

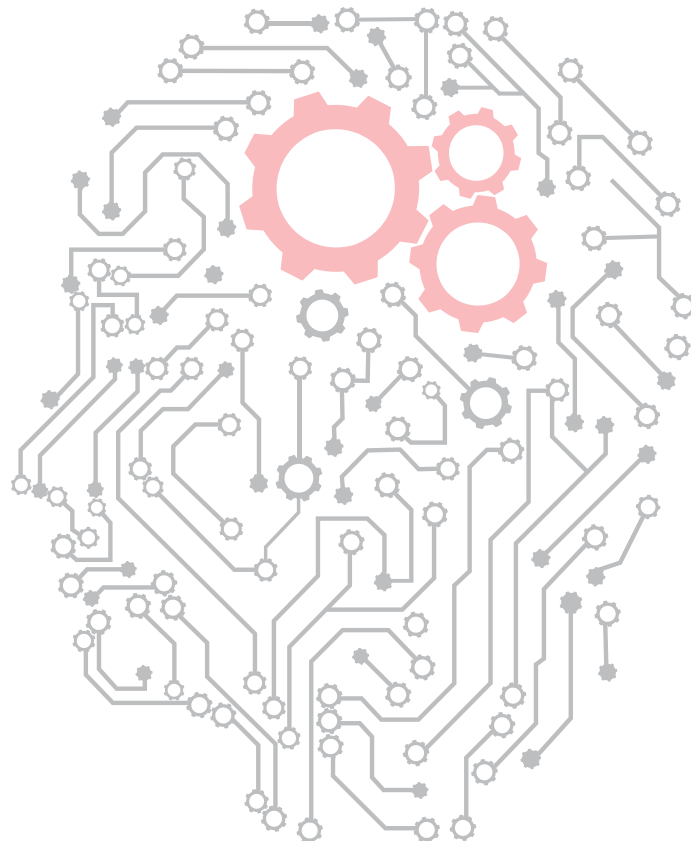
Co-ordinating  
Partner



# Mitsubishi Electric Cup

Collaborate. Innovate. Excel.

**THEME AND RULE BOOK - 2016**



# Mitsubishi Electric Cup: National Level Automation Competition for Students



## INTRODUCTION

Today, strengthening the cultivation on students' innovative consciousness, cooperative spirit and engineering practice abilities is a vital reform of higher education. Competitions play a positive role in further developing higher education reform, consolidating basic knowledge education, cultivating comprehensive abilities, integrating theories and practices, etc. for University students through promoting extracurricular scientific and technological activities. Consequently, Mitsubishi Electric India has launched a science and technology competition, Mitsubishi Electric Cup, a National Level Automation Competition for students (including undergraduates and postgraduates) on a yearly basis, offering opportunities for outstanding talents. The competition includes innovative design and application which will be held every year.

Mitsubishi Electric is a leading global manufacturer in automation industry and provides high-performance automation products and technical services for customers of various industries from all over the world. It is one of the international brands which is present in India for a long time. Today, its automation products such as PLC, inverters, servos, CNC, low-voltage electric products, industrial robots and other products are recognised as a benchmark in the industry and have greatly contributed to India's economic development. Mitsubishi Electric India, through its CSR activity, has collaborated with various institutes by contributing world-class FA training equipment, training to faculty and students through seminars and workshops.

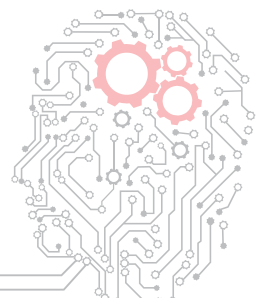
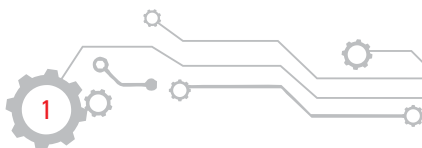


## MISSION

Constantly developing information/artificial intelligence technology has provided traditional manufacturing industry transformation with powerful force for change and technical guarantee. The researches on intelligent manufacturing aim to establish a highly flexible, personalized, and digitalized production mode for products and services; while on the other hand, with the approaching of energy crisis and aggravation of environmental pollution, energy conservation, emission reduction and environmental protection based green factory have become common pursuits. Intelligent green factory will address the above two issues. Mitsubishi Electric serves the continuous improvement and transformation of India's industry benefiting from its rich technology and products. Therefore, the Competition Organization Committee hopes students can realize intelligent manufacturing and energy saving management system under the guidance of teachers through innovation and by making use of Mitsubishi Electric's technology platform.

