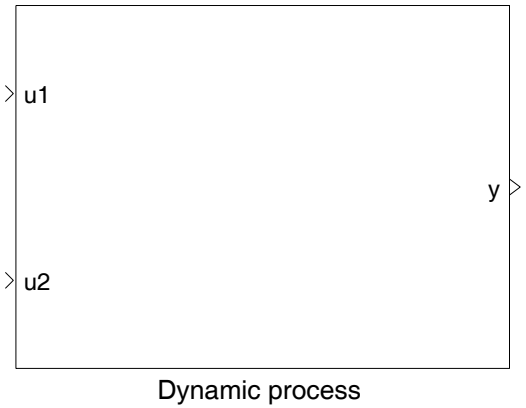
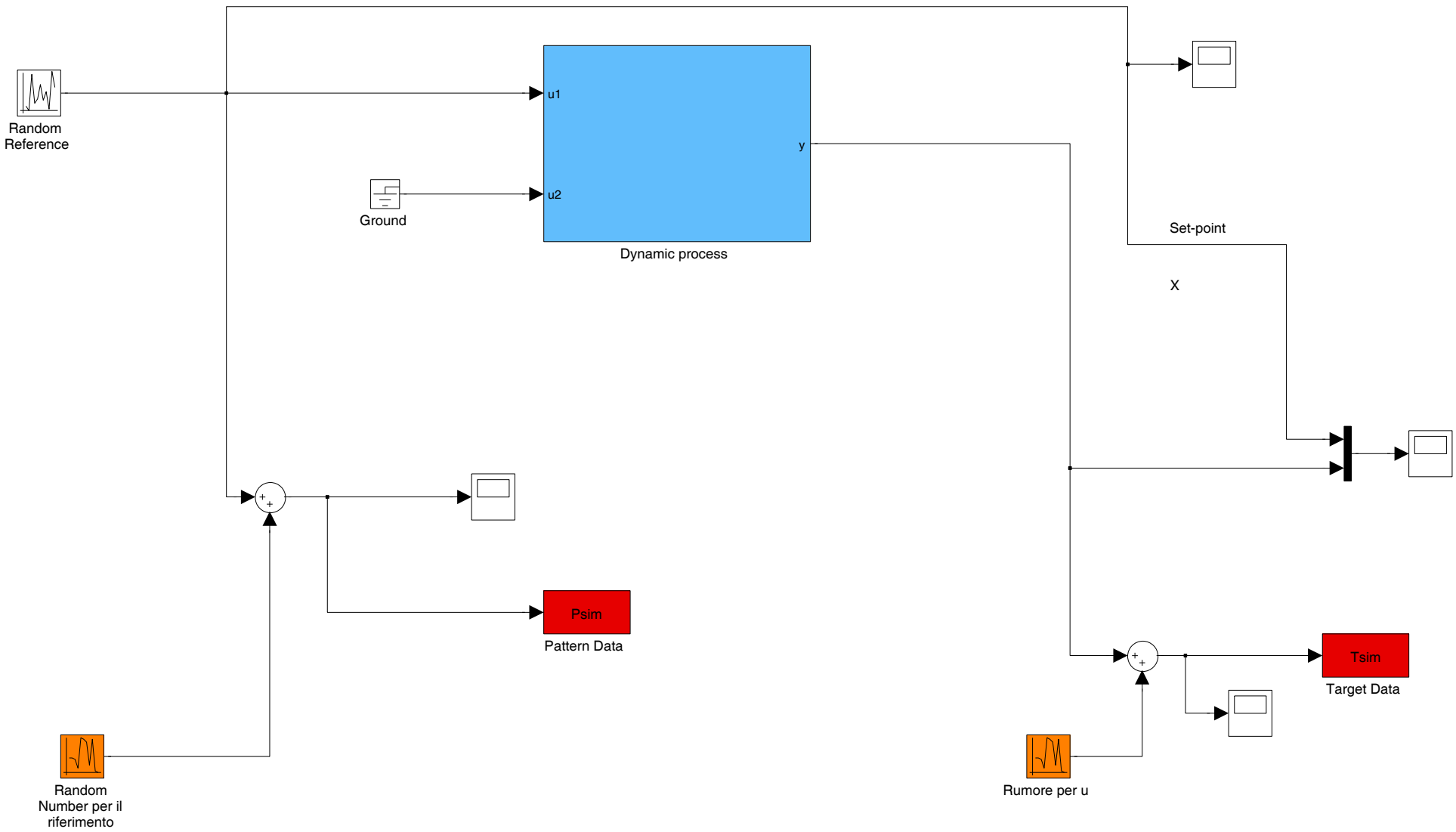
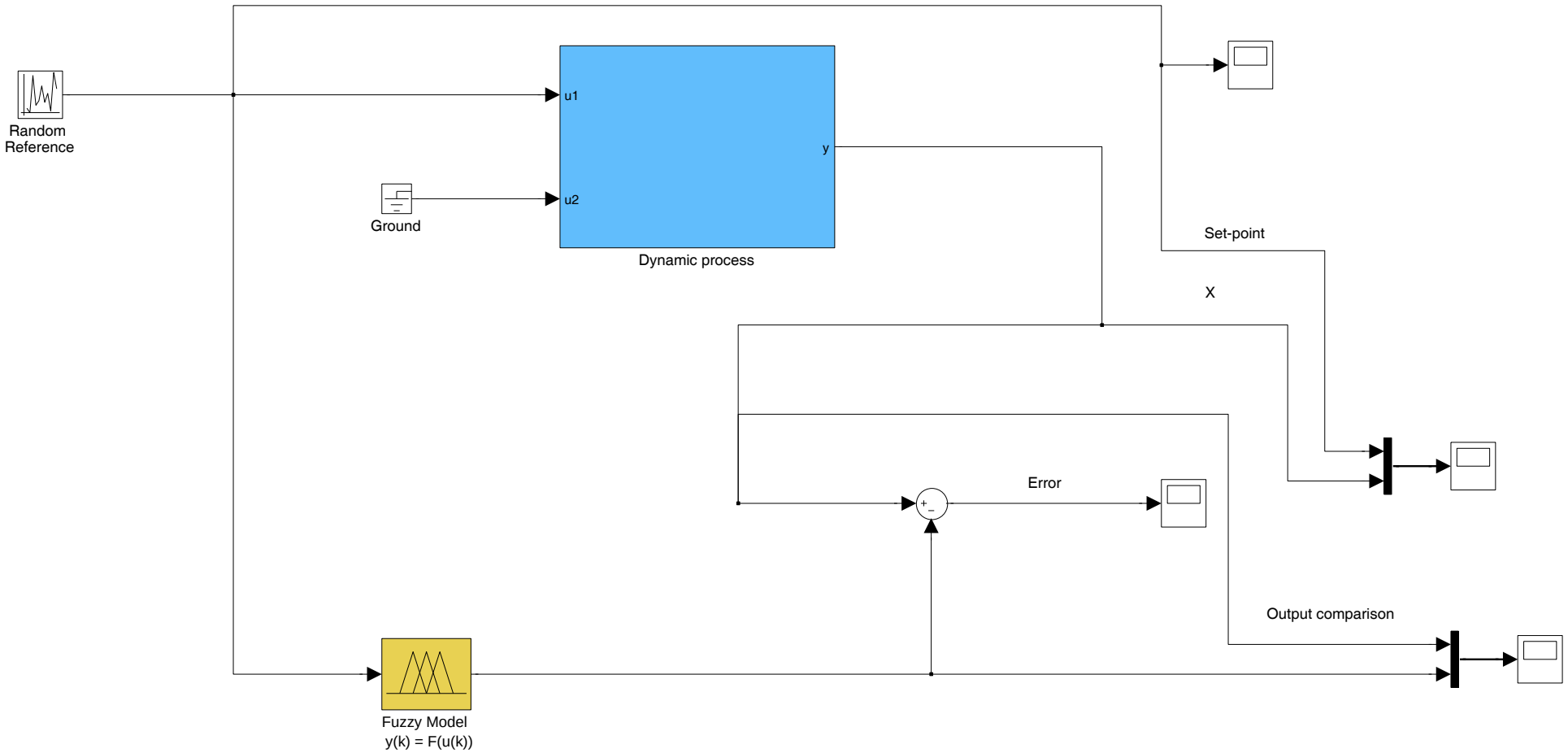
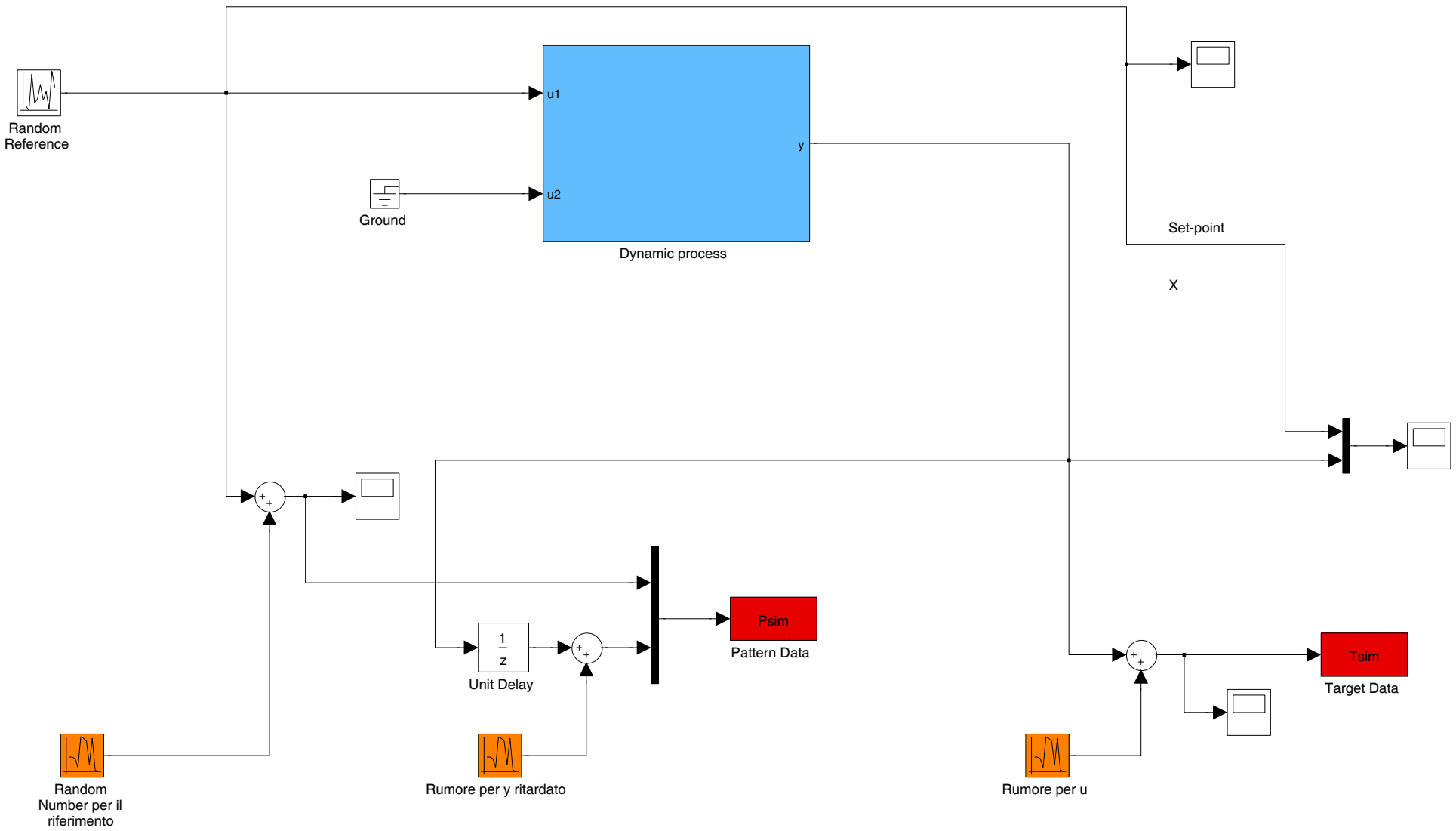
```
%%%
%%% File for the initialisation of the model parameters
