

# Computer Based Teaching Methodology for Outcome-Based Engineering

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## Abstract

- In recent years, the usage of Computer Based Courses all over the globe have increased drastically in different domains of engineering education and its application development.
- The man power required with the computer expertise skills is like a hot cake in the Industry all over the world.
- Today exploring different ideas and innovation of new techniques are mandatory for a fresh engineering graduate.
- This poster describes about the procedure to develop Computer Based Teaching Methodology (CBTM) and successfully implemented for various courses like Linear Digital Integrated Circuit Application, Micro Processors & Micro Controllers and Embedded System courses for engineering graduates.
- This paper also discusses the effectiveness of usage of CBTM with the results and the case study courses described for better attainment of values for Course Outcomes (COs) and Program Outcomes (POs) in Outcome-Based Education (OBE).



## OPEN LOOP AMPLIFIER:

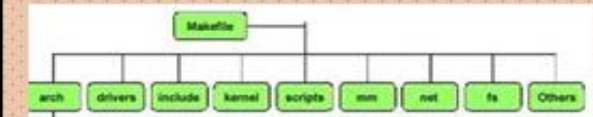
**Simulation:**

**Practical:**



## CBTM for Embedded System

### Linux Kernel Source tree



### Proprietary OS for VIIT

```

root@kali:~# cat /etc/os-release
NAME="Kali Linux"
VERSION="2020.1"
ID="kali"
ID_LIKE="debian"
PRETTY_NAME="Kali Linux"
VERSION_ID="2020.1"
HOME_URL="https://kali.org/docs/reference/desktop/working-with-the-kernel"
BUG_REPORT_URL="https://kali.org/docs/reference/desktop/working-with-the-kernel"

```

### CBTM for Raspberry Pi processor board



## Conclusion

- This paper describes an effective computer-based teaching methodology developed at the Department of Electronics and Communication Engineering, VIIT, Hyderabad, India, to teach various courses for undergraduate students.
- After this course with the computer based learning methodology students are able to not only design a customized project, also able to present their project as research paper at International/National conferences or well reputed research journals.

## Acknowledgement

- We render our gratitude to the Correspondent, Director, and Principal of VIIT, Hyderabad, India for their encouragement to implement OBE framework.

## Design of CBT Methodology

<b>Course System</b>	Linear and Digital Integrated Circuits
<b>Course Objectives</b>	Acquire a working knowledge of the characteristics and applications of integrated circuits. This includes basic ICs, op-amp, the most common circuit configurations for active devices and their use in various applications. This course is a bridge between basic electronics and IC applications.
<b>Prerequisites</b>	1. A. Basic Electronics, Basic Physics, Linear Integrated Circuits, and analog, digital, and microprocessor fundamentals. B. ICs, A/D and D/A converters, and microprocessors. The design and analysis of integrated circuits.
<b>Prerequisite Test</b>	1. A. Basic Electronics, Basic Physics, Linear Integrated Circuits, and analog, digital, and microprocessor fundamentals. B. ICs, A/D and D/A converters, and microprocessors. The design and analysis of integrated circuits.
<b>Course Objectives</b>	1. To understand the characteristics and applications of linear integrated circuits and op-amp circuits. 2. To understand the characteristics and applications of digital integrated circuits and microprocessors. 3. To understand the characteristics and applications of microprocessors and microcontrollers.
<b>Course Outcomes</b>	1. To understand the characteristics and applications of linear integrated circuits and op-amp circuits. 2. To understand the characteristics and applications of digital integrated circuits and microprocessors. 3. To understand the characteristics and applications of microprocessors and microcontrollers.
<b>Computer Based Course Learning Outcomes</b>	By the end of the course students will be able to do the following: 1. Acquire a working knowledge of the characteristics and applications of integrated circuits. 2. Acquire a working knowledge of the characteristics and applications of linear integrated circuits and op-amp circuits. 3. Acquire a working knowledge of the characteristics and applications of digital integrated circuits and microprocessors. 4. Acquire a working knowledge of the characteristics and applications of microprocessors and microcontrollers.
<b>Course Coordinator</b>	M. Rajendra Prasad

## Computer-Based Teaching Methodology At Vidya Jyothi Institute of Technology



## Results & Discussions

- The OrCAD PSpice simulator is used for Linear and Digital Integrated Circuit Application.
- Micro-Processors & Micro-Controller is done using Keil uVision software.
- Embedded systems are experimented on the ARM processors.
- These helped the students to learn the concepts and analyze them easily.

