Technical Challenge: Computer Vision & Robotics Engineer

Objective

Develop a system capable of detecting and classifying distinct moments in a **manual or semi-automated industrial operation**, contributing to the broader goal of **task recognition and performance analysis** in a smart factory context.

You will receive **videos** and a **dataset of annotated frames** to support the training and evaluation of your models.

Challenge Details

1. Task Description

Video Analysis:

You will receive a video depicting an operator performing a manual quality check on an industrial part.

Your goal is to detect and recognize **four specific moments** within each operation:

1. When the operator **picks up the piece**.
2. When the **probe passes through the piece**.
3. When the operator **makes a marking (scratch)** on the piece.
4. When the operator **places the piece in the box**.

Performance Metrics:

Based on your detection results, calculate the following:

- Average duration of the complete operation.
- Percentage of operations where the probe passes over the pieces.
- Percentage of operations where markings are made.
- Total number of operations performed.

2. Deliverables

Results Video:

- A video showing the detection results for each of the four moments.
- Clearly indicate whether each task was completed successfully.
- Include any relevant visual overlays, labels, or information that clarify your approach.

Documentation:

- Provide a brief document (text or schematic) describing your **thought process**, **technical decisions**, and **development approach**.
- Explain the **methodologies** used for detection and discuss any **challenges** faced.
- Outline any **assumptions** made and how they shaped your implementation.

Code Submission:

- Submit all developed code in a well-organized and modular structure.
- Ensure the code is **clearly commented** and includes a **README** with instructions on how to run it and reproduce your results.

Insights and Ideas:

- Share any insights, observations, or innovative ideas that emerged during development.
- Suggest possible **improvements** or **extensions** (e.g., integration with robotic systems, multi-camera tracking, or 3D analysis).

3. Resources Provided

All necessary materials are available in the shared folder:

ComputerVision_Robotics_Challenge_InfiniteFoundry

The folder includes:

- Reference video(s)
- Annotated frame dataset
- Example structure for organizing your output

Evaluation Criteria

- **Detection Accuracy** – Precision in identifying the four target moments.
- **Performance Metrics Calculation** – Correctness and reliability of derived metrics.
- **Code Quality** – Clarity, modularity, and documentation of the codebase.
- **Innovation** – Creativity and problem-solving ability demonstrated in your approach.
- **Documentation** – Completeness and clarity of the report or supporting explanation.

Submission Guidelines

1. Confirm your understanding and acceptance of this challenge by replying to the initial email.
2. Submit your results video, documentation, code, and insights **by Wednesday, October 29 (end of day)**.
3. All submissions should be sent to ritamagalhaes@infinitefoundry.com.
4. If you have any questions or require clarification, please reach out directly.

Good Luck!