%%%

M = 1;
m = 0.1;
l = 1;
g = 9.8;

x0 = 0.2;
theta0 = 0.55;

K = [-3.1623   -4.8648  -45.9014  -14.6871];

Ts = 0.05; % Sampling time
```

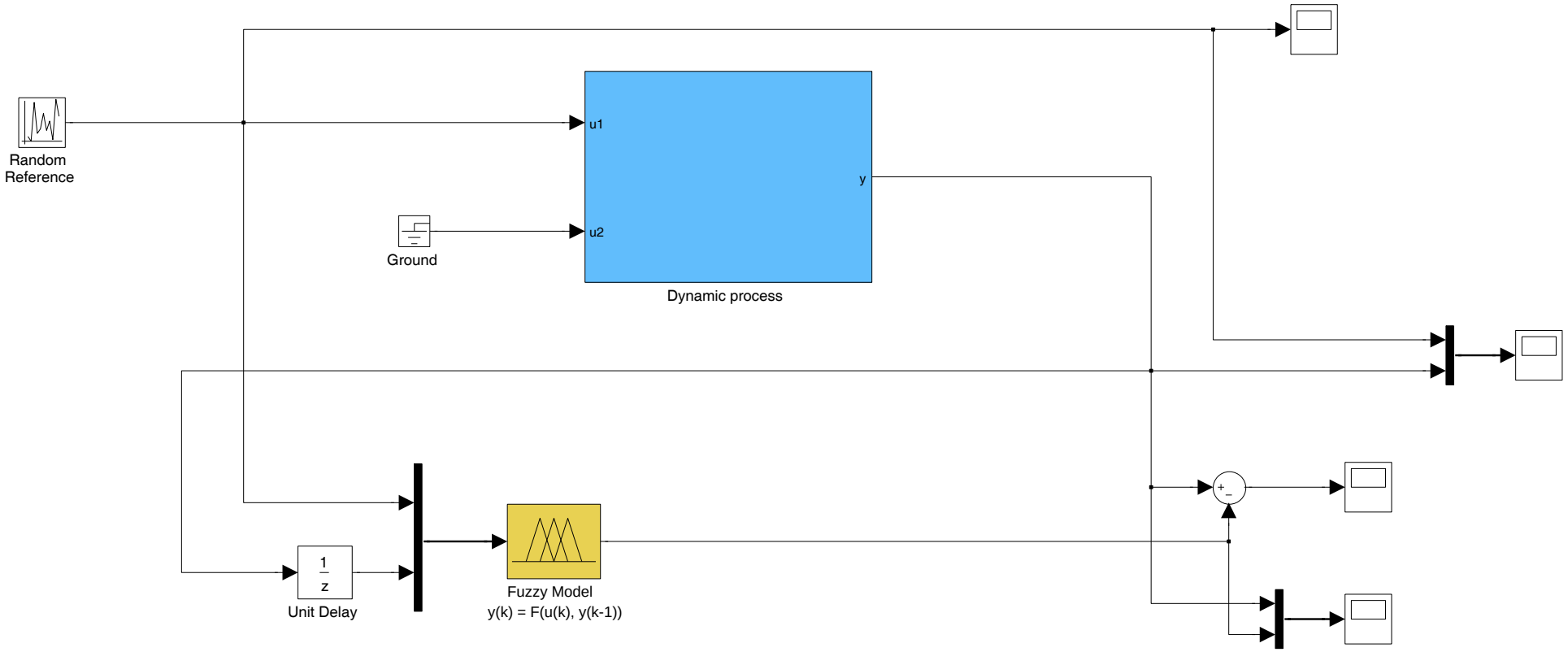

u1
u2
y
Dynamic process

