

Physical Progress Report

of

Design Innovation Centre

at

Islamic University of Science and Technology

Awantipora, J&K

7<sup>th</sup> June, 2016

# Summary

Design innovation centre at Islamic University of Science & Technology (DIC@IUST) was established in collaboration with the University of Delhi, Jamia Milia Islamia, and School of Planning & Architecture (New Delhi) under the MHRD scheme of 'National Initiative for setting up of Design Innovation Centres, Open Design School & National Design Innovation Network'.

With a major theme as 'Product Design', DIC@IUST has since then been involved in establishing the Innovation Lab with state-of-art facilities. A state of art hardware and software has been put in place, especially towards realizing product design. Students and faculty have a hassle free access to such facilities for realizing their innovative projects and ideas.

One of the major projects currently being funded is "Development of a Haptic Device for enhancing Pedagogy in Education at school and K-12 level". Apart from this, fourteen student projects are currently being funded, of which most of them are B-Tech final year projects promising some innovation.

DIC@IUST is currently offering three elective courses to the students of School of Technology, IUST – Microcontroller based System Design, Introduction to Computational Electromagnetics, Mechatronic System Design.

DIC@IUST has initiated a series of workshops to foster the spirit of creativity and innovation in the students of IUST (from all backgrounds). The first of these workshops, Innovation Frontiers-I was organised on 28<sup>th</sup> April 2016, in which participants were introduced to the contemporary technologies like 3D printing and CAD, along with a design thinking exercise.

Winter trainings on Embedded Systems and Robotics and Winter INnovation Award (WIN) were launched in January 2016, in which the students independently worked on their innovative ideas. DIC@IUST will be offering summer internships and a certificate course on product design and development from Autumn 2016.

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## DIC@IUST (Brief Overview)

The basic purpose of setting up Design Innovation Centre at Islamic University of Science and Technology is to promote a culture of innovation and creative problem solving, to serve as a place that imparts design based education and practice and to create an ecosystem facilitating students and faculty to take their innovative ideas from classrooms/labs to market/people.

### Specific Targets and Objectives:

1. Setting of an Innovation Lab with state-of-art facilities
2. Elective courses on Product Design, Embedded Systems, Mechatronics, etc
3. Certificate courses focussed on Product Design and Development
4. Design and Innovation related workshops
5. Winter trainings
6. Summer Internships
7. Grand challenges in design

### DIC@IUST Management Team:

1. Dr. Shahkar Ahmad Nahvi(Coordinator, DIC@IUST)
2. Dr. Faroze Ahmad Mir
3. Mr. Kaiser Giri
4. Dr. Majid H Koul
5. Dr. Basharat N Dar

### DIC@IUST Staff:

1. Mr. Peerzada Shaoib Hamid(DIC Fellow, M.Tech E&C Engineering)
2. Mr. Tanveer Ahmad(Office Assistant)
3. Miss Shabroza(Attendant)