In the Contest, students are required to integrate Mitsubishi Electric's factory automation products (including PLC, servo, inverter and human-machine interface, etc.), built up and achieve an analogous system of intelligent manufacturing and energy saving management application, based on e&eco-factory concept and taking e-factory system as the trunk.

The Contest aims to improve college students' engineering application capability, arouse their interests in learning engineering technology, build up innovation capacity and cooperation spirit, as well as improve their self-management ability and communication skills. It is also intended to embody the 'learning for practice' ideology, review students' actual manufacturing and commissioning abilities, and meanwhile enhance exchange and cooperation between college and enterprise.





The Contest primarily embodies three parts, that is, "System Design and Presentation", "Basic Knowledge" and "Good Behaviour". 'System Design and Presentation' requires participating teams to focus on the topic of "Eco Imagination through Smart Manufacturing", independently design and produce a complete set of devices/models by using Mitsubishi Electric factory automation products, the control system shall be built up based on e&eco-f@ctory concepts.

As per the theme "Eco Imagination through Smart Manufacturing", it is expected to include IoT, interfacing through web based solutions, connectivity with upper layer of Manufacturing Execution Systems (MES). For example, if machine/model can be operated through mobile phone / or apps running on mobile, indication of overall operational data on mobile, etc.

e-F@ctory promises enhanced productivity. It makes full use of leading control technologies and network technologies to "visualise" production information, including quantitative and qualitative production data and equipment information, and links production equipment to higher manufacturing execution systems to allow production information to be incorporated into production plans be utilised to ensure quality traceability.

eco-Factory allows "visible management" of power usage through the introduction of measuring equipment and technologies that support energy conservation efforts by meticulously measuring power usage. It also promotes the effective installation of inverters and other energy saving devices to not only eliminate wastefulness and surges in energy consumption but to reduce overall power usage.

To summarize, e&eco-F@ctory based solutions provide a means to "Measure, Visualise, Reduce and Manage" Energy Usage in the Manufacturing Industry.

Participant can develop part of manufacturing processes like conveying & sorting, packaging and image processing, bottle filling process, mixing & separating different components, process control like Level /Temperature /Pressure control in manufacturing, model for smart building / smart city, etc. These are few examples, but participants are encouraged to use their imagination & creativity to develop their model. They are motivated to design an Electro-Mechanical Model displaying the working of a specific process/part of process in the Industry.

Participants shall bring their own Prototype Machine/Model controlled by Mitsubishi FA Components, together with necessary tools, insulation shoes and computers for debugging. During the competition, participating teams shall demonstrate self-produced system, and provide presentation and defence for the system design and innovations.

Basic set of Mitsubishi FA components (comprising of PLC, HMI and VFD or Servo Drive – Servo Motor set) will be given on returnable basis to the participating institute. All other electro-pneumatic, mechanical, sensor or any other accessory will be in participants/institute's scope. If any team needs additional Mitsubishi Electric hardware, then institute needs to purchase from MEI with concessional rate as decided by MEI.

For FA components, only Mitsubishi Electric make FA components are allowed be used.

The basic full score of the competition is 100 points, consisting of "basic knowledge" (5 points) "system design and presentation" (90 points; bonus) and "good behaviour" (5 points).

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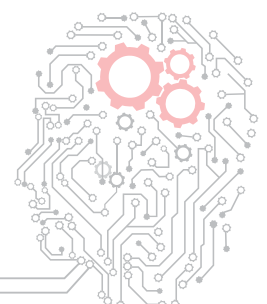
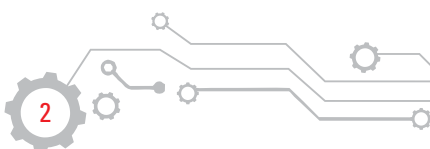
## A. BASIC KNOWLEDGE

The Basic Knowledge test is a closed-book exam with a limited time. Each team shall independently complete the test with group discussions for consensus answers; the test includes choice and true or false questions.

