

EMBEDDED SYSTEM

Submitted in partial fulfillment of the requirements for the completion of

PROFESSIONAL TRAINING

By

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

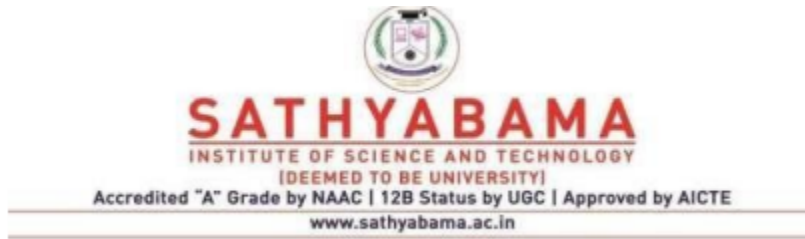
INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

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OCTOBER 2023



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this INTERNSHIP Report is the bonafide work of SNEKHA R(41140085)who have done the Internship in

" ADVENTURE TECHNOLOGY SOLUTION PVT LTD"who carried out the

Internship entitled "EMBEDDED SYSTEMS " from 15TH May 2023 to 19TH May 2023.

A handwritten signature in blue ink, appearing to read "Dr. Radhika".

Dr. Radhika M.E.,Ph.D.

Head of the Department

Submitted for Viva voce Examination held on_____

A handwritten signature in blue ink, appearing to read "S. Sankar".

Internal Examiner

A handwritten signature in blue ink, appearing to read "Chh".

External Examiner

DECLARATION

I am **R.SNEKHA(41140085)** declare that the Internship Report entitled “**EMBEDDED SYSTEMS**” done under the company of” **ADVENTURE TECHNOLOGY SOLUTION PVT LTD**” in Degree of Bachelor of Engineering in Electrical and Electronics Engineering.

1.

DATE:

PLACE:

A handwritten signature in black ink that reads "Sneekha". The letters are cursive and connected, with a stylized 'S' at the beginning and a 'k' that has a long horizontal stroke.

SIGNATURE OF CANDIDATE

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LIST OF SYMBOLS AND ABBEREVIATIONS

V_c	Cutting speed (mm/sec)
N	Spindle speed (rpm)
V_c	Penetration rate (mm/sec)
F_n	Feed per revolution (mm/rev)
MRR	Metal Removal Rate (Q)
M_c	Torque (N/m)
T_c	Machining Time (sec)
A_e	Axial depth of cut (mm)
A_p	Radial depth of cut (mm)
R_a	surface roughness factor
L	length of cut (mm)
D	diameter (mm)
F_x	Tangential Force (N)
F_t	Thrust Force (N)

CHAPTER 1

INTRODUCTION ABOUT THE COMPANY

"Adventure Technology solutions providing Engineering R&D services, Developing Engineering Projects, Internships, Training & Placement assistance, Technology consulting and product development for engineering students and clients. We are also offering Software Training, Embedded system Training, Engineering projects, Software Development and Embedded Products Development At Adventure, innovation is not just another word, it's part of our organizational heritage. We strongly believe that empowering education can change society's ecosystem tremendously. For empowerment of engineering students and graduates we are transferring the knowledge through Training and engineering projects solutions with R&D services."

1.1 VISION OF THE COMPANY:

"To Make Education empowerment and enrich people's lives through knowledge transformation and technology Innovations"

"Every block of stone has a statue inside it and it is the task of sculpture to discover it – Adventure does"

1.2 MISSION OF THE COMPANY:

Create Technical Innovations with engineering projects, Make our products sustainably. Adventure build creative inventions to discover and to make positive impact in education system through training and development.

CHAPTER 2

NATURE OF WORK DONE

1. EMBEDDED SOFTWARE DEVELOPMENT: Writing code for micro controllers or processors, implementing device drivers, and optimizing software performance.
2. HARDWARE DESIGN: Designing and prototyping electronic circuits, selecting components, and ensuring proper functionality and integration with software.
3. SYSTEM INTEGRATION: Integrating hardware and software components, ensuring compatibility, and troubleshooting any issues that arise.
4. TESTING AND VALIDATION: Conducting tests to verify the functionality and reliability of embedded systems, debugging and resolving any issues, and ensuring compliance with industry standards.
5. REAL-TIME SYSTEMS: Working with systems that require precise timing and synchronization, such as those used in robotics, automotive applications, or industrial control.
6. IOT AND CONNECTIVITY: Developing embedded systems that connect to the internet, enabling communication and data exchange with other devices or cloud services.

CHAPTER – 3

METHODS AND PROCESSES

1. EMBEDDED SYSTEM DESIGN: This course covers the fundamentals of embedded systems, including hardware and software design principles, real-time operating systems, and interfacing with peripherals.
2. MICROCONTROLLER AND PROGRAM: This course focuses on programming micro controllers, understanding their architecture, and implementing embedded software using programming languages like C or assembly.
3. DIGITAL ELECTRONICS: This course teaches the basics of digital logic design, combination and sequential circuits, and how to design and analyze digital systems.
4. REAL-TIME SYSTEMS: This course delves into the concepts of real-time computing, including task scheduling, synchronization, and communication in time-critical embedded systems.
5. EMBEDDED SYSTEMS TESTING AND VALIDATION: This course explores various testing techniques and methodologies specific to embedded systems, ensuring the reliability and robustness of the developed systems.