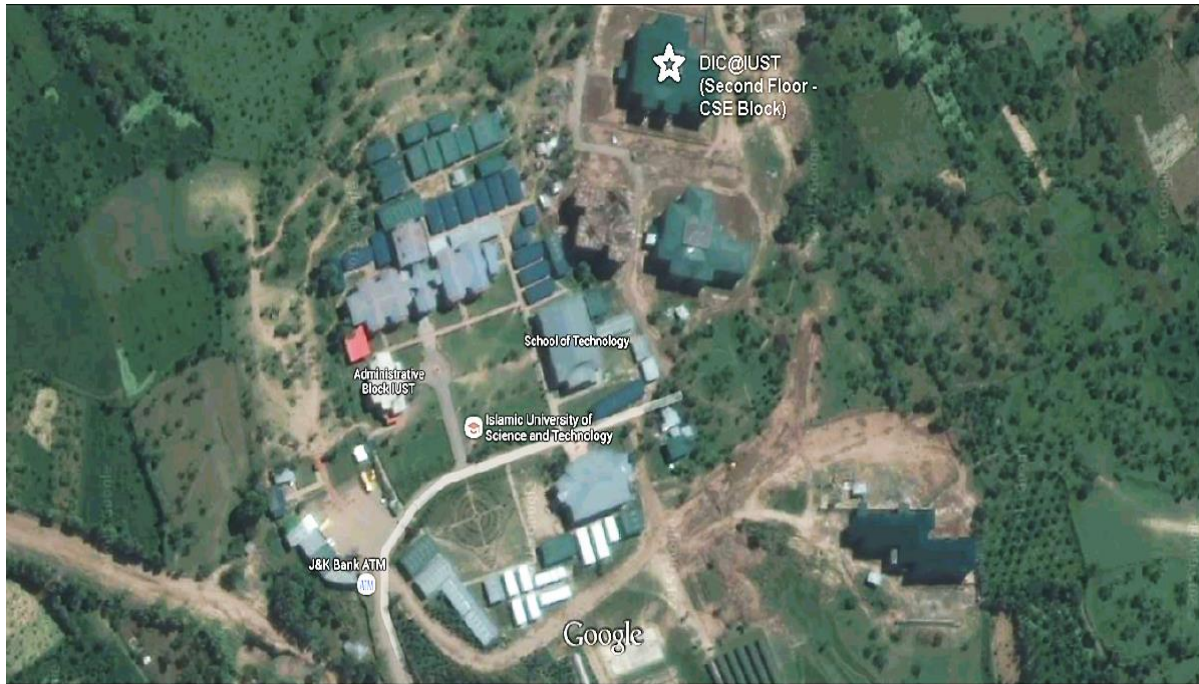



Figure 1: Location of DIC@IUST



**ISLAMIC UNIVERSITY  
OF SCIENCE & TECHNOLOGY**

ADMISSIONS  
**2016 OPEN**  
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List of students shortlisted for Embedded Systems and Robotics Workshop organized by TECIS Department of CSE

**About Department**

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Design Innovation Centre

**Coordinator's Message**



Islamic University of Science & Technology in partnership with the University of Delhi, Jamia Millia Islamia, and School of Planning & Architecture (New Delhi), has established a Design Innovation Centre (DIC) under the MHRD scheme of National Initiative for setting up of Design Innovation Centres, Open Design School & National Design Innovation Network.


The basic purpose of setting up Design Innovation Centres is to promote a...

DR. SHAHKAR AHMAD NAHVI

[Read More](#)

Photo Gallery

PRODUCT DESIGN



**Department Today**

- ▶ List of projects selected for funding/facilitation NEW
- ▶ 3d-printing in DIC at IUST
- ▶ Application format for Submitting Projects to DIC@IUST
- ▶ [Click here for location of DIC@IUST](#)

Figure 2: DIC@IUST web presence



Figure 3: DIC@IUST LAB

# Courses: Programmes introduced

## 1. **Microcontroller Based System Design**

Type of course: Open Elective (Autumn session)

L-T-P: 0-0-6

This course was designed to provide practical and project based emphasis on the application of microcontrollers and logic devices like FPGA's in designing an embedded system based product.

Students were encouraged to work in groups, with emphasis on working towards a major project. Student performance was evaluated based on their attendance in the lab and their performance in the major project. Each student project in the course was funded by DIC after appropriate review of the project feasibility and the performance. In fact, an opportunity was provided to all the groups to present their proposals for extending their work as a B.Tech Project. Only a few (two) were selected for funding by DIC for their major project.

Eligibility: Final year students of Electrical, Electronics and Communication, Computer Science and Engineering, and final year students of Masters in Computer Applications.

Intake Capacity: 20.

## 2. **Introduction to Computational Electromagnetics**

L-T-P: 2-0-0

This course will be offered as open elective from DIC@IUST from Autumn 2016 (Subject to the approval of BOS).

## 3. **Mechatronic System Design**

L-T-P: 2-0-0

This course will be offered as open elective from DIC@IUST from Spring 2017 (Subject to the approval of BOS).

The purpose of this course will be to study the basics of automata (Electromechanical Systems) from an engineering perspective and to serve the purpose of controlling advanced hybrid systems such as production systems (3D Printers), automotive subsystems such as anti-block system, everyday equipment such as autofocus cameras, CD players, washing machines, legomatics, etc.

