

**Research/Technical Note**

# Learning of Embedded System Design, Simulation and Implementation: A Technical Approach

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**Abstract:** Learning embedded system design, simulation and implementation opens a new paradigm in developing practical laboratory experiments for embedded based systems. This paper showcases method of learning system circuit design with the use of simulation computer aided design tools like proteus virtual system modelling (PVSM), multism and Tiny CAD. In order to demonstrate this procedure on how virtual microcontroller-based circuit experiments were carried out in the laboratory, PIC16F887 chip was used as the major logic component. Several practical on hands-experiment were demonstrated with the aid of PVSM, and the result of each experiment performed were displayed with snapshot. Although, the intent of this paper is to put forward a technical approach for learning and engaged students in practices, expert in the progression of learning embedded system courses. This hands-on experiment will be an added advantage besides the class room teaching of students, and allows hobbyist, professional scientist and engineers to design and analyze the system design before building a prototype on learning breadboard and before ever making final packaging.

**Keywords:** Embedded System, Simulation, Microcontroller, Paradigm, Snapshot

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## 1. Introduction

Gobally, students tend to be less intrested in courses involving embedded systems, due to the less technical and practical experiece they have gotten over the years. The limited experts in embedded systems as well has inadequate resources such as the hardware and software development tools which account for the loss of interest. In spite of these difficulties, today student can step into the area of embedded systems by (learn-while doing) undertaking certain simple in-house experiments with frequent practices on microcontroller-based electronics circuit design and simulation using Computer Aided Design (CAD) Tools such as the Proteus Virtual System Modelling (PVSM), multism, TinyCAD, Hamburg Design System (HADES), Quite Universal Circuit Simulator (QUCS), FidoCadJ tools [1,9]. However, it is pertinent that beginers and young desingers can

adopts a step by step or bottom to top approach of learning, which would ease the learning and understanding of simple embedded system design [2-4].

PVSM is an innovative design and simulation software tool for science and engineering professional. The PVSM, likewise other tools of its kind are very versatile and robust in nature for automated circuit designs [5]. The versatility of this tool tends beyond the use for only simulation but also aids the testing and troubleshooting of the circuitry at various stages/level of development for learning while doing laboratories exercises for advanced purposes. This tool (PVSM) is suitable for the applications of engineering electronics circuit design in the "learn-while doing" laboratory exercises in the courses like embedded system, microprocessor and microcontroller system, control engineering and digital system.

The application of these CAD software tools in the engineering and technical design would facilitate the