The Basic Knowledge test involves questions on PLC, inverters, HMI, servos and field-bus, aiming to examine students' understanding of Mitsubishi Electric products and

technologies. Participating teams should learn related knowledge of aforementioned five aspects in advance. Please refer to the Mitsubishi Electric Automation e-learning website

<http://www.mitsubishielectric.com/fa/assist/e-learning/index.html>



## B. SYSTEM DESIGN AND PRESENTATION

The System shall be based on Mitsubishi Electric automation products (including low-voltage apparatus), and the major theme is the application of automation system (e&eco-F@ctory). Self-chosen design / production idea shall focus on the theme of this competition, that is, "Eco Imagination through Smart Manufacturing". Shortlisted Teams shall prepare a working model of the proposed idea along with the necessary documents under the guidance of faculty adviser to be demonstrated at the competition venue. All the selected teams are required to design their models in an independent and innovative manner.

During the final competition, the selected teams will be judged on the following points:

1. **Design of the Model**
2. **Innovation in Idea**
3. **System Optimisation**
4. **General Safety**
5. **System Efficiency**
6. **Demonstration of the Model**
7. **Overall Presentation**

## C. GOOD BEHAVIOUR

Participating teams must comply with the discipline and arrangements of the Organizing Committee, the words and deeds should be friendly in a civilized manner.



### TEAM FORMATION

Participating Institutes can decide the team from various streams of UG & PG like Electronics, Instrumentation, Mechanical, Electrical, or Mechatronics with below criteria:

Maximum No. of member: **Four Students (UG + PG)**

Maximum No. of PG students per team: **One**

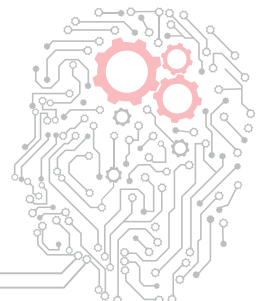
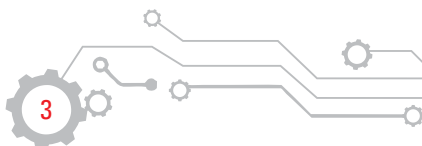
Faculty Adviser: **One**

**Role of Faculty Adviser:** He/she will be advising the team for selection of model, objective of model, etc. and will act as a general guide throughout of competition. He/she will not be involved directly for any programming, hardware wiring and fabrication or similar task since these are supposed to be done by the students.



### COMPETITION PROCEDURE

1. Team Registration & Proposal Submission (15<sup>th</sup> Sep'15)
  - a. The Hard Copy of Registration form and Declaration form shall reach the OC on or before 15<sup>th</sup> Sep'15. In case of incomplete Registration Form/Declaration Form, the participation will be rejected by the OC. Registration after 15<sup>th</sup> Sep'15 will not be accepted by the OC.
  - b. All the Registered Teams will have to submit their Proposal to the OC on or before 15<sup>th</sup> Sep'15 through e-mail. The following documents shall be submitted:
    - i. Project Abstract and design Proposal shall be of about 2000 words in PDF format. Teams can even use diagrams and mechanical drawings for explaining their proposal. Extra Pages may be added for drawings and sketches
    - ii. Bill of material with approximate budget in PDF Format
    - iii. Presentation of Proposal in PDF format
2. Review of the Submitted Proposal by the OC (16<sup>th</sup> Sep'15 – 30<sup>th</sup> Sep'15)
3. Top 15 Teams will be notified through mail regarding their selection by 1<sup>st</sup> Oct'15.
4. Dispatch of FA components to the institute of selected team by 1<sup>st</sup> week of Oct'15.
5. Preparation of Model (Oct'15 to Jan'16): Selected Teams will prepare the models based upon their proposal. The teams will be able to approach MEI FA centre for any technical assistance or training on FA products. The training/technical assistance on FA product to the selected teams will be free of cost. The schedule of training will be as per the convenience of concerned FA centre. The FA centre details are provided in the contact page on the website.
6. Submission of Progress Report (on or before 21<sup>st</sup> Dec'15): The Selected Teams will have to submit an intermediate report including pictures of the actual model in PDF format in not more than 5 A4 pages. They will also need to submit a video clip of minimum 30 sec. and maximum 60 sec. (max. 5 MB in avi/wmv format only) displaying the actual model.
7. Submission of Final Video (on or before 5<sup>th</sup> Feb'16): The teams need to submit the video of working model (with max. size of 10 MB in avi/wmv format only). Teams should ensure that the quality of video is good enough for evaluation of the model.