## WAVEFORM GENERATOR:

**Simulation:**

**Practical:**

## CBTM for Traffic signaling Application



# Project Based Teaching Methodology for Embedded Engineering Education

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## Abstract

- An Embedded System is an integration and combination of customized hardware and optimized software designed for a specific function running continuously.
- Project based active learning teaching methodology is essential in the area of Embedded System Engineering Education (ESEE) at under graduate level.
- This poster describes about the Embedded System Engineering course and Micro Processors and Micro Controllers course.
- This poster also discusses the results for the case study projects for the above mentioned courses.
- This teaching methodology is applied for ARM9 processor based embedded system development project used for telecom applications and the outcome of these courses are explained with results.

## Methodology

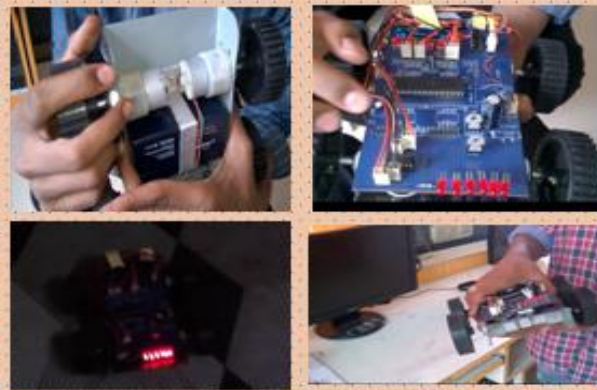
- Before starting to teach any course in engineering education, Instructor should identify active learning topic, methods and areas those can be enhanced to in-house project level implementation in the same semester or year.
- These courses are aimed at more senior undergraduates to synthesize their knowledge acquired from multiple prerequisite courses, and to facilitate their ability to realize ambitious real-world projects in a short time.
- The following methodology is used to maximize the teaching potential of engineering education in Embedded System Engineering and Micro Processor based application development courses.
- The following are the main steps for implementing project based teaching methodology for any course in the engineering education.



## Results & Discussions

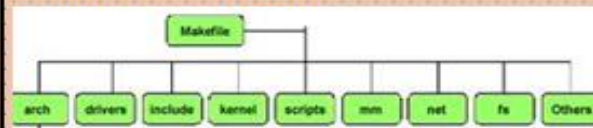
- Project Based Learning is implemented on the Micro Processors and Micro Controllers course.
- Designed a Robot with night vision capability using RF.
- Project Based Learning is also implemented for the Embedded system course.
- The outcome of the Embedded System course is a research paper presented in National Conference on Communications, Signal Processing and Systems- NCCSPS-2014.

## Students Demonstrating Project



## PBL for Embedded system

### > Linux Kernel Source tree



### > Configuration of Kernel for ARM mini 2440



### > Menu config for mini2440 kernel



### > Message showing zImage is ready



### > Booting the kernel on ARM920T Board



### > Project Based Research paper at NCCPS-2014



## Conclusion

- This poster describes an effective project-based teaching methodology developed at the Department of Electronics and Communication Engineering, Vidya Jyothi Institute of Technology, Hyderabad, India to teach a Embedded System course and Micro Processor and Micro Controller Courses. This methodology gives students to learn concepts and course contents actively. After this course with the project based learning methodology students are able to not only design a customized embedded system but also able to present their project as a research paper at International/National Conferences or well reputed research journals.

## Acknowledgement

- We would like to thank the Correspondent, the Director and the Principal of Vidya Jyothi Institute of Technology, Affiliated to JNTU-Hyderabad, for their support in presenting this paper at the International Conference.