

Project Based Learning and Publishing Refereed Papers through Course Projects

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Abstract: Publishing quality papers in both International conferences and Journals is one of the great challenges faced by Engineering Institutions. To publish quality papers with scopus index based on the experience of Course Projects which are explored through Project Based Learning. This was considered in third semester MTech. Since the time is too short and is only 12 weeks, we have come up with many ideas and used new innovative process to publish papers in International Conference with Scopus Index. The main purpose is to train the MTech students to publish quality papers in International Conferences / Journals with scopus index through course projects. To publish quality papers with scopus index, based on the experience of course projects require lot of in-depth knowledge, choosing tools and making use of the latest technology. Imparting this knowledge is challenging and is achieved through project based learning. Choosing the latest area was the first challenge. Internet of Things (IoT) was a course in third semester MTech and was selected as the theme for Course Projects and it was compulsory. The students were given a chance to choose a project in the area of their interest under IoT. After selecting a project, optimal and feasible solution has to be selected with innovation. The students as a team have to learn and give a solution to the problem and it should be such that the work carried out should be able to publish the paper in an International Conference / Journals. There were nineteen students in the class and five teams were made out of nineteen students. The target of each team is to publish one scopus indexed paper in International Conference / Journal. All the five teams are able to achieve the goal set and is discussed in the results below. All the five teams formed are able to submit the papers to IEEE International Conference on Advances in Information Technology 2019 (ICAIT2019) and all the papers have been accepted and presented, three will be published in IEEE Explore and two will be published in UGC Referred INTERNATIONAL JOURNAL OF RESEARCH IN ELECTRONICS AND COMPUTER ENGINEERING (IJRECE) and all are scopus indexed. It has been a practice to teach a course with emphasis on theory. In this approach a course project was insisted by selecting a problem and giving an IoT solution to the problem. The five teams formed are able to

publish five scopus indexed papers one per team and are able to get in-depth knowledge about the course taught. Without this kind of approach, the students would not have published such papers and would not have got in-depth knowledge.

Keywords: Internet of Things, Project Based Learning, Course Project

1. INTRODUCTION

Many students who join MTech are interested to join teaching / industry and interested to publish refereed papers in International Conference / Journal. Also publishing quality papers in both International conferences and Journals is one of the great challenges faced by Engineering Institutions. To publish quality papers with scopus index based on the experience of Course Projects which are explored through Project Based Learning. This was considered in third semester MTech. Since the time is too short and is only 12 weeks, we have come up with many ideas and used new innovative process to publish papers in International Conference with Scopus Index. We need time to publish the work done. We continue to work for three hours per week along with the project work of fourth semester. Fourth semester is completely dedicated for project work and is of eight months. The students spend only small amount of time on the course project of third semester in fourth semester so that they are able to publish the quality papers. This experiment is made first time in KLE Technological University, Hubballi. We are happy to say that the efforts and the ideas put together have yielded fruitful results. By the time the students complete the fourth semester they are able to publish papers with the help of the TEQIP facility of the University.

2.PURPOSE, CHALLENGES AND INNOVATION

The main purpose is to train the MTech students to publish quality papers in International Conferences / Journals with scopus index through course projects. To publish quality papers with scopus index, based on the experience of course projects require lot of in-depth knowledge, choosing tools and making use of the latest technology. Imparting this knowledge is challenging and is achieved through project based learning. Also it is seen that by doing the projects students are able to understand the subject better and are able to do better in both In Semester Assessment (ISA) and End Semester Assessment (ESA).

2.1 CHALLENGES FACED

1. Internet of Things was selected as the Theme for the Course Project and it was Mandatory. The students were given a chance to choose the project based on their interest.
2. The second challenge was to impart in-depth knowledge This was achieved by conducting special labs. Also a resource person from EBSCO/IEEE conducted a three hours training on literature survey and publishing papers.
3. The third challenge was; most of the students are from Computer Science and Engineering background are having less experience on hardware, writing device drivers, interfacing machine, lack of knowledge on sensors and working with high voltage devices. This was overcome by the support given by our Institute to purchase the IoT kits under TEQIP. The students were given the IoT kits and trained. The students were able to adopt themselves to the kits and the Technology

2.3 INNOVATION

The following points are integrated to achieve the goal of publishing the papers:

1. Five teams were formed; each group consists of 4 students
2. Impart the in-depth knowledge
3. Choose problem of interest
4. Provide hands-on experience
5. Conduct Special Labs
6. Conduct workshop for writing skill
7. Continue to work on course project in forth semester also.