8. Final Competition (12<sup>th</sup> – 13<sup>th</sup> Feb, 2016):
- Teams can carry or send their model to the venue. They can send the model on or before 11<sup>th</sup> Feb'16.
  - Upon arrival, the teams will have to register their participation.
  - The teams will get access to venue from 9 am, 11<sup>th</sup> Feb'16 for installation and trials.
  - Basic Knowledge Test on 12<sup>th</sup> Feb'16 from 9 am -10 am
  - Exhibition of Model on 12<sup>th</sup> Feb'16 from 10 am onwards

- Defence Session on 12<sup>th</sup> Feb '16. Please prepare for the question-and-defence session. This session include 5 minutes for PowerPoint presentation and 5 minutes for Q&A.
  - Evaluation by the judges on 13<sup>th</sup> Feb'16
  - Prize Distribution Ceremony on 13<sup>th</sup> Feb'16, 4 pm onwards
- The detailed Agenda for the Competition will be shared on 11<sup>th</sup> Feb'16 with participants.



## SELECTION PROCEDURE

### Level 1: Shortlisting of Top 30 Teams

The following selection procedure will be implemented for selecting top 30 teams from the received proposals:

- Proposition & Design (20 marks)
  - Innovation Quotient (10 marks) – Will be measured on the Innovativeness of the proposal highlighting how the proposed solution addresses smart manufacturing
  - Technical Complexity (10 marks) - complexity of the process being addressed
- Quality of work (20 marks)
  - A well-documented proposal having detailed description of process being addressed, the importance of the process and proposed solution.

- Feasibility of proposal realizable within the contest duration.
  - Originality of the project
- e&eco-F@ctory Concept (10 marks)
    - The proposals addressing the concept of e&eco-F@ctory

### Level 2: Selection of Top 15 teams

The shortlisted teams will have to explain their proposals through Video Conferencing. There can be a Q&A session by the Judging panel so shortlisted teams are advised to prepare them for the same.



## CRITERIA FOR PROPOSED MODEL

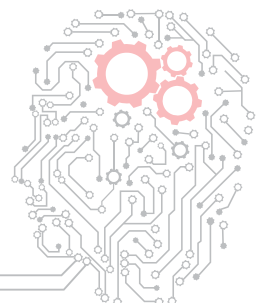
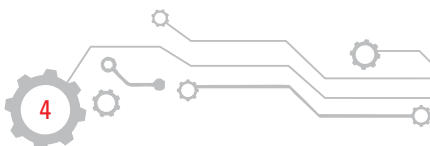
Minimum dimension	: 0.5 m x 0.5 m x 0.5 m (WxHxD)
Maximum dimension	: 1.5 m x 1.5 m x 1.5 m (WxHxD)
Maximum weight	: 100 Kg (excluding FA components from Mitsubishi Electric India)



## MITSUBISHI ELECTRIC FA COMPONENTS SETS

After selection of the Model by the OC, the below hardware will be given to college on returnable basis:

Sr. No	Model	FA Hardware	Description	QTY
1	FX5U-32MT/ES	PLC	FX5U PLC with 16 inputs, 16 outputs, built in Ethernet, Analog I/O, RS485 Modbus, 2 AI, 1 AO, 4 high speed output, and High speed Inputs.	1
2	GS-2107-WTBD	HMI	7" GS Type HMI, Touch Screen, Ethernet, RS232, etc.	1
3	FR-D720S-025EC	VFD	Inverter, 1Ø 230 VAC input, 3Ø 200 VAC output, 400 W (0.5 HP), 2.5 Amps, Built-in Modbus (Induction Motor is not included)	1
4	MR-JE-20A	Servo System	Pulse input type servo, 200W, with Servo motor: HG-KN-23J, and necessary cables	1



