Picode:  
Inline Photos Representing Posture Data in Source Code

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BACKGROUND

We deal with posture data retrieved from robots or Kinect devices.
PROBLEMS

Raw posture data cannot be represented well in textual or symbolic representations.

```java
HumanPose pose = new HumanPose(
    -0.0139, -0.0856, 2.2563, -0.0255, -0.0284, 2.3022, -0.0226, 0.2881, 2.2856, 0.012, 0.4823, 2.2662,
    -0.1898, 0.1982, 2.248, -0.4059, 0.2173, 2.2121, -0.393, 0.4257, 2.1835, -0.3946, 0.4749, 2.1794,
    0.1536, 0.1636, 2.3229, 0.3501, 0.1161, 2.3202, 0.4462, 0.3234, 2.3088, 0.4632, 0.3953, 2.3172,
    -0.0926, -0.1627, 2.2235, -0.0298, -0.5136, 2.1015, -0.0223, -0.7798, 2.0743, -0.0015, -0.8185, 1.9894,
    0.0693, -0.1669, 2.2707, 0.371, -0.3215, 2.0965, 0.5015, -0.6241, 2.0075, 0.5338, -0.6467, 1.9204
);

HumanPose pose = PoseLibrary.query("Whoa");
```
CONTRIBUTION

Inline photos representing posture data in text-based source code.
INTEGRATED SUPPORT FOR PROGRAMMING WITH POSTURE DATA

```java
if (pose.eq("Left\_Arm\_Up\_Right\_Arm\_Down")) {
    showText("Got the command!");
    nxt.setPose("Left\_Arm\_Up\_Right\_Arm\_Down");
}
```
INTEGRATED SUPPORT (1)
CAPTURE A PHOTO WITH POSE DATA
INTEGRATED SUPPORT (2)
DRAG & DROP PHOTOS, WRITE CODE

```java
if (pose.eq(right)) {
    showText("Got the Command!");
    nxt.setPose(right);
}
```
INTEGRATED SUPPORT (3)
RUN THE PROGRAM

```java
if (pose.eq("right")) {
    showText("Got the command!");
    nxt.setPose("right");
}
```
INTEGRATED SUPPORT FOR PROGRAMMING WITH POSTURE DATA

```java
if (pose == Human) {
    showText();
}

nxt.setPose(right);
```
INPUT OR OUTPUT POSTURE DATA

Input: retrieve posture and compare it.

```java
Pose pose = human.getPose();

if (pose.eq()) { /* do sth */ }
```

Output: set posture.

```java
robot.setPose();
```
INPUT OR OUTPUT POSTURE DATA

Output: play an action consisted of multiple poses.

```java
Action a = robot.action();

a = a.pose().wait(100).pose();
a.play();
```
RELATED WORK: IMPROVEMENTS ON CODE EDITORS

**Barista**: augmenting code editors with visuals

```java
// Rotates an Image by an angle given in degrees. For example,
transfomer.rotate(img, 45) performs this operation:

public void rotate(Image img, double degrees)
```

[Ko et al., CHI ’06]

**Sikuli**: GUI automation script with inline screenshot images

```java
switchApp("CleanMyMac.app")

click(Scan)

while not find(Scan is finished)

sleep(5)

click(Remove)
```

[Yeh et al., UIST’09]
**RELATED WORK:**
**IMPROVEMENTS ON CODE EDITORS**

**Barista:** no data behind an image

**Sikuli:** image data visualized as an image

**Picode:** posture data is associated with a photo
WHY PHOTOS? (1/2)
RICH CONTEXTUAL INFORMATION

With photos

Environmental  Nonverbal  Emotional

Without photos

20
23
0
WHY PHOTOS? (2/2)

CODE AS COMMUNICATION MEDIA

```java
Mindstorms NXT

void setup() {
    nxt = new MindstormsNXT();
    nxt.connect();
    // Show the preview window so that
    // CHI people can see the robot :)
    nxt.showCaptureFrame(true);
}

void draw() {
    // If the robot is handling a task, do nothing.
    if (nxt.isActing()) {
        return;
    }
    if (flag == true) {
        // If the flag is true
        nxt.setPose(dcode.pose("both"));
        flag = false;
    } else {
        // Otherwise, if the flag is false
        nxt.setPose(dcode.pose("none"));
        flag = true;
    }
}
```

**Mere text code**

**With inline photos**
EVALUATION

Preliminary study:
• Pair of a programmer and a non-programmer, together
• 2 hours of free use

Result:
• A non-programmer could take part in the dev process
• She felt the ownership by replacing photos by d&d
• Good starting point for learnable programming
CONCLUSION (AND GOOD NEWS FOR YOU)

- **Picode** augments a source code editor with **inline photos** representing posture data.
- Photos provides **rich contextual information**.
- They also work as a **communication medium** between programmers and non-programmers.

- **Picode is an open-source project** on GitHub available at [http://junkato.jp/picode/](http://junkato.jp/picode/)
- Teachers’ materials including pptx might be released. (YOUR help is needed!)