# Lab setup

A Wi-Fi enabled laboratory with 24x7 Uninterrupted Power Supply (UPS) has been established with the following facilities:

## 1. IT Infrastructure:

S. No.	Item	Quantity
1	Workstations with Intel Xeon E52630 Processor, 16 GB DDR4, RAM, 1 TB Hard Drive and 4 GB NVIDIA Quadro Graphics	3
2	Desktop PC's with Intel core i7 processor, 8 GB DDR3 RAM and 1 TB Hard Drive	3
3	Laptops – Apple MacBooks with Intel i5 Processor and 1 Dell	2
4	Laptop with Intel core i7 Processor, 8GB DDR3 RAM, 1 TB Hard Drive and 2 GB NVIDIA Graphics	1
5	Desktop PC's with Intel core i3 processor, 8 GB DDR3 RAM and 1 TB Hard Drive (Office Purpose)	2



Figure 4: IT Infrastructure at DIC@IUST

## 2. Rapid prototyping:

S. No	Item	Quantity
1	Ultimaker-2 3D Printer	1
2	Ultimaker-2 Extended 3D Printer	1
3	Ultimaker-2 3D Printer	1



Figure 5: 3D Printer and 3D Printed Objects



Figure 6: Ultimaker 3D Printers, with higher workspace

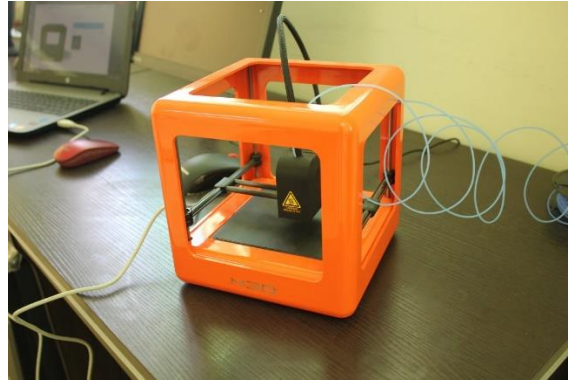


Figure 7: Micro 3D Printer

### 3. Machining Facilities

S. No.	Item	Quantity
1	Mini Lathe	1
2	Mini Milling Machine	1
3	Drilling Machine	1
4	Cut off Saw	1
5	Other Tool Kits: Angle Grinders, Screw Drivers, Bench Vice, Pliers etc	--



Figure 8: Mini Lathe and Milling Machine

#### 4. Electronics Setups:

S. No.	Item	Quantity
1	Four Channel, >100Mhz Digital Storage Oscilloscope	1
2	Dual Channel Oscilloscope	2
3	Dual Power Supply	2
4	Triple Power Supply	1
5	Digital Multimeters	6
6	Analog Multimeter	1
7	Clamp Meter	1
8	Microcontroller Kits and Development Boards(Atmel, ARM, PIC)	7
9	Arduino Boards	7
10	FPGA Kits based on Altera Cyclone 3 and Spartan-6	2
11	Raspberry Pi Kits	2
12	6-DOF Robotic arm	1
13	3-DOF Haptics Kit with GUI	1
14	Universal IC Tester	1
15	Microcontroller Burners	1