**NOTE:**

- a. Servo System and VFD will be given as per the requirement of the proposal. If proposed model does not need it then will not be given to the selected team.
- b. For Self-Learning of the Products, the Participants can view the e-Learning manuals from the site:  
<http://www.mitsubishielectric.com/fa/assist/e-learning/index.html>
- c. The Technical details of the above products can be found on the website:  
<http://www.mitsubishielectric.in/fa/factory-automation.php>

**SCHEDULE:**

The Schedule for the Competition is as follows:

24 <sup>th</sup> Jul'15	Announcement of Competition
15 <sup>th</sup> Sep'15	Registration and Submission of Proposal
1 <sup>st</sup> Oct'15	Announcement of Selected Teams – Top 15 teams
Oct'15 to Feb'16	Each team will prepare model by process of fabrication, wiring, programming, commissioning, testing, etc.
21 <sup>st</sup> Dec'15	Intermediate Report Submission
12 <sup>th</sup> -13 <sup>th</sup> Feb'16	Final Competition

**ORGANISING COMMITTEE****PATRONS****Mr. Makoto Kitai**

Managing Director, Mitsubishi Electric India Private Limited

**Shri. Rajkumar Agarwal**

Chairman, BRAC, Pune

**GENERAL CHAIRS****Mr. Makoto Yokoyama**

Director & Division Manager, FAID, Mitsubishi Electric India Private Limited

**Prof. (Dr.) Rajesh Jalnekar**

Director, Vishwakarma Institute of Technology, Pune

**ADVISORY COMMITTEE****Mr. Hiroki Omura**

General Manager, FAC, Mitsubishi Electric India Private Limited

**Mr. Rajeev Sharma**

Head - Corporate Services & Strategic Planning, Mitsubishi Electric India Private Limited

**Prof. (Dr.) P. S. V. Nataraj**

Systems & Control Dept., I.I.T. Bombay

**Prof. (Dr.) S. L. Patil**

Head, Dept. of Instrumentation Engineering, COE, Pune

**Prof. (Dr.) Jayant Kulkarni**

Dean, Administration & Registrar, Vishwakarma Institute of Technology, Pune

**PROGRAMME CHAIRS****Mr. Rameshchandra Bhorania**

Sr. Manager, FAC, Mitsubishi Electric India Private Limited

**Prof. P. M. Kanjalkar**

Head, Dept. of Instrumentation Engineering, Vishwakarma Institute of Technology, Pune

**EXECUTIVE COMMITTEE****Prof. J. A. Gaikwad**

Convenor, Dept. of Instrumentation Engineering, Vishwakarma Institute of Technology, Pune

**Mr. Manoj Gupta**

Sr. Manager, FAC, Mitsubishi Electric India Private Limited

**Prof. V. R. Bhanuse**

Dept. of Instrumentation Engineering, Vishwakarma Institute of Technology, Pune

**Mr. Manish Jain**

Marketing Dept., Mitsubishi Electric India Private Limited

**Prof. A. B. Kadu**

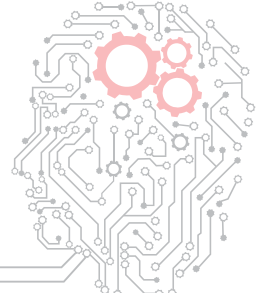
Dept. of Instrumentation Engineering, Vishwakarma Institute of Technology, Pune

