KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

SKILL LABS

FOR

II Semester CSE Students

DEPARTMENT OF

Computer Science and Engineering

KLS GOGTE INSTITUTE OF TECHNOLOGY

Software Testing Concepts and Tools

FOR

Students of II Semester

Overview

Testing is critical to the process of software development. The importance of software testing stems from multiple Key factors are : 1. Risk Mitigation , as it helps to identify and fix any errors or bugs within the code prior to launch which reduces project risks related to quality, security, performance, etc. Testing shows the presence of defects. Today, web application development companies use a wide variety of technologies and processes to control their software testing lifecycle 2. Assures Quality of the product 3. Checks for Satisfaction of the customer 4. Determining the performance of the software 5. Ensures Security 6. Enhancing the development process 7. The main aim for doing software testing is to find errors, gaps, or missing requirements in contrast with the actual requirements.

Mode of Conduction of each Module

Theory: 26 Hours
Lab sessions: 10 Hours
Total duration: 36 Hours
Certification exam: 3 Hours

Module 1: (6 hours)

A Perspective on Testing:

Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Approaches of software testing.

Examples: The triangle problem, The NextDate function, The commission problem.

Module 2: (10 hours)

Boundary value analysis :

Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Guidelines for Boundary Value Testing

Equivalence Class Testing:

Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.

Module 3: (10 hours)

Decision Table–Based Testing:

Decision tables, Test cases for the triangle problem. Decision tables for NextDate function, and the commission problem, Guidelines and observations.

Path Testing, Data Flow Testing:

DD paths, Test coverage metrics, Basis path testing, guidelines and observations

Module 4:(10 hours)

Demonstration of Testing through programming (C/Python) (8 Programs).

Using Selenium tools to test the web applications.

Text books:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008.
2. Aditya P. Mathur: Foundations of Software Testing, Pearson Education, 2008.
3. Srinivasan Desikan, Gopalaswamy Ramesh: Software testing Principles and Practices, 2nd Edition, Pearson Education, 2007.

https://onlinecourses.nptel.ac.in/noc22_cs61/preview

Coordinator:

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Main objectives of Testing Software are:

1. Verification and Validation of the software
2. Identification of Defects
3. Defects Prevention
4. Ensuring Quality Attributes in the Product
5. Risk Management

- List the outcomes of the Skill lab offered by your department.
  1. Describe and determine the purpose and importance of a software testing in project development life cycle.
  2. Prepares to provide product realization that is both reliable and effective, thus of high quality.
  3. Define and evaluate Quality assurance measures.
  4. Reduced Development Costs in terms of time and money
  5. Verifying that what was specified is what was delivered
- In what way will it benefit the students.
  The following industry relevant competency skills are expected to be developed among the students:
  1. Design test suites for different problems
  2. Exercise the programs against the test suites written. Validate and Verify the result.
  3. Learn about different online freely available testing tools
  4. Study how Selenium tool will be used for testing Web applications
- Career prospects
  1. Students shall develop Testing skills as expected by industries
  2. Students can develop a skill to able to manage and address project risk before launching.
  3. Have expert knowledge of the project management tools, techniques, and methodologies.

Acceptance

In order to accept and start the training program, students are required to register with the respective department. Details to be provided by the student to the department include: **Name, USN, UID, Mobile No, Email id**

Terms and Conditions

- Only students who have paid a skill lab fee to the institution are eligible for the training.
- The students must maintain 90% attendance for obtaining the skill lab certificate.
- Students must attend training as per scheduled time

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SKILL LAB

FOR

2 nd -Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering .

KLS GOGTE INSTITUTE OF TECHNOLOGY

Software Tools and Techniques

FOR

Students of 2 nd Semester

Overview

- This 36-hour hands-on course immerses students in the world of software tools, equipping them with essential skills for modern tech environments. Key highlights:
- Core Concepts: Dive into the fundamentals of software development, covering basic concepts such as version control, debugging, and deployment.
- Tool Mastery: Gain practical experience with widely-used software tools like Git, Docker, Jenkins, and IDEs (Integrated Development Environments).
- Application and Integration: Learn to apply theoretical knowledge in real-world scenarios, understanding how software tools interact and support the development lifecycle.
- Practical Mini Projects: Implement and design software solutions through hands-on projects that reinforce learning and encourage innovation.
- Problem-Solving Skills: Develop critical problem-solving skills by tackling design, testing, and troubleshooting challenges.

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**3 Hours**

Module 1:	**Module 2:**
Introduction to LinkedIn, GitHub, Kaggle, Google form, Google classroom, Google sheet, usage of Google drive	**MS Excel** - Filling, Logical functions, Functions and formulae, Sort and filters, Charts, Shortcuts
Module 3:	**Module 4**
MS Word - Quick styles, Template usage, Graphics use, Auto correction, Auto formatting, Translate documents, Compare documents, Document security, Set watermark, Report writing	**MS Access** - Orientation to access, Working with table data, Querying a database

MS PowerPoint - Power Point - Introduction of templates Power Point - Creating a Basic Presentation Introduction to the different options available for creating your presentation	

Coordinator

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Outcomes:

Outcomes of Skill Lab: Software Tools

- Enhanced Skills: Mastery of crucial software tools and development practices.
- Practical Experience: Hands-on mini projects that solidify learning through real-world application.
- Problem-Solving Abilities: Development of critical thinking and troubleshooting skills.
- Industry Relevance: Understanding of how software tools are used in modern tech environments, from IoT to automation.
- Career Readiness: Equipping students for roles in software development, DevOps, IoT, and more.
- Innovation and Prototyping: Encouraging a mindset geared towards rapid development and innovative solutions.

