**HCI Scenario**

George is 78 and in the early stages of Alzheimer’s. He lives independently, but his daughter worries constantly about him forgetting his medication. We set up the HCI system on his kitchen laptop, which is always on.

It's 3:57 PM. The laptop screen, which was showing a calm "All good" message, suddenly turns yellow. A voice says, "George, it's time for your 4:00 PM pill." George, who was sitting in the next room, hears it and walks over. The screen shows "Please take your afternoon pill."

He looks at the counter and sees his pillbox, which has a small square TUIO marker on top. He picks up the pillbox and brings it in front of the laptop webcam. The screen doesn't change—it's waiting for him.

He opens the pillbox with one hand and uses his other hand to take out the pill. As his hand moves near the box and then up towards his mouth, the screen instantly turns **green**. "Afternoon pill taken! ✅" it reads, and the voice confirms, "Pill taken successfully. Well done." George feels relieved and confident. He puts the pillbox down and goes back to his book.

At 4:20 PM, George has a moment of confusion. "Did I take my pill?" He walks back to the kitchen, picks up the pillbox, and repeats the motion of taking a pill.

The instant he does, the screen flashes bright **red**, and a loud but not alarming **"Beep-beep-beep!"** sound plays. The screen reads, "Warning: You already took this dose ❌." The voice says, "Warning: You already took this dose." George is startled but immediately understands. "Oh, right," he says, and puts the box down, safe from an accidental double dose.

**PACT Analysis**

**People**

* **Primary User:** The Alzheimer's patient (e.g., "George").
  + **Characteristics:** Elderly people with bad memory.
  + **Needs:** A simple and clear reminder system.
  + **Physical:** May have unsteady hands. Gestures must be simple.
* **Secondary User:** The caregiver (e.g., "George's daughter").
  + **Needs:** They want peace of mind and need to make sure their father took the right dosage using the pill\_log.csv file.

**Activities**

* **Primary Activity:** Remembering to take, and taking the medication at the correct time.
* **Secondary Activity:** Preventing accidentally taking the dosage twice.
* **System Activities:**
  + **Notifying:** Alerting the user during the pill window.
  + **Observing:** Monitoring the user's interaction with the pillbox.
  + **Confirming:** Providing immediate, multimodal (visual, audio) feedback.
  + **Warning:** Intervening with a strong alert if the user wants to take pill twice.
  + **Logging:** Creating a csv record for the caregiver.

**Context**

* **Physical Context:** The user's home, likely an area like the kitchen or living room where the laptop is placed. The environment should have good lighting.
* **Social Context:** The user is often alone. The system acts as a friendly reminder.
* **Time Context:** The system is most active during specific dosage timings (4:00 PM and 8:00 PM) but must be "aware" 24/7 to prevent off-cycle dosing.

**Technology**

* **Input:** **Webcam (OpenCV)** captures the real-world scene.
* **Sensing (Vision):**
  + **ArUco (OpenCV):** Used for object (pillbox) identification.
  + **MediaPipe Hands:** Used for body/hand tracking.
* **Recognition (Logic):**
  + **DollarPy ($1 Recognizer):** Used for gesture recognition to detect taking the pill.
* **Output (Feedback):**
  + **Java GUI:** A simple status window.
* **Communication:**
  + **Sockets (TCP/IP):** A real-time communication between Python and Java.