sketch_23_DHstrutture

```
import java.awt.event.KeyEvent;
int depth=0;
float q1=0;
float q2=0;
float q3=0;
float q4=0;
float q5=0;
float q6=0;
String input="";
String robotName="";
float q1v=0;
float q2v=0;
float q3v=0;
float q4v=0;
float q5v=0;
float q6v=0;
float Kp=0.01;
float Kchar=1.0;

float angoloX=0;
float angoloY=0;
float angoloXp=0;
float angoloYp=0;

float L1=80;
float D1=50;
float D2=50;
float D4=50;
float D6=50;
float L2=80;
float L3=80;
float L6 = 80;
void setup()
{
 size(1000, 1000, P3D);
 background(#607d8b);
}

void draw()
{
 background(#607d8b);
 details(q1, q2, q3,q4, q5, q6, q1v, q2v, q3v,q4v, q5v, q6v);
 translate(width/2, height/2, depth);
```

```
q1v=q1v-Kp*(q1v-q1);
q2v=q2v-Kp*(q2v-q2);
q3v=q3v-Kp*(q3v-q3);
q4v=q4v-Kp*(q4v-q4);
q5v=q5v-Kp*(q5v-q5);
q6v=q6v-Kp*(q6v-q6);

rotateY(-angoloY);
rotateX(angoloX);
rotateY(PI/2.0);
rotateX(PI/2.0);
rotateZ(PI/2.0);

directionalLight(126, 126, 126, 0, 0, 0.7);
ambientLight(200, 200, 200);
fill(#f4511e);
base();
fill(#F0D01D, 100);
noStroke();
pushMatrix();
robot(q1, q2, q3,q4,q5,q6);
popMatrix();
fill(0, 255, 0);

robot(q1v, q2v, q3v,q4v,q5v,q6v);
}
/*
 Implementazione di tutti i robot utilizzando la tabella di Denavit-Hartenberg
*/
void robot(float a1, float a2, float a3,float a4,float a5,float a6) {
 switch(robotName) {
 case "cartesiano":
   link(0, a1, -PI/2, 0);
   link(-PI/2, a2, -PI/2, 0);
   link(0, a3, 0, 0);
   break;
 case "cilindrico":
link(a1,L1, 0, 0);
   link(0, a2, -PI/2, 0);
   link(0, a3, 0, 0);
   break;
 case "scara":
   link(a1,L1, 0, D1);
```

```
  link(a2,0,0, D2);
  link(0, a3, 0, 0);

  break;
case "sfericoI":
  link(a1,L1, PI/2, 0);
  link(a2,0,PI/2, L2);
  link(0, a3, 0, 0);
  break;
case "sfericoII":
  link(a1,L1, -PI/2, 0);
  link(a2,L2,PI/2,0);
  link(-PI/2, a3, 0, 0);

  break;
case "antropomorfo":
     link(a1,L1, PI/2, 0);
  link(a2,0,0,L2);
  link( a3,0, 0, L3);

  break;
case "puma":
     link(a1,D1, -PI/2, 0);
  link(a2,0,0,L2);
  link( a3,0, PI/2, 0);
     link(a4,D4, -PI/2, 0);
  link(a5,0,PI/2,0);
  link(a6, D6, 0, 0);

  break;
case "stanford":
 link(a1,L1, -PI/2, 0);
  link(a2,L2,PI/2,0);
  link(-PI/2, a3, 0, 0);
     link(a4,0, -PI/2, 0);
  link(a5,0,PI/2,0);
  link(a6, L6, 0, 0);

  break;

default:
  robotName="";
  break;
}
```

```
}
/*
La funzione details() contiene tutte le informazioni visualizzate a schermo
*/
void details(float a1, float a2, float a3, float a4,float a5,float a6,float a1v, float a2v, float a3v,float
a4v,float a5v,float a6v) {
 String line="q1="+a1+"\nq2=+"+a2+"\nq3="+a3+"\nq4="+a4+"\nq5="+a5+"\nq6="+a6;
 String
lineV="q1v="+a1v+"\nq2v=+"+a2v+"\nq3v="+a3v+"\nq4v="+a4v+"\nq5v="+a5v+"\nq6v="+a6v;
