sponsored research Project /fund (lakh) generated from non-internal source	No: 7 Fund: 876.6 lakh	Average No. of PhD Granted per year	NA
Publication per Faculty/Masters/PhD students	2.8/0.27/0.93	No. of Consultancy and fund (lakh) generated from non-internal source	No. Nil Fund: Nil	Average No. of PhD Granted per year per faculty	NA
Average no. of citation per faculty per year	1.8	No of External Collaborations research papers/research projects/PhD students	5/2/0	Number of articles in collaborations with top ten countries	2

5. Vision for the Future (in brief):

   (i) Departments/centers/schools should spell out its Mission and Vision Statements, (ii) Plans for future to achieve the projected goals and (iii) Measures adopted towards above.

(i) **Vision**: *Make IIT Kharagpur the leader in engineering entrepreneurship education by reinventing, promoting and innovating on The Indian Entrepreneurship Models*
Mission*:*
   - To inculcate the spirit of innovation and incubate young innovators
   - To support ecosystems for technology transfer
   - To create entrepreneurs – behind jobs and on the jobs
   - To regularly innovate to remain relevant to Time and Nation

(ii) We have identified four thrust areas of research and project implementations based on the strength and skill sets of faculties in the department;
   A. *Entrepreneurship – Start up Environment and ecosystem Analysis*
   B. *Energy Management*
   C. *Business Analytics*
   D. *Health-care Service delivery*

We are committed to design new courses in regular offerings and in Summer-Winter term schools in supporting to build up these areas. We are also writing projects for in-house, national level and international level funding to strengthen the application areas. We are designing teaching labs, research labs, and application labs to support the research and teaching activities in these identified and related fields.

(iii) The School has set the road map to act on the thrust areas over the next 3-5 years to achieve the vision and has identified metrics for monitoring the progress of the same.

6. **List Strengths, Weaknesses, Opportunities & Threats (SWOT) of the Department**

Strength	Weakness

• Core competence & Institutional support
 • Early adopter and fast mover advantage
 • Good placement and employer traction
	• Visibility – Connecting to students with right mind-set
	 • Lack of Processes for
	    • Access to Lab and Workshops
	    • Engagement of Mentors

Opportunity	**Threat**
• Job crunch due to slow economy leads to entrepreneurship • Favourable global situation for entrepreneurship • Supportive Govt objectives of entrepreneurship development	• Societal and Parental Mind-set • Competition with Foreign Universities

Important Highlights

Rajendra Mishra School of Engineering Entrepreneurship
A Start-up for Start-ups

Vision:
Make IIT Kharagpur the leader in engineering entrepreneurship education by reinventing, promoting and innovating on the Indian Entrepreneurship Models

Mission:
- To inculcate the spirit of innovation and incubate young innovators
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Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE), founded at Indian Institute of Technology (IIT) Kharagpur in the year 2010, aims to encourage entrepreneurial minds of the engineering students. It is the first school of its kind in India. The School imparts strong entrepreneurial culture and ecosystem for venture creation and early start-ups. RMSoEE is endowed with a set of unique features including dual degree and research program, a well-supported ecosystem, student-driven eCell, specialized laboratories, national programs, international collaborations, and the like. We outline the highlights:

Dual Degree Program: The school offers 5-year integrated dual degree program with M. Tech in Engineering Entrepreneurship and B. Tech in an Engineering discipline. The B. Tech or Dual Degree M. Tech students of engineering departments opt for this program from their second year of study. They continue their B. Tech in their parent department while taking courses in entrepreneurship. Finally they earn their entrepreneurship specialization in their fifth year.

Schematic of Engineering Entrepreneurship Program 'e' → engineering. 'E' → Entrepreneurship
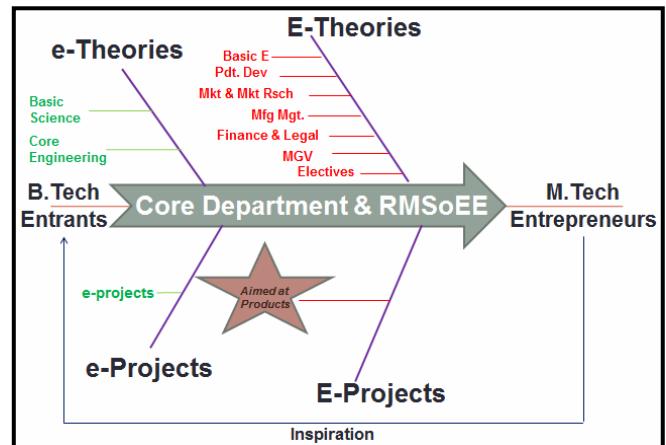
RMSoEE was created to establish a model dual degree M. Tech in engineering entrepreneurship programme. Hence the faculty have diverse background and experience as appropriate for this unique school. The courses are designed with a blend of both technology and management aspects. The students are nurtured with a culture of innovation, problem-

solving, entrepreneurship, and research, to assure that the students stay current with the latest developments in their respective fields, and they are encouraged to explore various interdisciplinary areas.