Figure 9: Electronics Setup

## 5. PCB fabrication

S. No.	Item	Quantity
1	Soldering and Desoldering Stations	3
2	Soldering Irons	2
3	Laminator for PCB	1

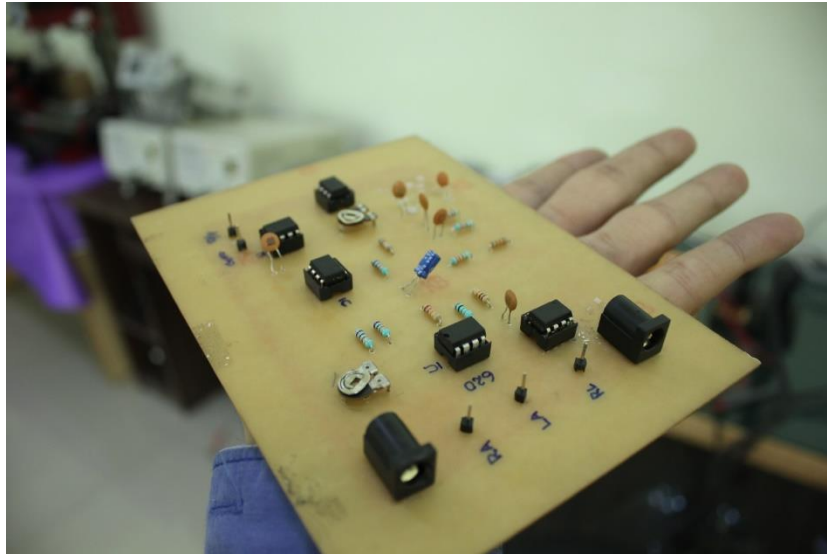


Figure 10: PCB fabricated at DIC@IUST

## 6. Softwares

S. No.	Item	No. of Licence
1	ANSYS Academic Teaching Mechanical + CFD	5
2	Autodesk Inventor Education Version 2015	Student Version
3	Keil C51, Editor, Debugger, Compiler for Microcontrollers	
4	Google Sketchup, for design	

7. Office Hardware: In addition to these, DIC lab has two PCs, two Printers and a Xerox Machine for office related work.

# Interdisciplinary Research

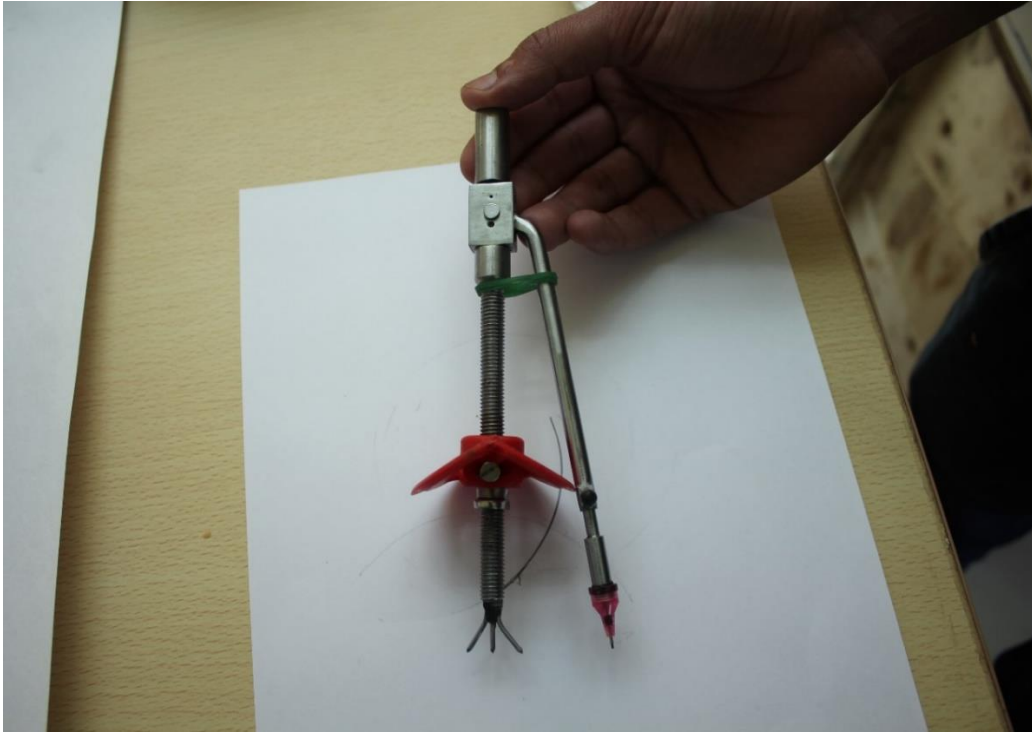
The major project currently being funded by DIC@IUST is “Development of a Haptic Device for enhancing Pedagogy in Education at school and K-12 level”.

Student projects currently being funded:

1. E-compass: A Compass that draws ellipses.
2. Wireless ECG Monitoring System
3. Smart Restaurant
4. Autonomous Quad copter Simulation and Realization
5. Energy Meter Testing
6. Design and Data Based Control of a PMDC Motor Drive
7. Implementation of different control strategies for mobile robot navigation
8. Sun tracking solar panel
9. GSM based automatic energy meter reading
10. Development of sustainable urban transport for Srinagar
11. Drowsing Detector: Driver’s Alarm’
12. Computer aided Design of electromagnetic systems
13. ATM security system using GSM and MEMS Module
14. Arduino based mobile ultrasonic RADAR



*Figure 11: Wireless ECG Monitoring System - Project in progress*



*Figure 12: E-Compass- Project*



*Figure 13: Autonomous Quadcopter - Project in progress*

# Students initiated innovations

## 1. Workshop: Innovation Frontiers-I

A workshop 'Innovation Frontiers-I' was organized in April 2016. The participants were introduced to contemporary technologies like 3D printing. There were lectures on innovation and design. Also there was a design thinking exercise.