 String car="Kp="+Kp+"\nKchar="+Kchar+"\n";
 String
options="-cartesiano(D)\n-cilindrico(F)\n-scara(G)\n-sfericoI(H)\n-sfericoStanford(J)\n-antropomorfo(
S)\n-puma(L)\n-stanfordCompleto(K)\nchar:=aumenta/diminuisce (up/down) variazione di
q1,q2,q3\nKp:=aumenta/diminuisce (right/left) velocità di inseguimento";
 textSize(20);
 textLeading(20);
 fill(#b71c1c);
 text(robotName, 5, 30);
 fill(#F0D01D);
 textLeading(20);
 text(line, 5, 70);
 textLeading(20);
 fill(0, 255, 0);
 text(lineV, 150, 70);
 fill(0);
 textLeading(20);
 text(car, 350, 70);
 textLeading(20);
 fill(255, 0, 0);
 text("Options:\n", 5, 700);
 textLeading(20);
 fill(0);
 textLeading(20);
 text(options, 5, 725);
}

void base() {
 pushMatrix();
 translate(0, 0, -100);
 box(80, 80, 20);
 popMatrix();
 pushMatrix();
 translate(0, 0, -50);
```

```
 box(25, 25, 80);
 popMatrix();
}


void link(float theta, float d, float alpha, float a) {
 rotateZ(theta);
 sphere(25);
 translate(0.0, 0.0, d/2);
 box(25, 25, d);
 translate(0.0, 0.0, d/2);
 sphere(25);
 rotateX(alpha);
 translate(a/2, 0.0, 0.0);
 box(a, 25, 25);
 translate(a/2, 0.0, 0.0);
}

void mousePressed() {
 angoloYp=angoloY+PI*mouseX/100000.0;
 angoloXp=angoloX+PI*mouseY/100000.0;
}

void mouseDragged() {
 angoloY=angoloY+PI*mouseX/100000.0;
 angoloX=angoloX+PI*mouseY/100000.0;
}

void keyPressed() {
 if (keyCode==&apos;R&apos;) {
   q1=0.0;
   q2=0.0;
   q3=0.0;
   angoloX=0;
   angoloY=0;
   Kp=0.02;
   Kchar=1;
 }
 if (keyCode==&apos;1&apos;) {
   q1+=Kchar*1;
 }
 if (keyCode==&apos;2&apos;) {
   q2+=Kchar*1;
 }
```

```
if (keyCode==&apos;3&apos;) {
  q3+=Kchar*1;
}
 if (keyCode==&apos;4&apos;) {
  q4+=Kchar*1;
}
if (keyCode==&apos;5&apos;) {
  q5+=Kchar*1;
}
if (keyCode==&apos;6&apos;) {
  q6+=Kchar*1;
}
if (keyCode==&apos;9&apos;) {
  q1-=Kchar*1;
}
if (keyCode==&apos;8&apos;) {
  q2-=Kchar*1;
}
if (keyCode==&apos;7&apos;) {
  q3-=Kchar*1;
}
 if (keyCode==&apos;Z&apos;) {
  q4-=Kchar*1;
}
if (keyCode==&apos;X&apos;) {
  q5-=Kchar*1;
}
if (keyCode==&apos;Y&apos;) {
  q6-=Kchar*1;
}
if (keyCode==LEFT) {
  Kp+=0.001;
}
if (keyCode==RIGHT) {
  Kp-=0.001;
}
if (keyCode==UP) {
  Kchar+=1;
}
if (keyCode==DOWN) {
  Kchar-=1;
}

if (keyCode==&apos;D&apos;) {
```

```
 robotName="cartesiano";
}
if (keyCode==&apos;F&apos;) {
 robotName="cilindrico";
}
if (keyCode==&apos;G&apos;) {
 robotName="scara";
}
if (keyCode==&apos;H&apos;) {
 robotName="sfericoI";
}
if (keyCode==&apos;J&apos;) {
 robotName="sfericoII";
}
if (keyCode==&apos;K&apos;) {
 robotName="stanford";
}
if (keyCode==&apos;L&apos;) {
 robotName="puma";
}
if (keyCode==&apos;S&apos;) {
 robotName="antropomorfo";
}


}
```