Acceptance

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SKILL LAB

FOR

3rd Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering

KLS GOGTE INSTITUTE OF TECHNOLOGY

Computer Hardware and Networking Skill Lab

FOR

Students of 3rd Semester

Overview

A **Computer Hardware and Networking Skill Lab** is an essential facility for students and professionals to gain hands-on experience with the foundational components of computing and communication systems. The lab focuses on training individuals in the assembly, maintenance, troubleshooting, and networking of computers and related devices.

- Computer Hardware
- Operating System Installation & Configuration
- Networking Fundamentals
- Network Configuration and Setup
- Troubleshooting and Maintenance

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**1 Hour**

Module 1: Introduction to basic computer hardware	Module 2: To assemble and disassemble computer hardware
• **Basic Components:** • Motherboard, CPU, RAM, Power Supply, Hard Drive, SSD, Cooling System • **Input/output Devices:** • Keyboards, Mice, Monitors, Printers, Scanners • **Peripheral Devices:** • External Storage, USB Devices, Network Adapters, Expansion Cards • server, routers, fiber cable, Hard disk, RAM, CMOS battery, SMPS, cache, ROM, BIOS.	**Assembly and Disassembly:** • Assembling a personal computer from parts, installing components like RAM, CPU, and hard drives • **Firmware and BIOS Setup:** • Understanding BIOS/UEFI, configuring boot order, updating firmware • **Storage Devices:** • Installing, partitioning, and formatting hard drives and SSDs • **Power Supply and Safety:** • Power supply units (PSU), voltage, and hardware safety precautions

Module 3: To install different operating systems with dual boot	**Module 4: Introduction to computer networks and its components**

• **Windows OS Installation:**
  • Installing Windows, drivers, and basic system configuration
• **Linux OS Installation:**
  • Installing popular Linux distributions (Ubuntu, CentOS, etc.), dual-boot configuration
• **Operating System Management:**
  • Disk management, user account setup, OS updates, and patches
• **Command-Line Tools:**
  • Windows Command Prompt, PowerShell, and Linux Terminal basics
	• **Networking Basics:**
	  • Understanding LAN, WAN, MAN, Internet, and Intranet concepts
	• **Network Devices:**
	  • Routers, Switches, Modems, Access Points, Network Interface Cards (NICs)
	• **Cabling and Connectors:**
	  • Ethernet cables (Cat5, Cat6), coaxial cables, fiber optic cables, RJ-45 connectors
	• **IP Addressing:**
	  • IP addressing schemes (IPv4 and IPv6), subnetting, and address classes
	• **Network Protocols:**
	  • TCP/IP, DNS, DHCP, HTTP/HTTPS, FTP, SSH, Telne

Coordinator

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Outcomes:

Outcomes of Skill Lab: Computer Hardware and Networking Skill Lab

1.Practical Hardware Knowledge

- Ability to identify and assemble key components of a computer (e.g., CPU, RAM, motherboard).
- Competence in troubleshooting hardware issues and performing repairs or upgrades.

2. Proficiency in Operating Systems

- Mastery in installing, configuring, and managing different operating systems (Windows, Linux, macOS).
- Ability to optimize OS performance and troubleshoot system-related problems.

3. Network Design & Configuration Skills

- Hands-on experience in setting up LANs, WANs, and wireless networks.
- Proficiency in configuring network devices such as routers, switches, and firewalls.

4. Network Troubleshooting Abilities

- Capacity to diagnose and fix common network issues, such as connectivity problems, IP conflicts, and performance bottlenecks.

5. Career Readiness

- Preparedness for job roles such as network engineer, system administrator, IT support technician, and cybersecurity analyst.
- Exposure to skills relevant for advanced careers in cloud infrastructure, IoT, and data center management.

9. Cross-disciplinary Collaboration

- Ability to work with software developers, data engineers, and cybersecurity experts to create secure, efficient systems.
- Interdisciplinary skills applicable to IT, electronics, and telecommunications.

10. Foundation for Certifications

- Lab experience prepares students for professional certifications such as **CompTIA A+**, **Network+**, **CCNA (Cisco Certified Network Associate)**, and **Microsoft Certified IT Professional (MCITP)**.

