

# **Project Description Statement**

## **ICT30001 - Information Technology Project**

**Class:** Fri 13:00 DT2.2 - **Tutor:** Dr. Nguyen Phuong Anh

**Name:** Trac Duc Anh Luong - **ID:** 103488117 - **Group 2**

# Project Title: AI and smart vision for house management

## Name of the Organisation

**Name:** NTT e-MOI JSC

**Email:** [contact@ntte-moi.com](mailto:contact@ntte-moi.com)

**Address:** Room 1401, 14th Floor, Indochina Plaza Ha Noi Office Building, 241 Xuan Thuy Street, Dich Vong Hau Ward, Cau Giay District, Hanoi City, Vietnam

## Contact at the Organisation

**Name:** Xuan Dung (Dustin) Luu

**Title:** Software Engineer

**Email:** [dung.luu@ntte-moi.com](mailto:dung.luu@ntte-moi.com)

**Phone:** (+84) 962 300 758

## Description of the project as initially stated by the client

Our goal for this capstone project is to transform the annual monitoring and detection of home changes using state-of-the-art artificial intelligence (AI) and smart vision technology. This project's primary goal is to create an advanced system that can produce highly detailed maps showing how housing structures transform over a year. This innovative system will use advanced AI algorithms and smart vision skills to assess a range of data sources, including satellite photos, drone footage, and other relevant visual data. By identifying and mapping constructions, demolitions, renovations, and other modifications, the system will offer thorough and precise insights into the changing housing structure landscape.

For the main functionalities, firstly, it will make it possible to spot trends and patterns in the construction and modification of housing, which can help with long-term planning and strategic decision-making. Secondly, the system's comprehensive maps and insights will guarantee regulatory compliance by presenting proof of complying with building rules and other legal obligations. The project's overall goal is to provide a potent instrument that will improve housing monitoring's accuracy and efficiency while also helping to manage and supervise housing developments more effectively.

# Description of the 'problems' as identified after the first client visit

While the client's initial request focused on data management and change detection, a more profound need was identified during the visit.

1. Data scarcity and fragmentation
  - a. The existing system is highly fragmented, and various databases are used to manage similar housing types. This leads to a significant amount of redundant data and complicates obtaining a comprehensive dataset of housing data.
  - b. Essential information like building compliance details, ownership history, and zoning laws is kept non-integrated or on paper and not accessible remotely.
2. Processing hold-ups and lack of transparency
  - a. Due to manual hand-offs and the requirement for several departmental clearances, clients and stakeholders currently need more time to process housing-related documentation.
  - b. Document status tracking could be more precise, which causes a rise in questions and discontent among stakeholders.
3. Inadequate and Error-Prone Workflows
  - a. Due to the manual procedures' susceptibility to human error, records frequently contain errors such as mismatched property boundaries and inaccurate owner information.
  - b. Workers have to excessively spend time fixing these mistakes, which adds to workflow delays.
4. Underutilisation of Data in Making Decisions
  - a. The amount of data that is readily available is significantly neglected for strategic planning and decision-making. Due to problems with accessibility and dependability, data that may be utilised for predicting housing patterns and organising urban development is now underdeveloped.

These findings have validated the requirement for a comprehensive digital solution incorporating cutting-edge data analysis capabilities to improve decision-making processes and service delivery to stakeholders, as well as transferring current paper-based records to one online platform.

## The 'revised' project objectives

Based on the initial assessment, the revised project objectives are:

1. Develop an AI-driven smart vision system capable of accurately detecting and analysing yearly changes in housing structures.
2. Generate interactive maps that visually represent these changes, providing actionable insights. The initial approach is to use satellite images from open sources like Google Maps.
3. Create a user-friendly interface for stakeholders to access and interpret the data easily.
4. Ensure the system can integrate with existing housing management software for seamless operation.
5. Develop a comprehensive reporting system that allows easy data analysis and visualisation, namely customisable dashboards and file exporting features.

# Brief description of the work

## 1. Data Collection and Preprocessing

- a. **Data Acquisition:** Gather historical and current satellite images, drone footage, and any available housing data.
- b. **Data Cleaning:** Clean and preprocess the data to ensure it is suitable for AI model training.
- c. **Data Annotation:** Manually annotate a subset of images to create a labelled dataset, highlighting different types of housing changes.

## 2. AI and Smart Vision Development

- a. **Model Development and Training:** Develop and train AI models capable of detecting changes in housing structures from processed images.
- b. **Algorithm Implementation:** Implement smart vision algorithms to enhance detection accuracy and efficiency.

## 3. Map Generation and Visualization

- a. **Algorithm Design and Map Creation:** Design algorithms to translate detected changes into visual map representations.
- b. **Visualisation Tooling:** Develop interactive map features that allow users to zoom, filter, and analyse changes over time.

## 4. User Interface Design

- a. **User-Centered Design:** Create a user-friendly dashboard that displays the maps and relevant data.
- b. Ensure the interface is intuitive and accessible to users with varying levels of technical expertise.

## 5. System Integration and Testing

- a. **Software Integration:** Integrate the AI and mapping system with the client's existing housing management software.
- b. **System Testing:** Conduct thorough testing to ensure the system operates reliably and accurately.

## 6. Training and Support

- a. **Training Sessions:** Provide training sessions for the client's team to ensure they can use the new system effectively.
- b. **Ongoing Support:** Offer ongoing support and maintenance to address any issues and implement improvements.