**MEDIA ADVISOR****Mr. Abhi Shekhar**

Corporate Marketing Communications, Mitsubishi Electric India Private Limited

**Mr. Abhijeet Kokane**

Marketing Communications, Mitsubishi Electric India Private Limited





## RULES & REGULATIONS

1. Only one Registration (one team) per institute is allowed.
2. Once the team is registered then alteration of team members is not allowed.
3. All the team members must be regular students of current academic year. Part-time students or evening course students are not allowed to participate in the competition.
4. The selection of teams will be done by the Organising Committee and the decision made by the Organising Committee will be final and binding on all the registered teams. This decision cannot be challenged by the registered teams/institute.
5. The Mitsubishi FA Components will be given to institutes on returnable basis. The Institute needs to return the components to MEI by 31<sup>st</sup> March'16. If components are required by the institute for internal presentation / demonstration then the institute will have to request the OC for the same. The OC may allow institute to keep the components till the period decided by the OC. The decision made by the OC will be final.
6. Apart from Mitsubishi FA components as mentioned above, all the other components will have to be arranged by participating team on their own cost.
7. Transportation (including transportation of Model) & Accommodation of participants at the Competition venue will be managed by the Participating Team/Institute. The OC will not be liable for any damage caused to their model during transportation.
8. Participants must pay adequate attention to safety when designing and building model so that their model doesn't harm anyone (other teams, OC, audience and so on) at the venue.
9. Please attach emergency button on the model in case of any accident/unexpected event.
10. Participants must not use any kind of inflammables in their designs. This is to ensure the safety of the participants, visitors, OC, judges and all concerns
11. All the models that will participate in the contest must be designed and constructed by the team members only.
12. Participants will arrange all the accessories own their own including air compressors if required etc.
13. Participants will be given an exception in terms of maximum dimensions for their designs with prior approval of the design from the OC. The decision made by the OC will be final and binding to the participants.
14. Teams will be provided with only single phase power supply at the venue. There will be no provision of three phase supply at the venue.
15. The participating team will have to submit their design of models which

- include mechanical drawings, PLC program, simulation results if any etc. for evaluation. They also need to submit a report along with a presentation which will describe the working of the model and innovation which is achieved. Hard copies of the above documents must be submitted to the OC as per the schedule.
16. Participating teams can submit hard copies of the documents at the time of registration at the venue or even they can send the hard copies through post before they arrive at the venue. Any team failing to submit the above documents will not be able to participate in the competition. List of mandatory documents to be submitted is described in section below.
  17. Team members need to show their College I-cards while registering at the venue for the competition failing to which they might not be able to participate in the competition.
  18. All the Mitsubishi FA components must be used as per the guidelines given in the respective manuals of the components. If required the participating team can consult nearby FA centre for any technical assistance or training. List of FA centres is given below in the Contact section.
  19. If Mitsubishi FA component is damaged due to mishandling and improper usage, then it shall be reported to the OC immediately so that it can be repaired at Mitsubishi Electric's FA Repair centre in Pune. Repairing from third party or local repair for this FA component is not permitted. If this hardware is found beyond repair then the participation of the team will be cancelled and all the components supplied by MEI (including the faulty component) must be returned to the OC.
  20. In case the participating team during the course of competition decided to quit the competition for any reason, participating team is bound to inform OC with reason and OC has the discretion to decide the cost, which shall be paid by college/Participating team for FA components along with sponsorship cost which MEI has incurred for such competition.
  21. The declaration form submitted at the time of Registration (on or before 15<sup>th</sup> Sept.) will be valid only for the selected teams. For all the other teams, the declaration will be void.
  22. During the course of the actual competition or at any phase before that, if any team is found to be using any unfair practices/methods, the team will be disqualified from the competition. Along with this, if necessary, other punitive actions/measures may be initiated against the erring team - as found viable by the Organising Committee (OC).
  23. Participating teams must comply with the discipline and arrangements of the OC, the words and deeds should be friendly in a civilized manner.

### LIST OF DOCUMENTS TO BE SUBMITTED ALONG WITH DEADLINES:

Sr. No.	Particulars	Deadlines(on or before)
1	Registration Form and Declaration – Hard Copy	15 <sup>th</sup> Sep' 15
2	Design Proposal in about 2000 words, Bill of material and Presentation - Soft Copy through e-mail	15 <sup>th</sup> Sep' 15
3	Intermediate Progress Report - Soft Copy through e-mail	21 <sup>st</sup> Dec' 15
4	Demo video of working model - Soft Copy through e-mail	5 <sup>th</sup> Feb' 16
5	CAD files & PLC/HMI programs - Soft Copy through e-mail	Before the competition
6	Final Report - Hard Copy & Soft Copy	Before the competition

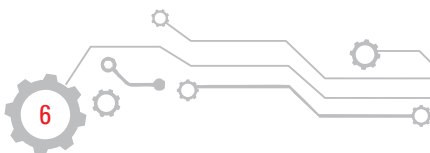
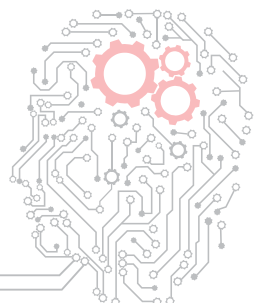
### REGISTRATION:

There is no registration fee for this competition. The registration must be done through the institute only and the institute have to submit the declaration to the OC along with Registration Form. The hard copies must reach the OC on or before **15<sup>th</sup> Sep'15**. Any Registration received after **15<sup>th</sup> Sep'15** will not be accepted by the OC.

