TRƯỜNG ĐẠI HỌC FPT

CAPSTONE PROJECT REGISTER

Class: **Duration time**: from ……../20…. To ……./20…..

(*) Profession: <Software Engineer> **Specialty**: <SE> [X]

(*) Kinds of person make registers: Lecturer [ ] Students [x]

1. Register information for supervisor (if have)

No.	Fullname	Phone	**E-Mail**	**Title**
Supervisor 1	Ngô Đăng Hà An	0906782333	AnNDH2@fe.edu.vn	Mr.
Supervisor 2	Phạm Thanh Trí	0937359396	TriPT9@fe.edu.vn	Mr.

2. Register information for students (if have)

	Full name	**Student code**	**Phone**	**E-mail**	**Role in Group**
	Dương Minh Nhất	SE182236	0704585671	nhatdmse182236@fpt.edu.vn	Leader
	Đào Trọng Đức	SE180110	0987039122	ducdtse180110@fpt.edu.vn	Member
	Phạm Đăng Khôi	SE170462	0854489295	khoipdse170462@fpt.edu.vn	Member
	Lê Nhật Quang	SE170415	0862008529	quanglnse170415@fpt.edu.vn	Member

3. Register content of Capstone Project

(*) 3.1. Capstone Project name:

- English: Learner Management and 3D Simulation System for Crane Training Center
- Vietnamese: Hệ thống Quản lý Học viên và Mô phỏng 3D cho Trung tâm Đào tạo Xe cẩu
- Abbreviation: CO-Sim (Crane Operator Training Simulation System)

a. **Context:**

Crane operation training requires both theoretical understanding and extensive practical experience. However, traditional methods using real cranes involve high operational costs, limited equipment availability, and significant safety risks for beginners. Training centers often face challenges in managing schedules, tracking trainee progress, and ensuring consistent quality of instruction. In addition, without modern simulation tools, trainees may lack adequate preparation before operating real machinery.

Therefore, there is a demand for an integrated system that can manage training operations while providing a safe, realistic 3D simulation environment to enhance learning efficiency and reduce operational risks.

b. **Proposed Solutions**

- Provide a centralized platform for managing student information (personal profiles) and managing training programs (courses), along with storing and tracking learning records (progress, results).
- Offer a realistic virtual training environment that allows trainees to practice crane operations on a simulation.
- Enable instructors to track learning progress and evaluate student results, while also providing direct feedback based on their performance in practical exercises and tests.
- Provide tests and exams (both theoretical and practical) to help trainees check their knowledge and skills.
- Manage detailed learning results and issue certificates to trainees. Instructors can approve and print certificates, and users can look up their certificates using a certificate code.

- **Functional requirement**
  - **Instructor Web App**
    - Instructor can create and manage training programs/courses, including setting up course details and learning materials.

- Instructor can create and manage practical training sessions on the simulator, setting the date and time.
- Instructor can manage trainee assignments for each practical session.
- Instructor can evaluate trainee performance and provide direct feedback on practical exercises and tests.
- Instructor can confirm pass or fail results for each trainee and record them in the system.

- **Trainee Web App**
  - Trainee can view registered courses, learning objectives, and completion requirements.
  - Trainee can access and review learning materials, including documents, images, and videos.
  - Trainee can take theoretical and practical tests and review the results with detailed explanations.
  - Trainee can view achieved certificates and earned badges.
  - Trainee can check their upcoming practical sessions and test schedules.

- **Simulator Manager Web App:**
  - Simulator Manager can manage and configure the entire simulation system, including hardware and software settings.
  - Simulator Manager can assign simulation time slots and resources to instructors or trainees.
  - Simulator Manager can monitor the operational status of simulators and training rooms in real-time.
  - Simulator Manager can oversee and analyze training performance across all sessions.
  - Simulator Manager can compile detailed reports on training effectiveness, resource utilization, and student results.

- **Admin Web App:**

        - Admin can manage user accounts and system roles (Instructor, Trainee, Simulator Manager).
        - Admin can view comprehensive system reports and a performance dashboard.
        - Admin can manage courses, training schedules, and learning content.
        - Admin can manage user reviews and feedback.
        - Admin can manage all simulation content in the system.
        - Admin can approve, digitally sign, and issue certificates or diplomas to trainees who meet course completion requirements. These certificates will include a unique lookup code

- **Non-functional requirement:**
    - Web application must respond to user requests within 2 seconds under normal load.
    - 3D simulation should run at a minimum of 60 FPS on recommended hardware.
    - The simulation interface must replicate realistic crane controls for effective skill transfer.

(*) 3.2. Main proposal content (including result and product)

a. **Theory and practice (document):**
    - Students should apply the software development process and UML 2.0 in the modelling system.
    - The documents include User Requirement, Software Requirement Specification, Architecture Design, Detail Design, System Implementation, and Testing Document, Installation Guide, sources code, and deployable software packages.
    - Server-side technologies:
        - Server: .NET, ASP.NET Core Web API
        - Database Design: SQL Server.
    - Client-side technologies:
        - Web Client: HTML5, CSS3, Javascript, ReactJS.
        - 3D Simulation: Developed with Unity 3D

b. **Products:**
    - Web App for Trainees: View courses, access training materials, check schedules, track progress.
    - Web App for Instructors: Manage training sessions, assign simulations, evaluate performance.
    - Web App for Simulator Manager: Configure simulation settings, monitor system status, generate reports.
    - Web App for Admin: Manage users, courses, schedules, feedback, and simulation content.
    - 3D Crane Simulator: Interactive training environment replicating real-world crane operations.

c. **Proposed Tasks:**
    - Task package 1: Develop the web application for Admin role.
    - Task package 2: Develop the web application for Instructor role and Trainee role.
    - Task package 3: Develop the web application for Simulator Manager role.
    - Task package 4: Build and integrate the 3D crane simulation system.
    - Task package 5: Deploy, test, and optimize the system on production environment.
    - Task package 6: Prepare all the required documents: System analysis and Design, Test plan, Installation manual, User manual.

4. Other comments (propose all relative things if have).

Supervisor (If have) *(Sign and full name)*	HCM, date …… ……. /2025 **On behalf of Registers** *(Sign and full name)*