Research Programs: Spearheaded by a number of fellows from IIMs and doctorates from IITs amongst its faculty, the School runs a vibrant *Doctoral/MS Program* aimed to bridge the intellectual gaps in the relevant interdisciplinary studies related to innovation and entrepreneurship. It enriches the value of knowledge in the domain of management, technology intervention and transfer, and overall ecosystem development for innovation and entrepreneurship.

Eco System: A rich eco-system revolves around the school and promotes innovation and entrepreneurship. The three major pillars of this eco-system are:
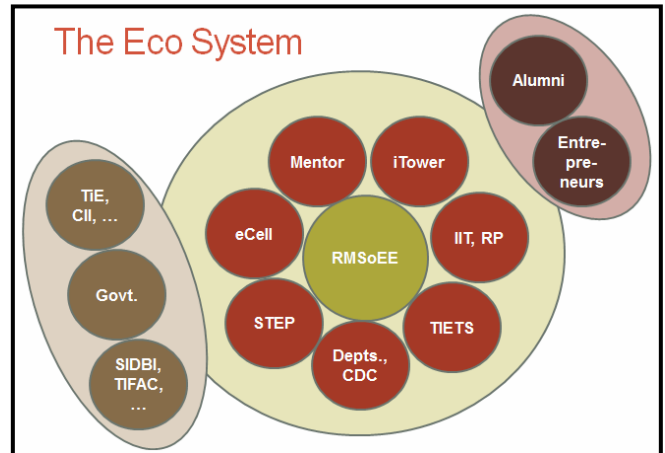
1. *Various Units of IIT –*
   - Different engineering departments mentor and provide technical support
   - *Career Development Cell* (CDC) for professional training, internship, and placement
   - *Science and Technology Entrepreneurship Park* (STEP) support with physical infrastructure and provide a peer-to-peer environment for entrepreneurs
   - *Technology Incubation & Entrepreneurship Training Society* (TIETS) directly supports with funding and mentorship
   - Students'-run *Entrepreneurship Cell* (eCell) organizes outreach programs and events
   - Upcoming *Research Park at Kolkata* (IIT, RP) will provide huge infrastructure for research, innovation, and industry connect
   - Upcoming *Innovation Tower* (iTower) will house new activities.

   These support entrepreneurship learning with technical inputs, seed funding, resource networking; and mentoring and are available for students of IIT as well as for outsiders.
2. *Public and Private Bodies* – DST, DeitY, DSIR and other governmental agencies; PSUs like SIDBI; and Industry consortiums like TiE, CII. Through these bodies various technical, financial and promotional activities are taken up by the school.
3. *Alumni and Entrepreneurs* – Alumni of IIT; and current and past entrepreneurs help as mentors, and with financial and networking support.

Innovation Lab (I-Lab): It is where innovations are born. Innovation Lab at RMSoEE aims to produce entrepreneurially oriented competent individuals. Each student of RMSoEE is attached

with innovation laboratory during their course. The lab provides:
- Thinking space for ideation
- Mentoring from industry specialists and technocrats
- Computing facility of 24*7 hrs
- Web conferencing facilities
- Support from incubation staffs
- Networking with alumni and industrial associations.

Analytics Lab (A-Lab): Analytics and handling of Big Data have emerged as a core skill for business management. At RMSoEE we are responding to

this global need by setting up the analytics lab. It is envisioned to provide hands-on training to the students and innovators on application of various analytical tools and techniques for business intelligence and business decision making. The lab is equipped with two high-end servers, standard analytics tools, and benchmark data sets. Further tools for Forecasting and predictive analytics, Market analytics and Financial analytics, Operational analytics, and Big data analytics are being setup.

Further our research team in healthcare service delivery is gearing up to use Big Data Analytics in key areas of healthcare industry to develop various analytical models including:

- Analytics for Medical Diagnosis: Faculty are involved in a project on detection of colorectal cancerous cells with Tata Medical Center, Kolkata
- Healthcare knowledge management with Personalized Medicine, Decision making in emergency care, Predictive Analytics and Preventive Measures

Modelling Lab (M-Lab): This new and novel lab will provide facilitate computer modelling, visualization of multi-dimensional environments, and building of small 3D prototypes. The lab is equipped with a 3D printer (developed indigenously by one of our entrepreneurs) and supported by a range of open-source modeling tools. Further a Microsoft Kinect based 3D imaging infrastructure is being setup for a complete 3D modelling solution including acquisition, analysis, design, visualization, and realization.

Projects on multitude of hardware and software technologies around this lab include – Rapid Prototyping for Small Models, Omni-directional 3D reconstruction in Real-time for Virtual Reality, 3D Modeling, Animation, and Reprographics.