The Email-ID for sending the proposal shall be as follows:  
**mitsubishielectriccup@vit.edu**

The Registration Form along with the declaration shall be sent on the following Address:

**Convenor- Prof. Jitendra Gaikwad,**  
Dept. of Instrumentation Engg.,  
Vishwakarma Institute of Technology,  
666, Upper Indiranagar, Bibwewadi,  
Pune-411037, Maharashtra



## PRIZE AND RECOGNITION:

All the teams will be given certification of participation from Mitsubishi Electric India. All selected teams will be given a chance to visit our factory in Pune and get a glimpse of the automation world. Along with certificate, the following prizes will be awarded:

Winning team	Prize worth of INR 100000 & Winner Trophy
Runner-up	Prize worth of INR 75000 & Runner up Trophy
Third place	Prize worth of INR 50000 & Trophy

There are many other prizes to be won in various categories including Most Innovative Model, Most Energy Efficient Model etc.

## VENUE:

Vishwakarma Institute of Technology,  
666, Upper Indiranagar, Bibwewadi,  
Pune-411037, Maharashtra

## CONTACT DETAILS:

**Convenor- Prof. Jitendra Gaikwad,**  
Dept. of Instrumentation Engg.,  
Vishwakarma Institute of Technology,  
666, Upper Indiranagar, Bibwewadi, Pune-411037,  
Maharashtra

### For enquiries regarding registration:

E-mail ID: [mitsubishielectriccup@vit.edu](mailto:mitsubishielectriccup@vit.edu)

Phone: +91-20-24202237

Website: [www.mitsubishielectric.in/fa/mecup](http://www.mitsubishielectric.in/fa/mecup)  
[www.vit.edu](http://www.vit.edu)



## MITSUBISHI ELECTRIC FA CENTRES

Below training centres to be contacted for technical assistance and training on Mitsubishi FA products:

### PUNE CENTRE

Mitsubishi Electric India Private Limited  
Factory Automation & Industrial Division,  
EL-3, J Block, MIDC Bhosari,  
Pune, Maharashtra,  
India – 411 026  
Tel.: +91-20-2710 2000  
Fax: +91-20-2710 2100

### GURGAON CENTRE

Mitsubishi Electric India Private Limited  
Factory Automation & Industrial Division,  
2<sup>nd</sup> Floor, Tower A & B, DLF Cyber Greens,  
DLF Cyber City, DLF Phase III, Gurgaon, Haryana,  
India -122 002  
Tel.: +91-124-4630300, Fax: +91-124-4630399

### BANGALORE CENTRE

Mitsubishi Electric India Private Limited  
Factory Automation & Industrial Division,  
Prestige Emerald, 6th Floor, Municipal No. 2,  
Madras Bank Road, (Lavelle Road),  
Bangalore, Karnataka,  
India -560001  
Tel: +91-80- 4020-1600  
Fax: +91-80- 4020-1699

### CHENNAI CENTRE

Mitsubishi Electric India Private Limited  
Factory Automation & Industrial Division,  
No.1 Vivekananda Road, Srinivasa Nagar  
Off Spur Tank Road, Chetpet, Chennai, Tamil Nadu  
India – 600 031  
Tel: +91-44-49232222  
Fax: +91-44-49232249

### AHMEDABAD CENTRE

Mitsubishi Electric India Private Limited  
Factory Automation & Industrial Division, B/4, 3rd floor,  
Safal Profitaire, Corporate Road, Prahaladnagar,  
Satellite, Ahmedabad, Gujarat,  
India – 380 015  
Tel. : +91-79-65120063

### For enquiries regarding technical assistance and training:

Email: [MEI-FAID-FATraining@asia.meap.com](mailto:MEI-FAID-FATraining@asia.meap.com)

Website: [www.MitsubishiElectric.in/fa/mecup](http://www.MitsubishiElectric.in/fa/mecup)