3APPROACH

Choosing the latest area was the first challenge. **Internet of Things (IoT)** was a course in third semester MTech and was selected as the theme for **Course Projects** and it was

compulsory. The students were given a chance to choose a **problem** in the area of their interest under **IoT**. After selecting a problem, optimal and feasible solution has to be selected with innovation. The students as a team have to learn and give a solution to the problem and it should be such that the work carried out should be able to publish the paper in an International Conference / Journals. There were **nineteen** students in the class and **five teams** were made out of nineteen students. The target of each team is to publish one scopus indexed paper in International Conference / Journal. All the five teams are able to achieve the goal set and is discussed in the results section.

The time allocated for third semester is hardly 11 weeks from mid August to beginning of the month of November. Thus it is very difficult to publish the work in 11 weeks. In Semester Examination and End Semester Examinations are conducted as per the Calendar of Events, however the students are asked to continue the Course Project by spending 3 hours per week and are given additional 16 weeks to complete the project in all respects and to write a paper. By the end of March the students start sending the papers to IEEE International Conference / Journals or any other scopus indexed Conference / Journal. Then the review and acceptance and presentation are completed by the end of the July month. The following figure shows the details:

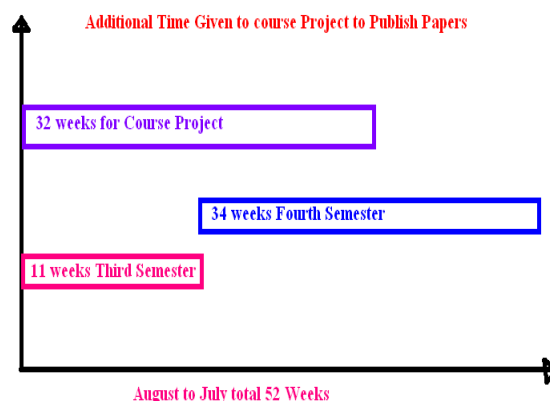


Fig. 1.0 Time allocation for Course Projects

Since the time allocated for third semester is too short, we made the students to work three hours per week towards the Course Project. The students were happy to work and publish the papers.

Mapping of Course Outcomes with Program Outcomes are shown in Table 1.0. In addition to the proposed Outcomes we could also achieve POs 8 and 9.

3.1 POs AS PER LESSON PLAN

Program Outcome 1: Scholarship of Knowledge: Ability to acquire in-depth knowledge of Computer Science and Engineering discipline with an ability to discriminate,

evaluate, analyze and synthesize existing and new knowledge.

Program Outcome 2: Critical Thinking: Ability to analyze complex Computer Science and Engineering problems critically, with application of independent judgment for synthesizing information to make intellectual and/or creative contribution to the enhancement of knowledge.

Program Outcome 3: Problem Solving: Ability to think independently, conceptualize and solve Computer Science and Engineering problems by evaluating a wide range of potential solutions for problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors involved.

Program Outcome 4: Research Skill: Ability to explore unfamiliar problems through literature survey, apply appropriate research methodologies, techniques and use tools to design, simulate, analyze and interpret data for the development of knowledge in the area of Computer Science and Engineering.

Program Outcome 5: Usage of modern tools: Ability to create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction, simulation, measurement and modelling, to complex Computer Science and Engineering problems with an understanding

Table1.0 Mapping of Course Outcomes with Program Outcomes.

Course Outcomes (COs) / Program Outcomes (POs)	01	02	03	04	05
Describe the characteristics of Internet of Things	M				
Choose IoT Enabling Technologies for developing applications				M	
Acquire domain specific knowledge to build IoT systems	M				
Select system parameters and components to design IoT applications			M		
Develop IoT solutions using Python, Raspberry Pi and Cloud		H			M
Illustrate use IoT for home automation and smart cities.			M		

3.2 EXTRA POs ACHIEVED

Program Outcome 8: Communication: Ability to communicate effectively with engineering community and society at large, regarding complex engineering activities in oral, written and presentation forms.