Acceptance

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SKILL LAB

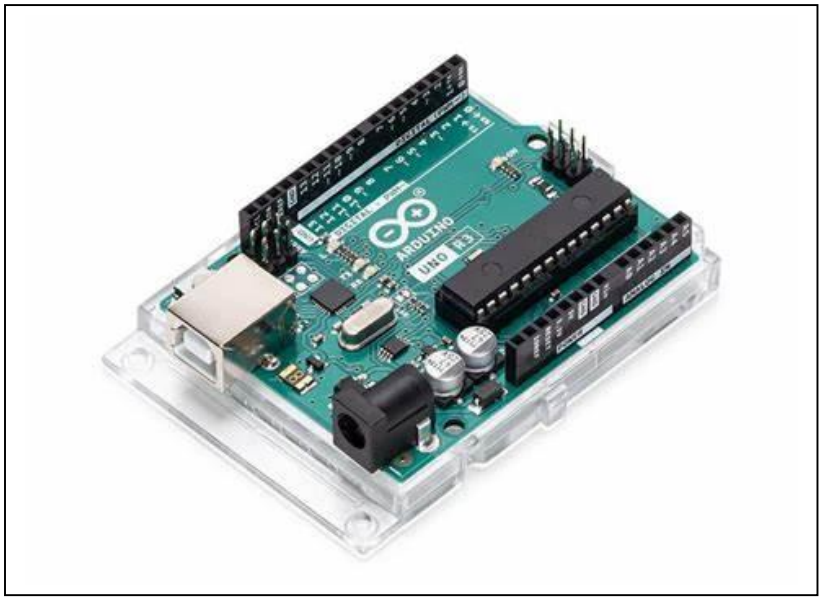
FOR

3rd Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering .

KLS GOGTE INSTITUTE OF TECHNOLOGY



Introduction to Arduino UNO for Beginners

FOR

Students of 3rd Semester

Overview

- **36-hour hands-on course** introduces students to embedded systems using Arduino UNO.
- Covers **basic hardware/software concepts**, sensor interfacing, communication protocols, and IoT applications.
- Students gain **practical experience** in designing and implementing embedded systems through mini projects.
- **Bridges the gap between software and hardware**, teaching students how they interact in real-world devices.
- Helps students **apply theoretical knowledge** from electronics, control systems, and programming.
- Develops **problem-solving skills** through design, testing, and troubleshooting.
- Introduces students to **IoT applications**, enabling sensor integration and internet connectivity.
- Encourages **prototyping and rapid development**, preparing students for innovation in industries.
- Explores **automation and smart devices** in home automation, smart agriculture, and industry 4.0.
- Equips students with skills for careers in **embedded systems, IoT development**, and **prototyping roles**.

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**3 Hours**

Module 1: Getting Started with Arduino UNO (9 hours)	Module 2: Sensor Integration and Data Acquisition (9 hours)

• **Introduction to Embedded Systems and Arduino**:
  ○ Basics of embedded systems and microcontrollers.
  ○ Overview of Arduino UNO hardware, pin configuration, and features.
  ○ Installation and setup of Arduino IDE, writing and uploading first sketch (program).
• **Digital I/O Fundamentals**:
	• **Working with Sensors**:
	  ○ **Temperature and Humidity Sensor (DHT11)**: Capturing environmental data.
	  ○ **Light Sensor (LDR)**: Measuring ambient light intensity.
	  ○ **Ultrasonic Sensor**: Distance measurement and object detection.

○ Controlling LEDs with digital outputs. ○ Using push buttons with digital inputs. • **Basic Programming Concepts**: ○ Understanding loops, conditionals, and variables.	• **Analog vs. Digital Sensors**: Understanding sensor data collection and its significance. • **Data Processing and Visualization**: ○ Reading and interpreting sensor data. ○ Displaying sensor data on serial monitor. ○ Introduction to plotting data on simple tools (e.g., Arduino serial plotter).
Module 3: Actuators and Communication (9 hours)	**Module 4: IoT Basics and Real-World Project (9 hours)**
• **Controlling Actuators**: ○ **Relays**: Switching high-power devices (e.g., home appliances). ○ **Servo Motors**: Controlling angles and rotation for robotics applications. ○ **DC Motors**: Driving motors with Arduino using motor drivers. • **Basic Communication Interfaces**: ○ **Serial Communication**: Sending and receiving data between Arduino and a PC. ○ **Bluetooth Communication**: Wirelessly controlling Arduino with mobile devices (using HC-05 module). • **Project: Simple Automation**: ○ Creating a basic smart appliance control system using relays, sensors, and actuators.	• **Introduction to IoT**: ○ Understanding the role of IoT in modern applications. ○ Overview of cloud platforms and how devices connect to the cloud. ○ Introduction to ESP8266/ESP32 WiFi modules for Arduino. • **Connecting Arduino to the Internet**: ○ Sending sensor data to cloud platforms (e.g., ThingSpeak). ○ Building a basic IoT system for remote monitoring. • **Final Project**: ○ Developing a real-world application that solves a problem using Arduino, sensors, actuators, and cloud connectivity. ○ Documentation and presentation of the project.

Coordinator

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Outcomes:

Outcomes of Skill Lab: Introduction to Arduino UNO

Hands-on Experience: Students will gain practical skills in programming the Arduino UNO and interfacing it with various sensors and actuators.

- **Project Development:** Learn to design and implement real-world IoT applications.
- **Problem-Solving:** Develop analytical skills for troubleshooting and optimizing embedded systems.

Benefits for Students:

- Enhanced understanding of microcontroller-based systems.
- Improved ability to prototype hardware projects.
- Exposure to IoT and smart systems.

Career Prospects:

- Embedded Systems Engineer
- IoT Developer
- Hardware/Software Integration Specialist
- Robotics Engineer

Acceptance

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SKILL LAB

FOR

3rd Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering .

