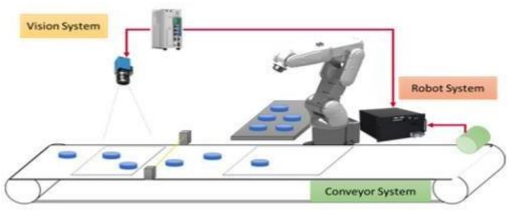
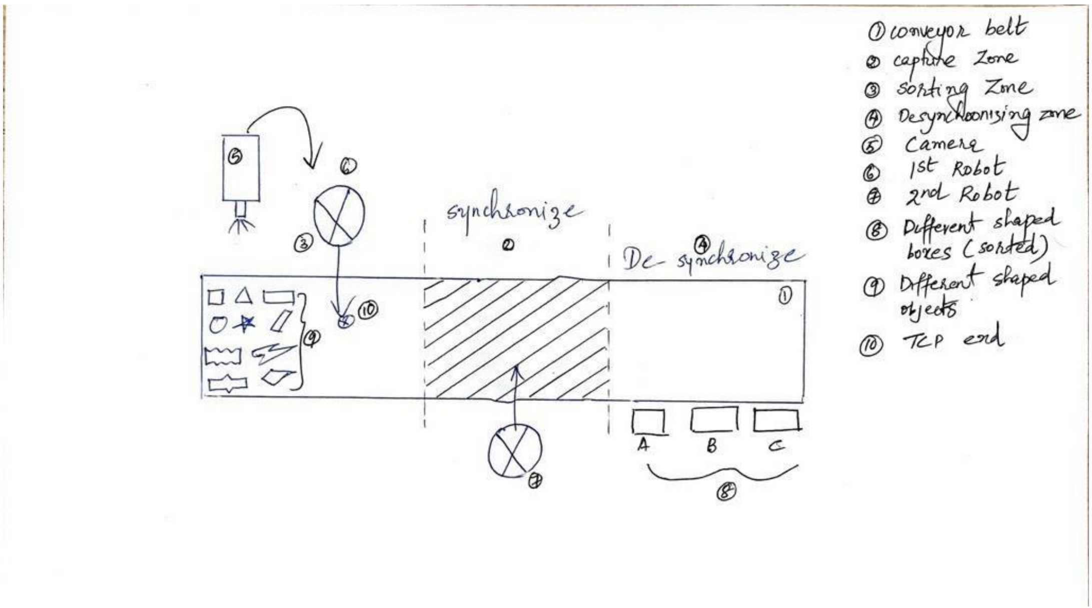
Visual Conveyor tracking for dual cobots using cameras



BACKGROUNDS:

This system allows cobots to dynamically interact with moving objects on a conveyor belt, improving efficiency, precision and flexibility. By using machine vision cameras, cobots can accurately identify, locate and track products in real time, regardless of variations in speed, orientation or shape.