**INNOVATION FRONTIERS - I**  
(A series of workshops to foster creativity and innovation)

Design Innovation Centre at Islamic University of Science and Technology, presents a series of workshops aimed at cultivating a culture of creativity and innovation. Innovation Frontiers-I is targeted at faculty and students of IUUST, who want to think out-of-the-box, are ready to experiment and don't fear to fail in the process. The workshop aims at providing a bird's-eye view of the contemporary technologies along with hands on design thinking exercises.

**Featuring :**

- > Lectures on Innovation & Opportunities
- > Hands on Rapid Prototyping
- > CAD & 3D Printing
- > Design Thinking Exercise

**Design Innovation Centre, IUUST**

"If learning the truth is the scientist's goal... then he must make himself the enemy of all that he reads."  
Ibn al-Haytham

**Who was Ibn al-Haytham?**  
Some around a thousand years ago in present day Iraq, Al-Hasan Ibn al-Haytham (known in the West by the Latinized form of his first name, Basilius, "Basilius" and later "Alhazan") was a pioneering scientific thinker who made important contributions to the understanding of vision, optics and light. His methodology of investigation, in particular using experiment to verify theory, shows certain similarities to what later became known as the modern scientific method. Through his book of Optics (Kitab al-Manazir) and its Latin translation (De Aspectibus), he has influenced European scholars including those of the European Renaissance. Today, many consider him a pivotal figure in the history of optics and the "father of modern Optics".

Registration link will be available at [www.iustive.com](http://www.iustive.com), on Monday and Tuesday (25<sup>th</sup> and 26<sup>th</sup> of April 2016).

**Workshop Venue:** Seminar Hall (AB-IV) & Design Innovation Centre, Second Floor, Academic Block IV, IUUST  
Doha, Qatar (2016)  
Timing: 10:30 AM to 4:00 PM

**For any query:**  
Email the PC:  
[designinnovationcenter@iust.edu.qa](mailto:designinnovationcenter@iust.edu.qa)  
or call: +974 996606455