KLS GOGTE INSTITUTE OF TECHNOLOGY

Overview

- A 36-hour hands-on lab on web technology will provide students with a **comprehensive, practical introduction to the core aspects of web development**.
- Students will be able to **develop, structure and style websites**.
- This will enable students to create **interactive, dynamic and responsive designs** that will adapt on different devices(mobile devices, computers and tablets etc.)
- Helps students to explore and design websites for real world arenas.
- With this fundamental concepts, students can explore the world of web development and equip themselves with the advanced technologies that are being used presently .
- It will help the students to explore different frameworks to develop and create respoinsive websites.

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**3 Hours**

Module 1: Introduction to Web Development and HTML(9 hours)	Module 2: CSS (Cascading Style Sheets) (9 hours)

• **Introduction to Web Development:**
  ○ Overview of Web Development
  ○ What is web development?
  ○ Understanding the difference between front-end and back-end.
  ○ Tools and technologies used in web development.
• **HTML (HyperText Markup Language:**
  ○ Getting Started with HTML
  ○ Structure of an HTML document.
	• **Introduction to CSS:**
	  ○ What is CSS and how does it work with HTML?
	  ○ CSS syntax, selectors, and properties**.**
	• **Styling Text and Layout****
	  ○ Fonts, colors, and backgrounds.
	  ○ Box model and spacing (margin, padding).
	• **CSS Layout Techniques:**

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Common HTML tags (headings, paragraphs, lists, links).

HTML Elements and Attributes:

Images, audio, and video embedding.
Using attributes (href, src, alt, etc.).

Forms and Input Elements:

Creating forms with input types (text, radio, checkbox, etc.).
Form validation and attributes (required, placeholder).

Semantic HTML:

Understanding semantic elements (header, footer, article, section).
- Importance of accessibility and SEO.

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Flexbox: layout and alignment.
CSS Grid: creating grid layouts.

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<td>Module 3: JavaScript (JS) (9 hours)</td>
<td>Module 4: Final Project (9 hours)</td>
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Introduction to JavaScript

What is JavaScript and its role in web development?
Variables, data types, and operators.

Functions and Control Structures:

Defining functions and scope.
Conditional statements (if, switch) and loops (for, while).

Working with the DOM:

Understanding the Document Object Model (DOM).
Selecting and manipulating DOM elements.

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Project Planning

Brainstorming project ideas.
Structuring the project and dividing tasks.

Project Development

Hands-on coding session.
Implementing HTML, CSS, and JavaScript.

Project Presentation and Review

Presenting projects to peers.
Feedback and discussion.

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• **Event Handling:**
 	
  ○ Understanding events and event listeners.
  ○ Creating interactive web pages (click events, form submission).	

Coordinators:

Name	**Dr. Kuldeep S**	**Prof. Seena Kalghatgi**	**Prof. Veena Kangralkar**	**Prof. Namitha Bhat**
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Outcomes:

Outcomes of Skill Lab: Introduction to Web Development

Hands-on Experience
Students will gain practical skills in:

- Building responsive websites using HTML, CSS, and JavaScript.

Project Development

- Learn to design and develop web pages.

Problem-Solving

- **Develop analytical skills for debugging and optimizing web applications.**

Benefits for Students:

- Enhanced Understanding: Gain a strong foundation in web technologies and development processes.
- Prototyping Skills: Improve abilities to create and iterate on web projects quickly.
- Exposure to Web Trends: Stay updated on current trends in web development.

Career Prospects

Graduates can explore diverse career paths, including:

- Front-End Developer: Specializes in creating user interfaces and experiences.
- Back-End Developer: Focus on server-side logic and database management.
- Full-Stack Developer: Work on both front-end and back-end development.
- Web Designer: Combine design and technical skills to create visually appealing websites.

Acceptance

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Terms and Conditions

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Advanced Design and Automation Tools

Detailed Syllabus

Module 1: Getting Started with Figma and FigJam
Introduction to design tools and user interface.
Working with frames, shapes, and layers.
Collaborative brainstorming and planning using FigJam.
Creating wireframes and layouts for multiple devices (phone, tablet, desktop).

Module 2: Advanced Figma Features and Prototyping
Designing reusable components and UI elements.
Using layout grids and constraints for responsive design.
Interactive prototyping: adding transitions and animations.
Creating prototypes for various devices and real-time collaboration.

Module 3: Introduction to JIRA and Agile Project Management
Overview of JIRA for software project management.
Creating and managing tasks, user stories, and sprints.
Using JIRA boards: Kanban and Scrum.
Introduction to Agile methodology and sprint planning.

Module 4: Advanced JIRA Features and Workflow Automation
Configuring JIRA workflows, transitions, and task dependencies.
Sprint execution and tracking with dashboards and reports.
Automating tasks and notifications in JIRA.
Final project presentation: integrating Figma designs with JIRA project management.

Outcomes

- Enhanced understanding of UI/UX design and prototyping using Figma.
- Improved ability to create responsive designs for multiple devices.
- Practical experience in project management and task tracking using JIRA.
- Exposure to agile methodologies and workflow automation in real-world projects.