CHAPTER – 4

KNOWLEDGE AND EXPERIENCE

I gained in-depth knowledge of hardware and software integration, micro-controllers, and low-level programming. This expertise can lead to rewarding career opportunities in industries like automotive, aerospace, and consumer electronics. Sensors measure the physical quantity and convert it to an electrical signal which can be read by an observer or by any electronic instrument like an A2D converter. A sensor stores the measured quantity to the memory. The experience which I got during this internship period can be applied in real-world projects, collaborate with industry experts, and develop a deep understanding of the field. This hands-on experience will make you more confident and competent in your work. Experience in embedded systems can really enhance your skills and knowledge. It gives you the chance to work on real-world projects and collaborate with experts in the field. This practical experience will make you more confident and capable in your work.

4.1 EMBEDDED SYSTEMS:

An embedded system is a combination of computer hardware and software designed for a specific function. Embedded systems may also function within a larger system. The systems can be programmable or have a fixed functionality. Industrial machines, consumer electronics, agricultural and processing industry devices, automobiles, medical equipment, cameras, digital watches, household appliances, airplanes, vending machines and toys, as well as mobile devices, are possible locations for an embedded system. While embedded systems are computing systems, they can range from having no user interface (UI) -- for example, on devices designed to perform a single task -- to complex graphical user interfaces (GUI), such as in mobile devices. User interfaces can include buttons, LED (light-emitting diodes) and touchscreen sensing. Some systems use remote user interfaces as well.

4.1.1 SYSTEM DESIGN:

A system is an arrangement in which all its unit assemble work together according to a set of rules. It can also be defined as a way of working, organizing or doing one or many tasks according to a fixed plan. For example, a watch is a time displaying system. Its components follow a set of rules to show time. If one of its parts fails, the watch will stop working. So we can say, in a system, all its sub components depend on each other.

4.1.2 CHARACTERISTICS OF EMBEDDED SYSTEM:

- **Single-functioned** – An embedded system usually performs a specialized operation and does the same repeatedly. For example: A pager always functions as a pager.
- **Tightly constrained** – All computing systems have constraints on design metrics, but those on an embedded system can be especially tight. Design metrics is a measure of an implementation's features such as its cost, size, power, and performance.
- **Reactive and Real time** – Many embedded systems must continually react to changes in the system's environment and must compute certain results in real time without any delay. Consider an example of a car cruise controller; it continually monitors and reacts to speed and brake sensors.
- **Microprocessors based** – It must be microprocessor or micro controller based.
- **Memory** – It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer.
- **Connected** – It must have connected peripherals to connect input and output devices.

4.1.3 EXAMPLES OF EMBEDDED SYSTEM:

1. SMARTWATCHES: Smartwatches are wearable devices that incorporate embedded systems to provide features like fitness tracking, notifications, and even standalone apps.
2. HOME AUTOMATION SYSTEMS: Embedded systems are used in home automation systems to control and monitor various aspects of a smart home, such as lighting, temperature, security systems, and appliances.
3. MEDICAL DEVICES: Many medical devices, like pacemakers, insulin pumps, and blood glucose monitors, rely on embedded systems to accurately monitor and regulate vital functions in patients.
4. AUTOMOTIVE SYSTEMS: Modern cars utilize embedded systems for various functions, including engine control, anti-lock braking systems (ABS), airbag deployment, infotainment systems, and advanced driver-assistance systems (ADAS).
5. DIGITAL CAMERAS: Digital cameras use embedded systems to control image processing, autofocus, exposure settings, and other features, allowing users to capture and store high-quality photos and videos.

4.1.4 STRUCTURE OF EMBEDDED SYSTEMS:

- **Sensor** – It measures the physical quantity and converts it to an electrical signal which can be read by an observer or by any electronic instrument like an A2D converter. A sensor stores the measured quantity to the memory.
- **A-D Converter** – An analog-to-digital converter converts the analog signal sent by the sensor into a digital signal.
- **Processor & ASIC** – Processors process the data to measure the output and store it to the memory.
- **D-A Converter** – A digital-to-analog converter converts the digital data fed by the processor to analog data
- **Actuator** – An actuator compares the output given by the D-A Converter to the actual (expected) output stored in it and stores the approved output.

4.1.5 C LANGUAGE IN EMBEDDED SYSTEMS:

C language is commonly used in embedded systems because it offers low-level control, efficient memory usage, and direct hardware access. It allows developers to write code that interacts closely with the hardware components of the system. This makes it a popular choice for programming microcontrollers and other embedded devices.

4.1.6 FUTURE SCOPE:

The industry for embedded systems is expected to continue growing rapidly, driven by the continued development of Artificial Intelligence (AI), Virtual Reality (VR) and Augmented Reality (AR), machine learning , deep learning, and the Internet of Things (IOT) The cognitive embedded system will be at the heart of such trends as: reduced energy consumption, improved security for embedded devices, cloud connectivity and mesh networking, deep learning applications, and visualization tools with real time data. According to a 2018 report published by QY Research, the global market for the embedded systems industry was valued at \$68.9 billion in 2017 and is expected to rise to \$105.7 billion by the end of 2025.

4.1.7 MERITS :

Embedded systems offer compact size, real-time capabilities, energy efficiency, customization, and reliability. They enable the development of small devices, quick response times, long battery life, tailored functionalities, and robust operation in various industries.

DEMERITS:

Their limited flexibility for future upgrades or modifications. Once an embedded system is designed and implemented, it can be challenging to make significant changes or add new features without significant effort or cost. Additionally, the specialized nature of embedded systems can make them more complex to develop and maintain compared to general-purpose systems.

CHAPTER 5

CONCLUSION

The total period while I worked Adventure Technology solutions was very pleasant. It will help me a lot in future life. During This period of time learned about how to execute an Embedded project. This gave me a lot more insights about the embedded systems and IOT system. An embedded system is a microprocessor-based computer hardware system with software that is designed to perform a dedicated function, either as an independent system or as a part of a large system. At the core is an integrated circuit designed to carry out computation for real-time operation