```
% Program Utama

% load citra (dari kamera)
clear cam
cam=webcam(2)
f=snapshot(cam)

% Tentukan target obyek:
% T = obyek yang dicari
%       1 = Tabung
%       2 = Balok
%       3 = Kubus
%       4 = Prisma
T = 4;
[targetblok]=bloktarget(f,T);
movearmblok(targetblok);

function movearmblok(targetblok)
% % targetblok = vector berukuran 1x16 yang berisi jumlah target dalam
setiap
% blok.

idTB=find(targetblok>=1);
for i=1:length(idTB)
    numTarget=targetblok(idTB(i));
    for j=1:numTarget
        movearm(idTB(i));
    end
end

function movearm(blok)
% blok = nilai blok.

a = arduino('COM3','Uno','Libraries','Servo');
base = servo(a,'D4');
shoulder = servo(a,'D5');
elbow = servo(a,'D6');

if (blok==1)
    B=0.1;
    S=0.8;
    E=0.6;
    disp('blok1')
elseif (blok==2)
    B=0.2;
    S=0.8;
    E=0.6;
    disp('blok2')
elseif (blok==3)
    B=0.3;
    S=0.8;
    E=0.6;
    disp('blok3')
elseif (blok==4)
    B=0.4;
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```
    S=0.8;
    E=0.6;
    disp('blok4')
elseif (blok==5)
    B=0.5;
    S=0.8;
    E=0.6;
    disp('blok5')
elseif (blok==6)
    B=0.6;
    S=0.8;
    E=0.6;
    disp('blok6')
elseif (blok==7)
    B=0.7;
    S=0.8;
    E=0.5;
    disp('blok7')
elseif (blok==8)
    B=0.8;
    S=0.8;
    E=0.6;
    disp('blok8')
elseif (blok==9)
    B=0.9;
    S=0.7;
    E=0.6;
    disp('blok9')
elseif (blok==10)
    B=0.15;
    S=0.55;
    E=0.4;
    disp('blok10')
elseif (blok==11)
    B=0.25;
    S=0.6;
    E=0.5;
    disp('blok11')
elseif (blok==12)
    B=0.4;
    S=0.5;
    E=0.5;
    disp('blok12')
elseif (blok==13)
    B=0.5;
    S=0.5;
    E=0.5;
    disp('blok13')
elseif (blok==14)
    B=0.65;
    S=0.55;
    E=0.5;
    disp('blok14')
elseif (blok==15)
    B=0.8;
    S=0.6;
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```
    E=0.5;
    disp('blok15')
elseif (blok==16)
    B=0.9;
    S=0.55;
    E=0.4;
    disp('blok16')
else
    disp('luar jangkauan')
end

writePosition(base,B);
writePosition(shoulder,S);
writePosition(elbow,E);

pause(2)
%HOME
B1=0.5;
S1=0.4;
E1=0.4;
writePosition(base,B1);
writePosition(shoulder,S1);
writePosition(elbow,E1);
pause(2)


function [kelas, K, koordinat, ciri, LI]=identifikasi(I,T)
% fungsi identifikasi obyek
% Input:
% I = citra input dari kamera
% T = obyek yang dicari
%       1 = Tabung
%       2 = Balok
%       3 = Kubus
%       4 = Prisma
%
% K = vector kelas obyek yang sesuai target;
% kelas = vektor obyek dan identifikasinya


% imask=imbinarize(rgb2gray(imread('masking.jpg')));
imask=imread('blokmask.bmp');
% convert grayscale
Ig=rgb2gray(I);
Ibin=imbinarize(Ig);
Imorf1 =bwareaopen(Ibin,50);
Imorf=Imorf1&imask;

%ekstraksi ciri
[LI, N] = bwlabel(Imorf);
blobMeasurements = regionprops(LI,...
'Perimeter', 'Area', 'FilledArea', 'Solidity', 'Centroid',...
'MajorAxisLength','MinorAxisLength');

perimeters = [blobMeasurements.Perimeter];
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```
areas = [blobMeasurements.Area];
filledAreas = [blobMeasurements.FilledArea];
solidities = [blobMeasurements.Solidity];
MajorAxisLength = [blobMeasurements.MajorAxisLength];
MinorAxisLength =  [blobMeasurements.MinorAxisLength];
koord = [blobMeasurements.Centroid];

% merubah susunan matrik koordinat
koordinat=zeros(2,N);
koordinat(1,:)=koord(1:2:end);
koordinat(2,:)=koord(2:2:end);

ciri=[areas;perimeters;solidities;filledAreas;...
    MinorAxisLength;MajorAxisLength];

load net92.mat;
y=net(ciri);

kelas=zeros(1,N);
K=kelas;
for i=1:N
    kelas(i)=find(y(:,i)==max(y(:,i)));
end
K(find(kelas==T))=1;


function [targetblok]=bloktarget(f,T)
%   F = citra akusiisi;
%   T = obyek yang dicari
%   1 = Tabung
%   2 = Balok
%   3 = Kubus
%   4 = Prisma


load citrablok;

if T==1
    TO='Tabung';
elseif T==2
    TO='Balok';
elseif T==3
    TO='Kubus';
else
    TO='Prisma';
end

[kelas,K,koordinat,ciri, LI]=identifikasi(f,T);

figure(1), imshow(f);
hold on;
idtarget=find(K==1);
Itarget=logical(zeros(240,320));
pxltarget=round(koordinat);
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```
for i=1:length(idtarget)
    hold on;
    plot(koordinat(1,idtarget(i)),koordinat(2,idtarget(i)),...
        '*r');
    Itarget(pxltarget(2,idtarget(i)),pxltarget(1,idtarget(i)))=1;
end
title(strcat('Target objek: ',TO));

% penentuan blok target
targetblok=zeros(1,16);
for blk=1:16
    csum=Itarget&citrablok(:,:,blk);
    if sum(sum(csum))>=1
        targetblok(blk)=targetblok(blk)+1;
    end
end
```