Program Outcome 9: Life-long Learning: Ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

4. RESULTS

All the five teams formed are able to present the papers in **IEEE International Conference on Advances in Information Technology 2019 (ICAIT2019)** and all the papers have been accepted, three will be published in IEEE Explore and two will be published in UGC Referred INTERNATIONAL JOURNAL OF RESEARCH IN ELECTRONICS AND COMPUTER ENGINEERING (IJRECE) and all are scopus indexed. The details of the papers are as shown below in Table 1.0

Table2.0 List of Papers Presented at IEEE International Conference on Advances in Information Technology 2019 (ICAIT2019), Chickmagalur, Karnataka

S.No.	Authors	Title
1	Unnati Koppikar, Shobha Hiremath, Akshata Shiralkar, Akshata Rajoor, Vishwanath P Baligar	IoT based Smart Attendance Monitoring System using RFID
2	Pooja B L, Annapurna Kattimani, Raksha Nidavani, Harshita Kanamadi, Vishwanath P Baligar	Smart Security System for Invasion Detection
3	Asfia Khan, Bhagyashree Hanamshetti, Meghadarshini Hiremath, Keerti Akkur and Vishwanath Baligar	IoT based Wireless Electronic Notice Board
4	Akshaya Kulkarni, Amit Potdar, Suresh Hegde and Vishwanath Baligar	RADAR based Object Detector using Ultrasonic Sensor
5	Amulya D, Deepa Malimath, Keerthi Lotlekar Namita Kanthi, and Vishwanath Baligar	SMART DOOR USING IOT

Feedback by the students was collected and compared with the feedback of the previous year and there was a slight improvement as shown in Fig. 2.0.

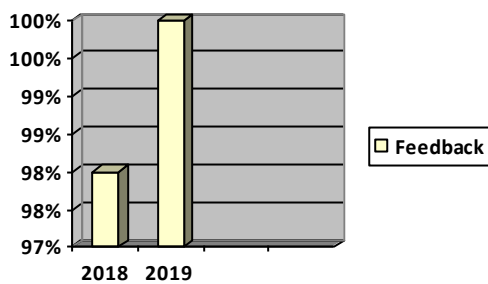


Fig. 2.0 comparison of Feedbacks before and after the proposed methodology.

The feedback has 14 questions and each question carries 8 marks and is are shown below:

1. How punctual is the teacher to the classes?
2. Discussion about the lesson plan in the classes?
3. Is the teacher is always well prepared for the classes?
4. How does the teacher explain the subject?
5. Opportunity for question and discussion
6. Continuity from class to class
7. Motivation to think about the subject
8. Syllabus completion and exam pattern
9. Language of the teacher
10. Utilization time for teaching the subject in the class
11. Control on the class
12. Help outside the class room about the subject
13. Attitude of the teacher towards the students.
14. Favoritism to the students.

Analysis of Outcome Based Education:

Internet of Things 2017-19 batch

Q	PI	BL	CO	Marks	Attainment
1	1.1	L2	1	5	72.63%
2	4.1	L2	2	5	76.67%
3	2.1	L2	3	5	70.53%
4	2.1	L2	4	5	75.79%
5	2.1	L2	5	5	72.04%
6	2.1	L2	5	5	
7	5.2	L3	5	10	
8	5.2	L3	5	10	
9	2.1	L3	5	10	
10	2.1	L3	5	10	76.82%
11	3.1	L3	6	10	
12	2.1	L4	6	20	
13	2.1	L4	6	20	

Comparison with 2016-18 batch:

CO	CO Attainment	
	2016-18 Batch	2017-19 Batch
1	85.88%	72.63%
2	80.59%	76.67%
3	82.35%	70.53%
4	80.59%	75.79%
5	63.77%	72.04%
6	----	76.82%

Average Marks Scored by 2016-18 batch is:

$$5 * (0.8588 + 0.8059 + 0.8235 + 0.8059) + 80 * 0.6377 \\ = 16.35 + 50.4 = \mathbf{66.75} \text{ out of 100 marks.}$$

Average Marks Scored by 2017-19 batch is:

$$5 * (0.7263 + 0.7667 + 0.7053 + 0.7579) + 50 * 0.6377 + 30 \\ * 0.7682 \\ = 14.65 + 31.5 + 22.8 = \mathbf{68.95} \text{ out of 100 marks.}$$

When compared with the previous batch, CO1, CO2, CO3 and CO4 performance of the previous batch was better as shown in the Table above. However CO5 achieved is better than the previous year. Also additional CO6 is added for the current 2017-19 batch.

5. Conclusions

It has been a practice to teach a course with emphasis on theory. In this approach a course project was insisted by selecting a problem and giving an IoT solution to the problem. The five teams formed are able to publish five scopus indexed papers one per team and are able to get in-depth knowledge about the course taught. Without this kind of approach, the students would not have published such papers and would not have got in-depth knowledge.

6. Acknowledgement

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