**Hong Kong Institute of Vocational Education**

**Discipline of Information Technology**

**IT114116 – HD in Data Science and Analytics**

**Final Year Project – Big Data Analytics (ITP4870M)**

**Project Proposal**

**Project title:** < Highlight your Theme, Technologies and/or Application to be created >

**Group Members:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Name (Student ID)** | **E-Mail** | **Phone Number** |
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| Github link: <https://github.com/printEricLee/IA_Project> | | | |

\* sorted by name

\* Highlighted the group leader

\* Git/Github link

**Introduction to the proposed project (Statement of problem to be solved)**

There are regulations when a dump truck is operating on the road, including that the materials in the dump truck are not allowed to exceed 70%, and there is only one kind of material inside. For example, stones cannot be mixed when transporting soil. Therefore, the driver needs to check the dump truck repeatedly before driving it, which will prolong the entire driving time. Therefore, our project hopes to slow down this phenomenon.

We set up the camera and monitor the scene footage in real time to check whether the interior of the car complies with our regulations. If we find that regulations are not being met, we will issue a warning or record it immediately so that on-site personnel can make immediate improvements.

**Background (Background of the problem)**

The transportation of materials using dump trucks is a critical component of the construction and landscaping industries. However, strict regulations are in place to ensure safety and compliance, such as limiting the load capacity and prohibiting the mixing of different materials. Non-compliance not only poses safety risks but can also lead to costly fines and project delays. Traditionally, drivers manually inspect their trucks, which is time-consuming and prone to human error. By automating this process through real-time camera monitoring, we can enhance compliance, improve efficiency, and ultimately contribute to safer roadways and more streamlined operations in the industry.

**Outline of proposed solution**

Application Platform: System: Linux, Window

Language: Python, Html, CSS

Reason: Linux 🡪 Open-source and highly customizable. / Robust support for server-side applications and real-time processing. / Better performance and resource management for heavy computation tasks.

Windows 🡪 User-friendly interface, widely used in many organizations. / Strong compatibility with a variety of software applications.

We will use Linux as the primary platform due to its efficiency in handling real-time data processing and its suitability for deploying server-based applications. Linux also offers better performance for running intensive algorithms like YOLOv8.

Software and technologies to be used in the project: Visual Studio Code

Reason: We will use Visual Studio Code for its flexibility, lightweight nature, and extensive support for web technologies. It allows for a seamless development experience across different languages, making it ideal for our multi-faceted project.

Algorithms that you may use: Yolov8 …

Reason: We will utilize YOLOv8 due to its balance of speed and accuracy, making it particularly suited for real-time monitoring of dump truck contents. Its ability to detect multiple materials simultaneously aligns perfectly with our project's requirements for compliance verification.

<Basic Features of your system/solution>

<System Architecture>

<Data handled: Source? Volume? ???>

<other non-functional requirements>

**Explanation of why proposed solution is appropriate**

Alternative solutions to monitor dump truck compliance include manual inspections or using traditional sensors. Manual checks are time-consuming and prone to human error, while sensors may only detect weight or presence, lacking the ability to assess material type. In contrast, our proposed solution utilizes real-time video monitoring with YOLOv8, providing accurate, instant feedback on material compliance. This approach significantly reduces inspection time, minimizes human error, and offers a comprehensive solution by detecting multiple material types simultaneously, ensuring regulatory adherence more effectively than alternative methods.

**Main development phases (Main Stages)**

1. Project Planning and Research: Complete project specifications and requirements gathering.
2. System Design and Architecture: Finalize system architecture and design specifications.
3. Development Environment Setup: Set up development environment and necessary software tools.
4. Algorithm Implementation: Implement YOLOv8 for real-time monitoring.
5. Real-time Video Integration: Integrate video feed with YOLOv8 for real-time analysis.
6. Testing and Validation: Conduct testing to ensure system accuracy and reliability.
7. Deployment and Training: Deploy the system for real-world use and train personnel.
8. Final Review and Documentation: Complete final review and project documentation.
9. Project Closure and Feedback: Gather feedback and perform project closure activities.

**Main deliverables**

1. Source Code: Complete source code for the application, including all algorithms, video processing components, and any supplementary scripts. The code will be well-documented to facilitate future development and maintenance.
2. Training Dataset: A curated dataset used for training the YOLOv8 model, including labeled images of different materials to improve detection accuracy. Documentation on how to augment or expand the dataset will also be included.
3. Testing Reports: Comprehensive testing documentation, including the methodologies used, testing results, accuracy metrics, and any issues encountered during testing. This will help verify the system's reliability and performance.

**The responsibilities of each member**

All team members will participate in regular meetings to discuss progress, challenges, and next steps, ensuring that everyone is aligned and informed throughout the project. This collaborative approach will foster effective teamwork and contribute to the overall success of the project.

**Important Notes: After the proposal is accepted, please mail the softcopy to Project Supervisor and Project Coordinator.**