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SKILL LAB

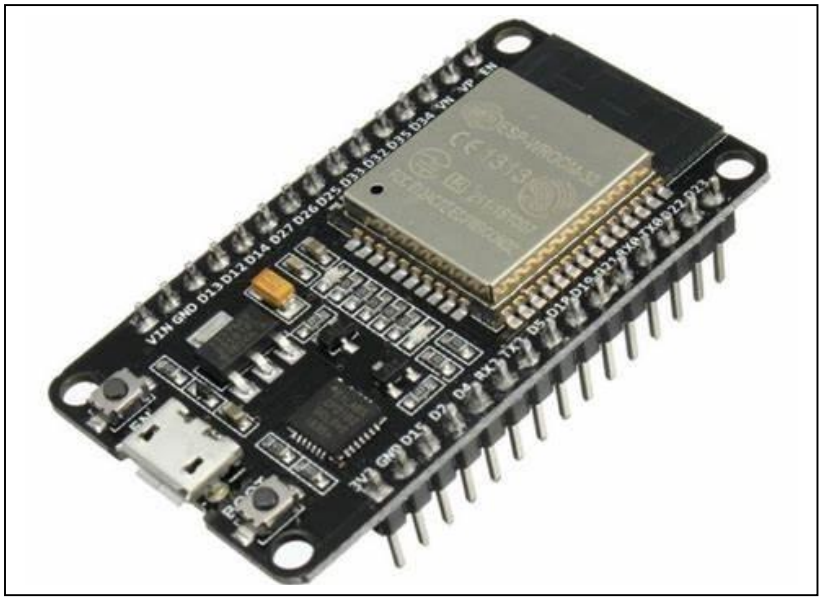
FOR

5th Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering .

KLS GOGTE INSTITUTE OF TECHNOLOGY



ESP32 Beginner Booster

FOR

Students of 5th Semester

Overview

- **Introduction to ESP32**: Familiarize students with ESP32's features, including dual-core processing, Wi-Fi, Bluetooth, GPIO, ADC, and DAC capabilities.
- **Development Environment Setup**: Guide students in setting up the ESP32 board with Arduino IDE and ESP-IDF, enabling them to write, upload, and debug code for their projects.
- **GPIO Control**: Teach basic digital and analog input/output operations, allowing students to control LEDs, buttons, and sensors.
- **Sensor Integration**: Introduce interfacing of sensors like DHT11, LDR, and analog/digital devices to collect real-time environmental data.
- **Actuator Control**: Implement control of DC motors, servos, and relays using Pulse Width Modulation (PWM) for home automation and robotics applications.
- **Wireless Communication**: Explore Wi-Fi and Bluetooth/BLE capabilities for IoT applications, including setting up a web server and using MQTT for cloud communication.
- **Mini Projects**: Encourage students to apply their skills in real-world projects, such as smart home systems, weather monitoring, and wireless device control.
- **Final Assessment & Presentation**: Students will develop and present a functional project, demonstrating their proficiency in ESP32 programming and IoT system design.

Mode of Conduction of each Module

Theory: **10 Hours** **Demo:** **10 Hours** **Lab sessions:** **16 Hours** **Total duration:** **36 Hours** **Certification exam:** **3 Hours**	
Module 1: Introduction to ESP32 & Setup (9 hours)	**Module 2: Sensors & Actuators Interface (9 hours)**

Session 1: Overview of ESP32 Microcontroller
 	
• **Topics**:
  ○ ESP32 features: Dual-core processor, Wi-Fi, Bluetooth, GPIO, I2C, SPI, ADC, DAC.
  ○ Comparison with other microcontrollers (Arduino, Raspberry Pi).
  ○ ESP-IDF vs. Arduino Core for ESP32.
• **Hands-on**:
  ○ Setting up ESP32 board with Arduino IDE.
	Session 1: Sensor Integration
	
	• **Topics**:
	  ○ Analog and digital sensors.
	  ○ Interfacing temperature, humidity, and light sensors (DHT11, LDR).
	  ○ Using ADC (Analog to Digital Converter).
	• **Hands-on**:
	  ○ Reading temperature and humidity data.
	  ○ Displaying sensor data on the Serial Monitor.

- Blink LED program using built-in LED. **Session 2: Getting Started with ESP32 Programming** **Topics**: - GPIO pin control, digital input/output. - Understanding the ESP32 pinout and power supply. - Basic delay and timing functions. **Hands-on**: - Controlling multiple LEDs. - Push-button interface. **Session 3: Serial Communication & Debugging** **Topics**: - UART communication basics. - Serial Monitor usage for debugging. **Hands-on**: - Sending and receiving data via Serial Monitor. - Debugging simple programs.	**Session 2: Actuators & Output Devices** **Topics**: - Controlling DC motors, servos, and relays. - PWM (Pulse Width Modulation) basics. **Hands-on**: - Controlling motor speed using PWM. - Creating a basic control system with relays and LEDs. **Session 3: Display Interface** **Topics**: - Interfacing LCDs (16x2) and OLED displays (I2C/SPI). - Displaying sensor data on an external display. **Hands-on**: - Displaying live sensor data on LCD or OLED.
Module 3: Wireless Communication & Networking (9 hours)	**Module 4: Mini Projects & Final Assessment (9 hours)**
Session 1: Wi-Fi Setup & Basic Networking **Topics**: - Connecting ESP32 to Wi-Fi. - HTTP requests and simple web server setup. **Hands-on**: - Creating a basic web server to display sensor data.	**Session 1: Project Planning & Development** **Topics**: - Identifying project ideas using ESP32 (home automation, environment monitoring, etc.). - Drafting hardware and software requirements. **Hands-on**:

○ Controlling ESP32 via web interface. **Session 2: MQTT Protocol & Cloud Connectivity** • **Topics**: ○ Introduction to MQTT (Message Queuing Telemetry Transport). ○ Publishing and subscribing to topics for IoT communication. • **Hands-on**: ○ Setting up ESP32 as an MQTT client. ○ Sending sensor data to the cloud using MQTT broker. **Session 3: Bluetooth/BLE Communication** • **Topics**: ○ Introduction to Bluetooth and BLE (Bluetooth Low Energy). ○ Configuring ESP32 for BLE. • **Hands-on**: ○ Sending data over BLE to a mobile device. ○ Controlling ESP32 from a mobile app.	○ Defining the architecture for the project (sensors, actuators, communication). **Session 2: Project Implementation** • **Topics**: ○ Developing, testing, and debugging code for the project. • **Hands-on**: ○ Implementing real-world applications, e.g., smart home automation, weather monitoring, etc. **Session 3: Final Project Presentation** • **Topics**: ○ Presenting project design, code, and results. ○ Peer review and improvement suggestions. • **Assessment**: ○ Individual project evaluations based on functionality, code quality, and innovation.

Coordinator

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Outcomes:

Outcomes of Skill Lab: ESP32 Beginner Booster

- **Hands-on Experience:** The hands-on experience in this course includes practical labs where students interface sensors, control actuators, and build IoT applications using ESP32's Wi-Fi and Bluetooth capabilities. Students will also complete mini-projects, applying their skills to real-world solutions like home automation and environmental monitoring systems.
- **Project Development:** Learn to design and implement real-world IoT applications.
- **Problem-Solving:** Develop analytical skills for troubleshooting and optimizing embedded systems.

Benefits for Students:

- Enhanced understanding of microcontroller-based systems.
- Improved ability to prototype hardware projects.
- Exposure to IoT and smart systems.

Career Prospects:

- Embedded Systems Engineer
- IoT Developer
- Hardware/Software Integration Specialist
- Robotics Engineer

Acceptance

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Terms and Conditions

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- Students must attend training as per scheduled time

KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

SKILL LAB

FOR

5th / 6th Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering

KLS GOGTE INSTITUTE OF TECHNOLOGY

Overview

- A 36-hour hands-on lab on Mobile Application technology will provide students with a **comprehensive, practical introduction to the core aspects of Mobile Application Development**.
- Students will be able to **Identify various concepts of mobile programming that make it unique from programming for other platforms**.
- This will enable students to Critique mobile applications on their design pros and cons
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**3 Hours**

Module 1: Introduction to Android (9 hours)	**Module 2: Android Application Design Essentials (9 hours)**
○ The Android Platform, Android SDK, Eclipse Installation, ○ Android Installation, ○ Building you First Android application, ○ Understanding Anatomy of Android Application, ○ Android Manifest file.	○ Anatomy of an Android applications, Android terminologies, Application Context, Activities, ○ Services, Intents, Receiving and Broadcasting Intents, ○ Android Manifest File and its common settings, Using Intent Filter, Permissions.
Module 3: Android User Interface Design Essentials (9 hours)	**Module 4: Using Common Android APIs (9 hours)**
○ User Interface Screen elements, ○ Designing User Interfaces with Layouts, ○ Drawing and Working with Animation.	• **Project Planning** ○ Brainstorming project ideas. ○ Structuring the project and dividing tasks. • **Project Development** ○ Hands-on coding session. ○ Deploying Android Application to the World • **Project Presentation and Review** ○ Presenting projects to peers. ○ Feedback and discussion.

Coordinators:

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Outcomes:

Outcomes of Skill Lab: Introduction to Mobile App Development

Hands-on Experience:
Students will gain practical skills in:

- Building responsive Mobile Android applications.

Project Development:

- Learn to design and develop android mobile applications.

Problem-Solving:

- Develop analytical skills for debugging and optimizing Mobile App applications.

Benefits for Students:

- Enhanced Understanding: Gain a strong foundation in Mobile Application technologies and development processes.
- Prototyping Skills: Improve abilities to create and iterate on web projects quickly.
- Exposure to Mobile Application Development Tools: Stay updated on current trends in Mobile Application Development.

Career Prospects:

Graduates can explore diverse career paths, including:

Mobile App Developer (Android/iOS)	Cross-Platform Developer	Frontend Mobile Developer
Mobile UX/UI Designer	Product Designer (Mobile Apps)	Mobile App Tester/QA Engineer

Acceptance
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Terms and Conditions

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- The students must maintain 90% attendance for obtaining the skill lab certificate.
- Students must attend training as per scheduled time

KARNATAK LAW SOCIETY'S

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SKILL LAB

FOR

7th Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering .

KLS GOGTE INSTITUTE OF TECHNOLOGY

Cyber Security & Automation System

FOR

Students of 7th Semester

Overview

- A Cyber Security & Automation Systems Lab is designed to provide participants with hands-on training in essential cybersecurity.
- Principles and how automation can be leveraged to enhance security operations.
- This lab focuses on equipping learners with the skills needed to identify, mitigate, and respond to cyber threats while utilizing automation tools to streamline and improve efficiency.