**Register FREE**  
Limited Seats Only!  
(30 Students + 10 Faculty)  
Hurry!

Figure 14: Innovation Frontiers-I Workshop

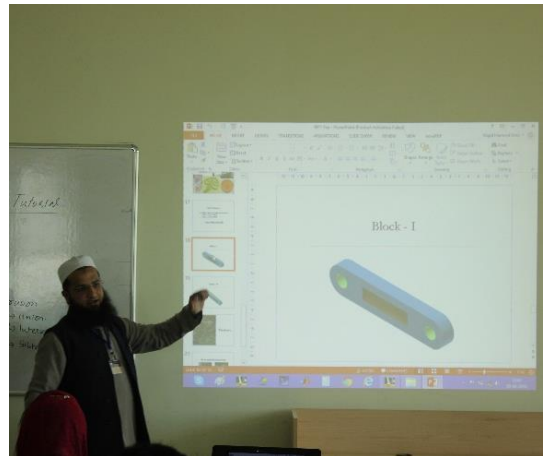


Figure 15: Participants during Innovation Frontiers-I

### Department:

Answered: 35 Skipped: 0

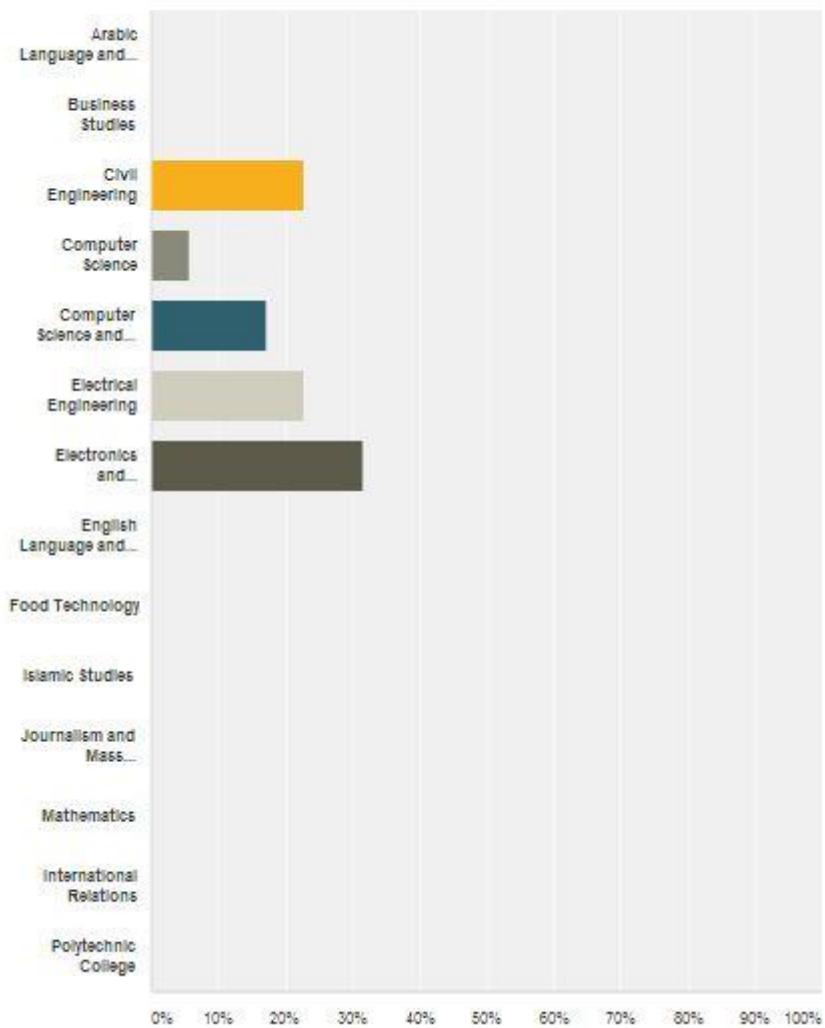
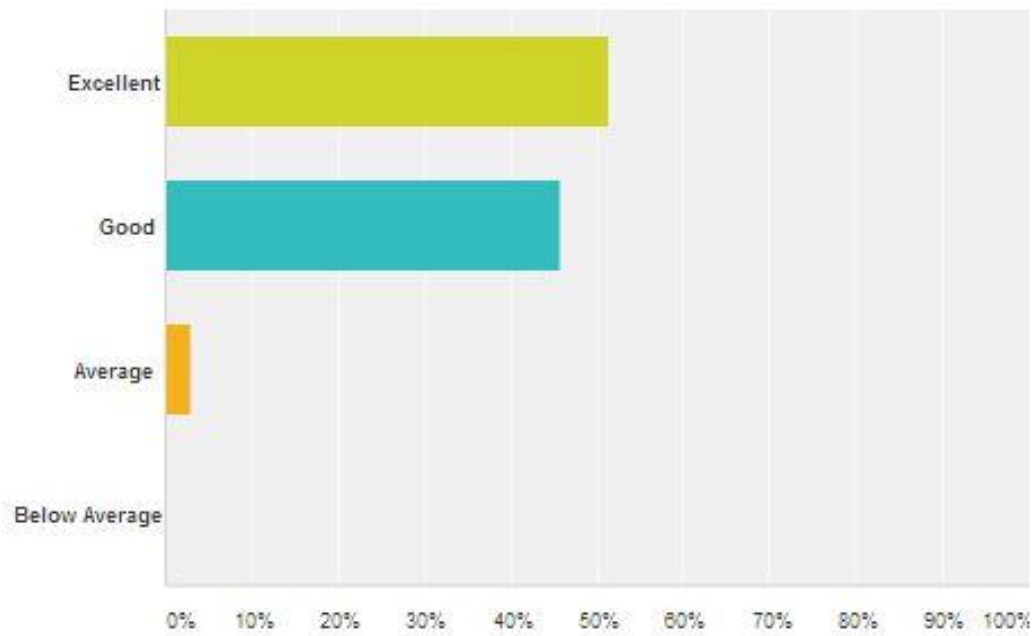