Entrepreneurial Outreach: Entrepreneurial outreach is high on the agenda of RMSoEE. The school works closely with various agents of its eco-system, notably STEP/TBI, TIETS and eCell, to reach out to the students and faculty of other Institutes, and existing and budding entrepreneurs. STEP-TIETS-TBI works as a conduit between IIT KGP and external world to facilitate technology transfer and convert research outcomes of entrepreneurs to commercially viable propositions. Specifically,

- *TBI/STEP* facilitates incubation of new technologies to reach the market place
- *TIETS* helps in virtual incubation, funding for incubatees, mentoring, evaluation & prototype branding.
- *eCell* is dedicated to the cause of promoting entrepreneurship among students. It has two annual flagship events that are coordinated by RMSoEE:
    - *Global Entrepreneurship Summit* (GES) is the biggest entrepreneurial platform in India for academicians, new-age entrepreneurs, eminent business personalities, venture capitalists and students to gather at one place and share their entrepreneurial endeavours and experiences.

GES 14, Kalidas Auditorium

    - *Entrepreneurship Awareness Drive* (EAD) is a massive initiative across 20 cities to promote entrepreneurship and encourage students to embrace the concept of entrepreneurship.
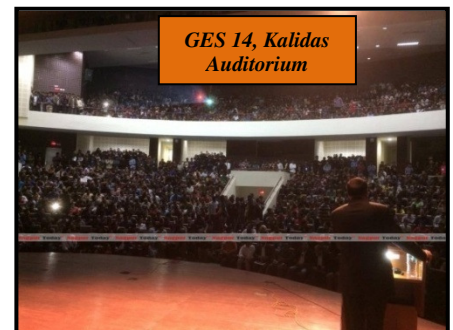
    Further, three competitions are conducted every year by eCell – *Concipio* (The In-house B-plan competition), *Empresario* (Nation's largest B-Plan competition), and *Envision* (The product design competition).

The school also reaches out to the faculty and students of engineering colleges by providing entrepreneurial training programs every semester through FDP and TeDP programs of DST.

Global Entrepreneurship Summit (GES 2014): GES 2014 at IIT Kharagpur has been the largest ever student-level entrepreneurial summit in India. It was attended by over 1400 students and various events including Start-up Camp, Connect the Dots, Elevator pitch, Panel Discussion, Innovation Exhibition, and Co-Founder's Meet were held.
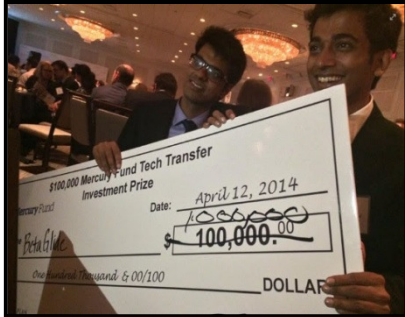
Achievements by Students: Students and entrepreneurs of RMSoEE regularly earn laurels for themselves and the Institute. Some of the recent ones include:

- BetaGlide, a start-up by two student-entrepreneurs and mentored by TiE, won the Mercury Fund Investment Prize. The team received several financial commitments totalling over $1 million. Earlier BetaGlide was TIBPC Asia Pacific RICE Track Runner up, 2014.
- Intugine Technologies won TIBPC Asia Pacific RICE Track, 2014.
- A team of three students mentored by RMSoEE represented IIT Kharagpur at Sao Paulo in Hult prize and was adjudged as the bronze medallist for their eco-friendly B-plan.

BetaGlide receiving $1m Mercury Fund Tech Transfer Investment Prize at Rice Business Plan Competition at Houston

International Summer and Winter Term on Big Data Analytics: In June, RMSoEE, in collaboration with Taipei Medical University, IIM Kolkata, and our Computer Science and Engineering Department, will offer a course on *Big Data Analytics* in the first *International Summer and Winter Term* (ISWT) of IIT Kharagpur. The course is planned as a mix of basic theory and a lot of hands-on in Data mining, Machine learning, and Visualization of big data. Naturally it has already received a huge response from the Industry.

International Research Collaboration: The school has several international research collaborations including:

- Prof. Sanjay Mishra, University of Kansas, USA for research on Entrepreneurship and Innovation.
- Prof. I J Chiang, Taipei Medical University, Taiwan for a course in Big Data Analytics.
- Prof. Paul Lillrank, Aalto University for research on healthcare management.
- Dr. Ajit Kumar, Postdoctoral Fellow, National Central University, Taiwan for research in healthcare domain.

RS Day: The school celebrated its first Research Scholars' Day *Insight 2014* on March 23, 2014. The occasion was graced by the esteemed presence of Mr. Arindam Mukherjee, CEO, Alumnus Software Ltd. and 1985 alumni, as the Chief Guest. The students presented their research through posters which evoked a lot of interest. The day closed with a panel discussion on *University startup is an anti-cultural dream in India.*