SE10 Program Document

Introduction

The SE10 program is designed to immerse students in practical, hands-on learning experiences. Our motto, "Learn by Doing," reflects our commitment to providing students with real-world skills and knowledge through direct application and practice. The program is structured around five key areas, ensuring a comprehensive approach to modern software engineering.

Program Focus Areas

1. Web App Development

Objective:

- Equip students with the skills to develop robust and scalable web applications.

Key Topics:

- Front-end development (HTML, CSS, JavaScript frameworks)
- Back-end development (server-side scripting, databases)
- Full-stack integration
- Modern web development practices and tools

Activities:

- Building responsive web pages using HTML, CSS, and JavaScript.
- Developing a full-stack web application using a popular framework (e.g., React, Angular, Vue.js).
- Implementing RESTful APIs for data interaction.
- Version control with Git and collaboration on GitHub.
- Code reviews and pair programming sessions.

2. Web Data Scraping

Objective:

- Teach students how to extract and manipulate data from various web sources.

Key Topics:

- Understanding web protocols and structures (HTTP, HTML, CSS)
- Web scraping tools and libraries (BeautifulSoup, Scrapy, Selenium)
- Data cleaning and preprocessing
- Legal and ethical considerations in web scraping

Activities:

- Writing scripts to scrape data from websites.
- Parsing and extracting information from HTML documents.
- Storing scraped data in databases.

- Cleaning and preprocessing data for analysis.
- Creating dashboards and visualizations of the scraped data.

3. Application Life Cycle Management (Application Deployment)

Objective:

- Provide students with the knowledge to manage and deploy applications effectively.

Key Topics:

- Continuous Integration/Continuous Deployment (CI/CD) pipelines
- Containerization and orchestration (Docker, Kubernetes)
- Cloud services and infrastructure (AWS, Azure, GCP)
- Monitoring and maintenance of deployed applications

Activities:

- Setting up CI/CD pipelines using tools like Jenkins, GitHub Actions, or GitLab CI.
- Containerizing applications with Docker.
- Deploying applications to cloud platforms (e.g., AWS, Azure, GCP).
- Implementing Kubernetes for container orchestration.
- Monitoring applications using tools like Prometheus and Grafana.
- Performing regular maintenance and updates on deployed applications.
- We emphasize deploying applications on a physical server within the campus environment.

4. Embedded System Development

Objective:

- Enable students to design and implement embedded systems for various applications.

Key Topics:

- Microcontroller programming (Arduino, Raspberry Pi)
- Sensor integration and data acquisition
- Real-time operating systems (RTOS)
- IoT development and connectivity

Activities:

- Writing programs for microcontrollers to interact with sensors and actuators.
- Building simple IoT devices and connecting them to the internet.
- Designing and implementing real-time applications on microcontrollers.
- Creating data logging systems to record sensor data.
- Developing mobile or web interfaces to interact with embedded systems.
- Participating in hackathons and challenges focused on IoT and embedded systems.

5. AI Application Development

Objective:

- Introduce students to the development and integration of AI applications.

Key Topics:

- Machine learning fundamentals and algorithms
- AI frameworks and libraries (TensorFlow, PyTorch)

- Developing AI-powered solutions
- Using open-source and paid AI modules for application management

Activities:

- Building and training machine learning models.
- Implementing AI features in web or mobile applications.
- Utilizing pre-trained models for tasks like image recognition or natural language processing.
- Experimenting with different machine learning algorithms and techniques.
- Participating in Kaggle competitions and other AI challenges.
- Collaborating on AI projects to solve real-world problems.

Program Structure

- Hands-on Workshops: Each focus area includes workshops where students actively work on projects and assignments to solidify their understanding.
- Real-world Projects: Students are given real-world problems to solve, encouraging practical application of their knowledge.
- Expert Guidance: Industry experts and experienced instructors provide mentorship and guidance throughout the program.
- Collaborative Learning: Students collaborate on projects, fostering teamwork and knowledge sharing.