Figure 16: Department Wise participation in Innovation Frontiers-I

## Rate the Workshop as an Overall Experience.

Answered: 35 Skipped: 0

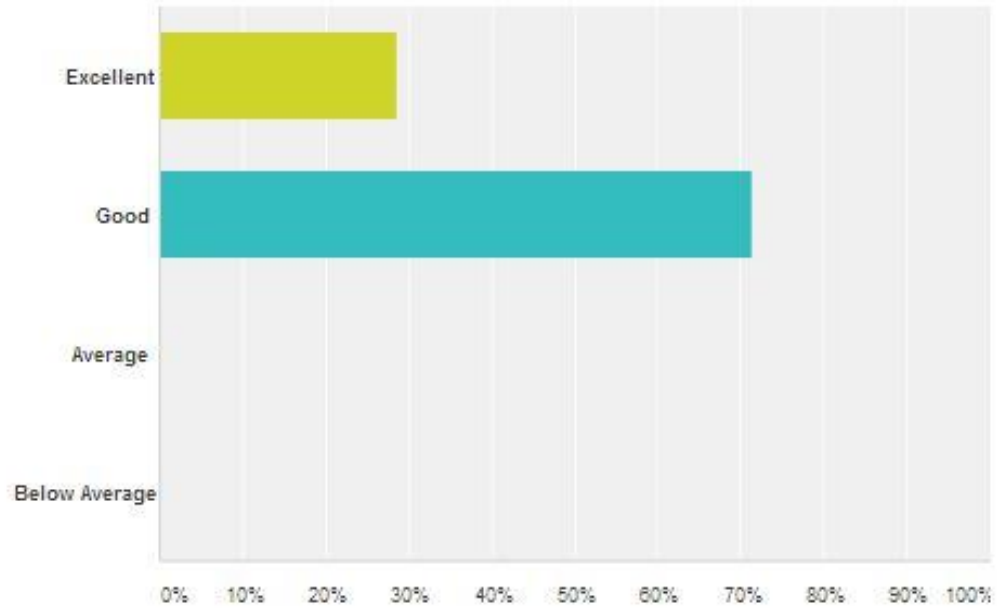


Answer Choices	Responses
Excellent	51.43% 18
Good	45.71% 18
Average	2.86% 1
Below Average	0.00% 0
Total	35

*Figure 17: Participant feedback of Innovation Frontiers-I*

### Rate the Technical and Scientific content of the Workshop.

Answered: 35 Skipped: 0



Answer Choices	Responses
Excellent	28.57% 10
Good	71.43% 25
Average	0.00% 0
Below Average	0.00% 0
Total	35

Figure 18: Participant feedback of Innovation Frontiers-I

## 2. Winter INnovation Award

In Dec 2015 DIC@IUST introduced Winter Innovation award in which applications with project proposals were invited from the students of the state to work on innovative ideas of their choice during winter vacations. A total of 15 applications were received by DIC@IUST. Shortlisting was carried out by an evaluation committee in two stages (written proposal review and presentations). Four projects were shortlisted out-of which two submitted their final prototypes.

- All Weather Umbrella
- Thermal Torch

The award carried a stipend of Rs. 700/week per student apart from project grant up to a maximum of INR 25,000.

**Winter INnovation award**  
**WIN**  
Design Innovation Centre, IUST

The Design Innovation Centre at Islamic University of Science and Technology (DIC@IUST) seeks applications for its Winter innovation award (WIN). WIN is a scheme devised to foster a spirit of innovation amongst the student community, wherein, students can work during winter vacations on an innovative project of their choice. The students need to identify and analyse problems and formulate innovative solutions. Under this scheme, students are required to submit the project proposal in association with identified faculty of the department who would act as facilitators.