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**3 Hours**

Module 1: Introduction to Cyber Security (9 hours)	**Module 2: Introduction to Automation in Cybersecurity(9 hours)**
• **Contents**: Introduction to Information Security and its policies: Cyber security threats and best practices, Types of Cyber Attack, • Concept and types of Scanning Methodology, Penetration Tests. Installation of Linux Based Operating System, • Basic Linux Commands, Commands for security professionals (mainly AppSec and Pentesters), Common ports and protocols like 22, 25, ssh, https, • How DNS works, How SSL works, what are the common network threat around these, MiTM, Network sniffing, Various TCP attacks, DoS and DDoS attacks and its preventions. • Use cases	• **Contents:** What is security automation? Benefits of automating security processes (efficiency, speed, accuracy). • Common automation tools and frameworks (Ansible, PowerShell, Python, etc.). Basic Threat Detection: Use of tools like Wireshark and Metasploit to detect and analyze potential threats. • Introduction to vulnerability scanners (e.g., Nessus). Automation Use Cases in Cybersecurity Automating Vulnerability Scanning: Overview of Security Information and Event Management (SIEM), Automating Incident Response, Best Practices in Cybersecurity • Automation, Future of Cybersecurity and Automation: Emerging trends: AI-driven security automation,

	machine learning for threat detection.
Module 3: Cryptography and Firewalls (9 hours)	**Module 4: Web Application Security and Pen-testing (9 hours)**
• **Contents:** Introduction to cryptography, Cryptography and Cryptanalysis, • Types of cryptograpy, Hash Cryptography, understanding digital certificates and signatures, • Types of cryptographic attacks, Working with Cryptool and Applications of Cryptography. • Types of Firewalls and its benefits, Stateful vs. Stateless Filtering Firewall and firewall detection tools • Use cases	• **Contents:** Understanding of various HTTP methods, • Understanding response status codes. • Understanding HTTP Headers. Practical & demonstration of the following • Tools Kali Linux, Nmap, Metasploit, Shodan, Wireshark & Burp Suite. • Uses case and mini project

Coordinator

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Outcomes:

Outcomes of Skill Lab: Cyber Security & Automation System

Practical Knowledge: Hands-on experience with cybersecurity tools and automation techniques.

Problem-Solving Skills: Enhanced ability to tackle real-world security challenges efficiently.

Tool Proficiency: Mastery of popular cybersecurity and automation tools (e.g., Metasploit, Wireshark, Ansible).

Threat Awareness: Up-to-date knowledge of emerging cyber threats and security trends.

Security Automation: Skills in automating security processes like incident detection and response.

Real-World Projects: Experience working on industry-relevant projects, boosting confidence.

Employability: Improved job prospects and certifications in cybersecurity and automation.

Better Security Posture: Organizations benefit from skilled individuals improving security processes.

Collaborative Learning: Fosters teamwork and networking among cybersecurity professionals.

Efficiency: Automation reduces manual effort, improving response time and productivity.

Certification Preparation: Equipping students with the knowledge and skills to earn industry-recognized certifications such as CEH and CompTIA.

Acceptance

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- Students must attend training as per scheduled time

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SKILL LAB

FOR

3rd Semester Computer Science & Engineering Students

DEPARTMENT OF

Computer Science &Engineering

KLS GOGTE INSTITUTE OF TECHNOLOGY

Computer Hardware and Networking Skill Lab

FOR

Students of 3rd Semester

Overview

A **Computer Hardware and Networking Skill Lab** is an essential facility for students and professionals to gain hands-on experience with the foundational components of computing and communication systems. The lab focuses on training individuals in the assembly, maintenance, troubleshooting, and networking of computers and related devices.

- Computer Hardware
- Operating System Installation & Configuration
- Networking Fundamentals
- Network Configuration and Setup
- Troubleshooting and Maintenance

Mode of Conduction of each Module

Theory:	**10 Hours**
Demo:	**10 Hours**
Lab sessions:	**16 Hours**
Total duration:	**36 Hours**
Certification exam:	**1 Hour**

Module 1: Introduction to basic computer hardware	Module 2: To assemble and disassemble computer hardware
• **Basic Components:** • Motherboard, CPU, RAM, Power Supply, Hard Drive, SSD, Cooling System • **Input/output Devices:** • Keyboards, Mice, Monitors, Printers, Scanners • **Peripheral Devices:** • External Storage, USB Devices, Network Adapters, Expansion Cards • server, routers, fiber cable, Hard disk, RAM, CMOS battery, SMPS, cache, ROM, BIOS.	**Assembly and Disassembly:** • Assembling a personal computer from parts, installing components like RAM, CPU, and hard drives • **Firmware and BIOS Setup:** • Understanding BIOS/UEFI, configuring boot order, updating firmware • **Storage Devices:** • Installing, partitioning, and formatting hard drives and SSDs • **Power Supply and Safety:** • Power supply units (PSU), voltage, and hardware safety precautions

Module 3: To install different operating systems with dual boot	**Module 4: Introduction to computer networks and its components**

• **Windows OS Installation:**
  • Installing Windows, drivers, and basic system configuration
• **Linux OS Installation:**
  • Installing popular Linux distributions (Ubuntu, CentOS, etc.), dual-boot configuration
• **Operating System Management:**
  • Disk management, user account setup, OS updates, and patches
• **Command-Line Tools:**
  • Windows Command Prompt, PowerShell, and Linux Terminal basics
	• **Networking Basics:**
	  • Understanding LAN, WAN, MAN, Internet, and Intranet concepts
	• **Network Devices:**
	  • Routers, Switches, Modems, Access Points, Network Interface Cards (NICs)
	• **Cabling and Connectors:**
	  • Ethernet cables (Cat5, Cat6), coaxial cables, fiber optic cables, RJ-45 connectors
	• **IP Addressing:**
	  • IP addressing schemes (IPv4 and IPv6), subnetting, and address classes
	• **Network Protocols:**
	  • TCP/IP, DNS, DHCP, HTTP/HTTPS, FTP, SSH, Telne

Coordinator

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Outcomes:

Outcomes of Skill Lab: Computer Hardware and Networking Skill Lab

1.Practical Hardware Knowledge

- Ability to identify and assemble key components of a computer (e.g., CPU, RAM, motherboard).
- Competence in troubleshooting hardware issues and performing repairs or upgrades.