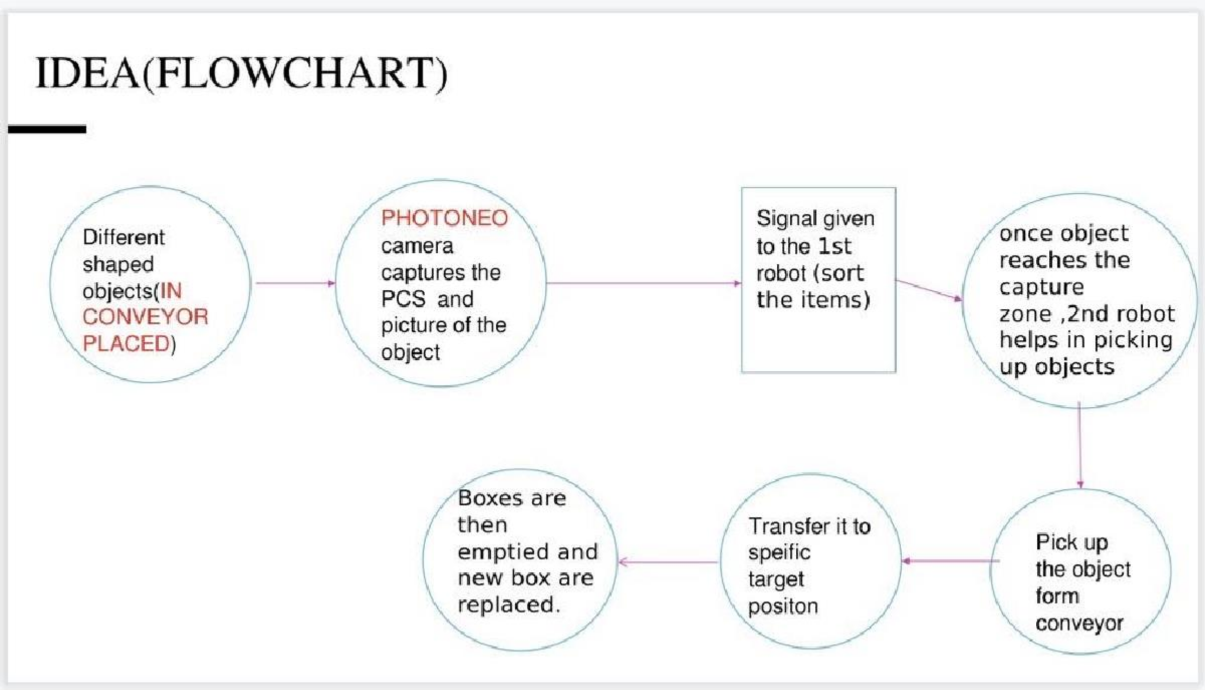


HOW IT WORKS (THESIS IDEA):

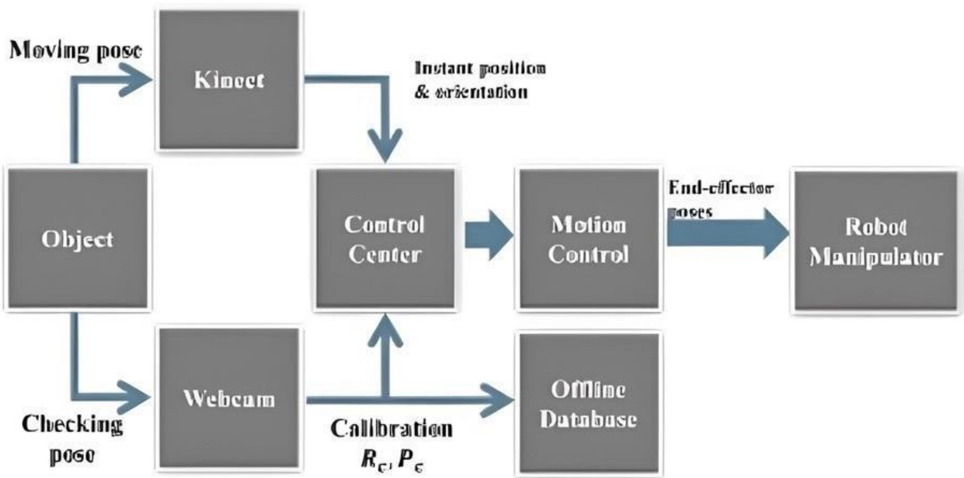
The idea of the project is to enable robots to automatically learn the position of the tool and approach them without collision by using a vision camera and an environment model. The challenges of synchronizing robot actions with fast-moving conveyor belts are also discussed.

The tracking setup consists of two cobots, two grippers, a conveyor belt, differently shaped objects and a vision camera. After moving the differently shaped objects along the conveyor belt, the first robot that helps in sorting out the differently shaped objects receives the information from the camera, which takes a photo of the object in a different position and its PCS (pat coordinate of the system).
There is also a capture area on the conveyor belt, where the second robot synchronizes with the sorted object to pick it up and take it to the target position specified by the user (differently shaped boxes). At the end, conveyor belts or other moving

Means are used to remove the boxes once they are filled with material. In this experiment, the main task of the first robot is to sort the differently shaped objects that come down the conveyor belt. This helps the second robot to remove the objects and place them in the designated places.



How can POSE be optimized?



The webcam captures an image when the gripper grasps the object to determine whether the task was successful or not. The webcam first stores a large amount of precise image data in the offline database to detect any change in the gripping pose. Once the poses are brought to a standard level, the mission to grip the moving target begins. Based on the optimal pose and the calibration from the previous section, the gripper can update its position and orientation during this phase.

SCIENTIFIC QUESTIONS:

1. How can the robot adjust the speed of the conveyor belt in real time?
2. What accuracy can be achieved with the vision camera?
3. How long does it take for the robot to pick up the object?

4. How long does it take the first robot to sort the objects?

METHODOLOGY:

System development:

1. the creation and integration of a semantic prototype.
2. the integration of an algorithm for collision-free approximation.
3. the integration of a tool management system to track relevant tool data.

EXPECTED RESULTS:

1. improving the latency of the sensor data
2. Fluctuations in conveyor speed can be tolerated by the robot in real time.
3. Improved efficiency when tracking and capturing objects of different sizes

TIMELINE (6 MONTHS):

Month 1: Literature research and requirements definition Month 2-3: System development and implementation of the prototype Month 4-5: Conducting the user study and data collection Month 6: Data analysis, documentation and completion