What to do?	The process
<ul style="list-style-type: none"><li>• Think of an innovative idea, a new technology, product or solution to a problem.</li><li>• Find a facilitator (faculty), submit a proposal.</li><li>• Shortlisted proposals would be invited for a presentation and final selection.</li><li>• Once selected, students would be paid a stipend and project costs would be covered.</li><li>• After evaluation, certificates would be issued to successful participants.</li></ul>	<ul style="list-style-type: none"><li>• Students are required to submit proposals (in the prescribed format, downloadable from website) forwarded by the facilitator and concerned HOD.</li><li>• Shortlisting of proposals would be carried out by an Evaluation committee. The proposals would be reviewed in 2 stages.</li><li>• Student groups, who clear the written proposal review are called for presentation. Those who clear both the stages are finally shortlisted to work on the projects submitted by them.</li><li>• The students would work on their project during winter vacation. They are required to complete their projects and submit final report in DIC.</li><li>• Evaluation Committee would evaluate their progress in the project, and only those students, who are found to have completed their work satisfactorily, would be finally awarded certificates.</li></ul>
Who can apply?	
Proposal may be submitted by a student alone or by a maximum of two students. All students of Engineering/Computer Sciences are eligible. Though more than one WIN proposals may be forwarded, only one WIN project can be awarded under the facilitation of a faculty member.	
Remuneration	Dates
The Award carries remuneration of Rs.700/- per week per student. Project grant would also be approved upto a maximum of Rs. 25,000/- to carry out the proposed work. The duration would be between 3-6 weeks during winter vacation.	<ul style="list-style-type: none"><li>• Last date for submission of Project Proposals: 25/1/16.</li><li>• Presentation date: 28/1/16</li><li>• Final shortlisted projects announcement: 29/1/16.</li><li>• Project duration: 1/2/16 to 28/2/16.</li><li>• Last date of submission of reports: 31/3/16.</li><li>• Certificate distribution completed by: 1/4/16.</li></ul>

Figure 19: Winter INnovation Award

### 3. Training: Embedded System and Robotics

In Jan-Feb 2015 DIC@IUST introduced winter trainings on Embedded Systems and Robotics for engineering students of the state. 16 students registered for the same. Students were introduced to various microcontrollers apart from lectures on robotics. Student were charged a fee of INR 5000 for the 4 week program.

**ISLAMIC UNIVERSITY**  
Center of Learning

# EMBEDDED SYSTEMS AND ROBOTICS

## Winter Training Program

DESIGN INNOVATION CENTRE, IUST

The Design Innovation Centre at Islamic University of Science and Technology (DIC@IUST) seeks applications from students for its 4 weeks Winter Training Program commencing in January 2016. The program is designed to give state-of-the-art exposure to students in Embedded Systems and Robotics, at the same time helping them in completing their mandatory academic requirements.

### Who can apply?

This training program is designed for students of Engineering or Computer Sciences enrolled in their pre-final or final years respectively. The prerequisites for joining the training program are basic Programming skills and knowledge of Digital Electronics and Microprocessors.

### Details

- ▶ The course duration is 4 Weeks. Starting 18th January 2016 till 14th Feb 2016.
- ▶ Fee: Rs. 5000/- per student
- ▶ Total intake capacity: 20 (First come first serve basis)
- ▶ Registration start date: 28th December 2015.

### The Process

- ▶ Download the Registration form from the web-page of Design Innovation Centre at [www.iustlive.com](http://www.iustlive.com)>Centres>Design Innovation Centre>Notifications.
- ▶ Fill and submit a copy endorsed by your HOD along-with the fee at the following address:

Design Innovation Centre  
Second floor, Academic Block - IV  
Islamic University of Science & Technology  
Awantipora - 192122

### Contents

**Week 1: 8051 Microcontroller**  
8051 Circuit in practice, Embedded C Programming, Simulator and Cross compilers, basic introduction to KEIL, writing your first Embedded C program, Compilation, Debugging & Simulation, Generation of Hex file, Burning of Hex File to Microcontroller, basics of interfacing.

**Week 2 : Arduino**  
IDE and overview of different boards, working with switches, buzzers and LEDs, working with strings in Arduino and LCD interfacing, Serial port programming, Interfacing with different sensors.

**Week 3: Robotics**  
Design of a basic 5V/12V Regulated Power Supply, Motor Drivers and control using Arduino, DC motor speed Control using PWM, assembling a Robotic Car, automatic obstacle detecting robots, introduction to DTMF technology and Mobile-phone controlled Robots.

**Week 4: Projects**  
Various projects based on Home-automation and Robotics.

### Contact

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Mobile: +919906095435

Figure 19: Embedded System and Robotics Winter Training Program

# Future Proposed Work

- Certificate Course “Product Design and Development” to be offered from August 2016
- Design Thinking Workshop (August 2016)
- Summer Internship Programme
- Innovation Frontiers – II (Workshop)
- Outreach Programme for School Children
- Outreach program for School Teachers to train them in creative thinking.