```
% user inputs

m_c = 1.5;
m_p = 0.5;
g = 9.82;
L = 1;
d_1 = 0.01;
d_2 = 0.01;
```

```
% using state space function

sys = state_model(m_c,m_p,g,L,d_1,d_2);
```

```
sys =

  A =
              x1         x2         x3
   x1          0          0          1
   x2          0          0          0
   x3          0          0  -0.006667
   x4          0      13.09  -0.006667

              x4
   x1          0
   x2          1
   x3  -0.006667
   x4   -0.02667

  B =
         u1
   x1     0
   x2     0
   x3  0.6667
   x4  0.6667

  C =
       x1  x2  x3  x4
   y1   0   1   0   0

  D =
       u1
   y1   0

Continuous-time state-space model.
```

```
%extracing matrices

[a b c d] = ssdata(sys);
```

```
function sys = state_model(m_c,m_p,g,L,d_1,d_2)
    A = [0 0 1 0; 0 0 0 1];
    A(3,1) = 0;
    %A(3,2) = g*m_p/m_c;
```

```
    A(3,3) = -d_1/m_c;
    A(3,4) = -d_2/(L*m_c);
    A(4,1) = 0;
    A(4,2) = g*(m_p+m_c)/(L*m_c);
    A(4,3) = -d_1/(L*m_c);
    A(4,4) = (-d_2*(m_c+m_p))/(L*L*m_c*m_p);

    B = [0; 0; 1/m_c; 1/(L*m_c)];

    C = [0 1 0 0];

    D = [0];

    sys = ss(A,B,C,D);
end
```