2. Proficiency in Operating Systems

- Mastery in installing, configuring, and managing different operating systems (Windows, Linux, macOS).
- Ability to optimize OS performance and troubleshoot system-related problems.

3. Network Design & Configuration Skills

- Hands-on experience in setting up LANs, WANs, and wireless networks.
- Proficiency in configuring network devices such as routers, switches, and firewalls.

4. Network Troubleshooting Abilities

- Capacity to diagnose and fix common network issues, such as connectivity problems, IP conflicts, and performance bottlenecks.

5. Career Readiness

- Preparedness for job roles such as network engineer, system administrator, IT support technician, and cybersecurity analyst.
- Exposure to skills relevant for advanced careers in cloud infrastructure, IoT, and data center management.

9. Cross-disciplinary Collaboration

- Ability to work with software developers, data engineers, and cybersecurity experts to create secure, efficient systems.
- Interdisciplinary skills applicable to IT, electronics, and telecommunications.

10. Foundation for Certifications

- Lab experience prepares students for professional certifications such as **CompTIA A+**, **Network+**, **CCNA (Cisco Certified Network Associate)**, and **Microsoft Certified IT Professional (MCITP)**.

Acceptance

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SKILL LABS

FOR

VII Semester CSE Students

DEPARTMENT OF

Computer Science and Engineering

KLS GOGTE INSTITUTE OF TECHNOLOGY

Project Management Tools

FOR

Students of VII Semester

Overview

Today's world is a digital world driven by software of varying sizes and complexity. Understandably, the effectiveness and efficiency of the quality of the software relies on the way it is managed during its development and maintenance phase. Hence, it is required for an engineer to learn the key Engineering Project Management (EPM) methodologies and to develop broader skills for the holistic aspects of bringing a software product successfully.

Mode of Conduction of each Module

Theory: 26 Hours
Lab sessions: 10 Hours
Total duration: 36 Hours
Certification exam: 3 Hours

Module 1: (6 hours)

Introduction to Project Management: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices.

Module 2: (10 hours)

Introduction to Software quality: Introduction, the place of software quality in project planning, Importance of software quality, defining software quality, quality models, ISO 9126, product and process metrics, product versus process quality management, Quality Management systems, process capability models, techniques to enhance software quality, testing, Software reliability, quality plans.

Module 3: (10 hours)

Project Integration Management: Develop project charter, develop project management plan, direct & manage project work, monitor & control project work, perform integrated change control, close project or phase. Project Quality management: Plan quality management, perform quality assurance, control quality.

Module 4:(10 hours)

Tools & Techniques of Project Management: Bar (GANTT) chart, bar chart for combined activities, logic diagrams and networks, Project evaluation and review Techniques (PERT) Planning, Computerized project management.

Text books:

1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill
2. Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 6th Edition, McGraw Hill Education, 2018.
3. 1. Project Management Institute, "A Guide to the Project Management Body of Knowledge (PMBOK Guide)", 5th Edition, 2013, ISBN: 978-1-935589-67-9
4. Prasanna Chandra, Project Planning Analysis Selection Financing Implementation & Review, Tata McGraw Hill Publication, 7th Edition, 2010, ISBN 0-07-007793-2.
5. Harold Kerzner, Project Management A System approach to Planning Scheduling & Controlling, John Wiley & Sons Inc., 11th Edition, 2013, ISBN 978-1-118-02227-6.
6. Rory Burke, "Project Management – Planning and Controlling Techniques", John Wiley & Sons, 4th Edition, 2004, ISBN: 9812-53-121-1

E-resource link: https://onlinecourses.nptel.ac.in/noc20_cs68/preview

Coordinators

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Outcomes

- List the outcomes of the Skill lab offered by your department.
    1. Describe and determine the purpose and importance of a software project and project management practices.
    2. Estimate and evaluate project management schedules and determine risk management approaches.
    3. Define and evaluate Quality assurance measures.
    4. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

- In what way will it benefit the students.
  The following industry relevant competency skills are expected to be developed among the students:
    1. Prepare SRS for the given software project
    2. Compare SDLC models for the given project
    3. Estimate project cost and prepare project schedule
    4. Evaluate risk management approaches suitable for the project
    5. Design test suite to ensure software quality

- Career prospects
    1. Students shall develop maintenance skills as expected by industries
    2. Students are able to manage risk and be adept at budgeting, scheduling, and planning to ensure the project stays on track and that it is finished on time and there are no project overruns
    3. Have expert knowledge of the project management tools, techniques, and methodologies.

Acceptance

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