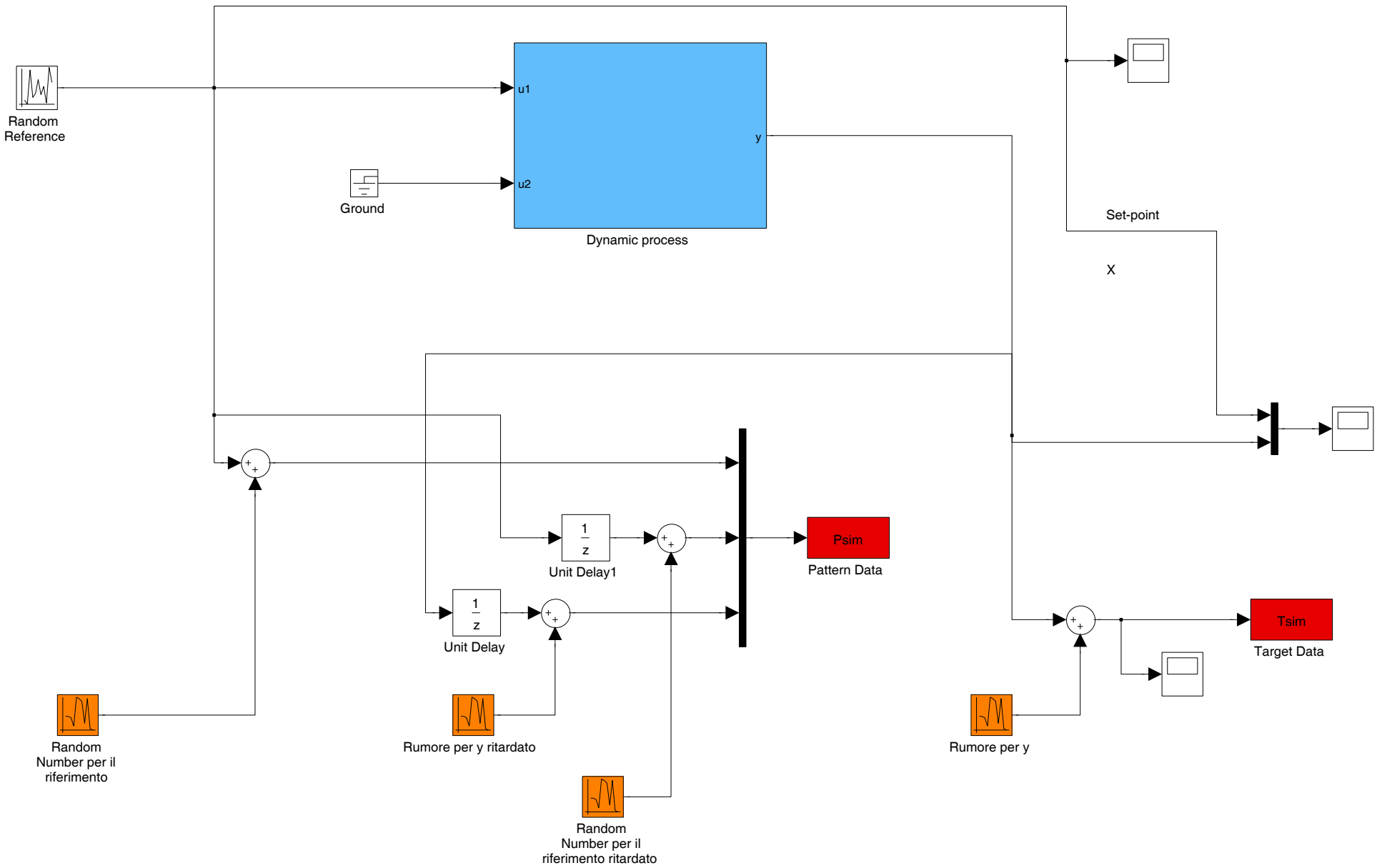
```
%%%
%%% File "gen_data_train_fuzzy.m": partiziona opportunamente i dati
%%%                                per il training del sistema fuzzy
%%%

% Caricare P e T che devono essere nel workspace.
% UYtrain: dati di training
% UYval  : dati di validazione
% UYtest : dati di test

UYtrain = [Psim(1:round(size(Psim,1)/3),:)...
           Tsim(1:round(size(Psim,1)/3),1)];

UYval = [Psim(round(size(Psim,1)/3)+1:2*round(size(Psim,1)/3),:)...
       Tsim(round(size(Psim,1)/3)+1:2*round(size(Psim,1)/3),:)];

UYtest = [Psim(2*round(size(Psim,1)/3)+1:end,:)...
          Tsim(2*round(size(Psim,1)/3)+1:end,:)];

return
```

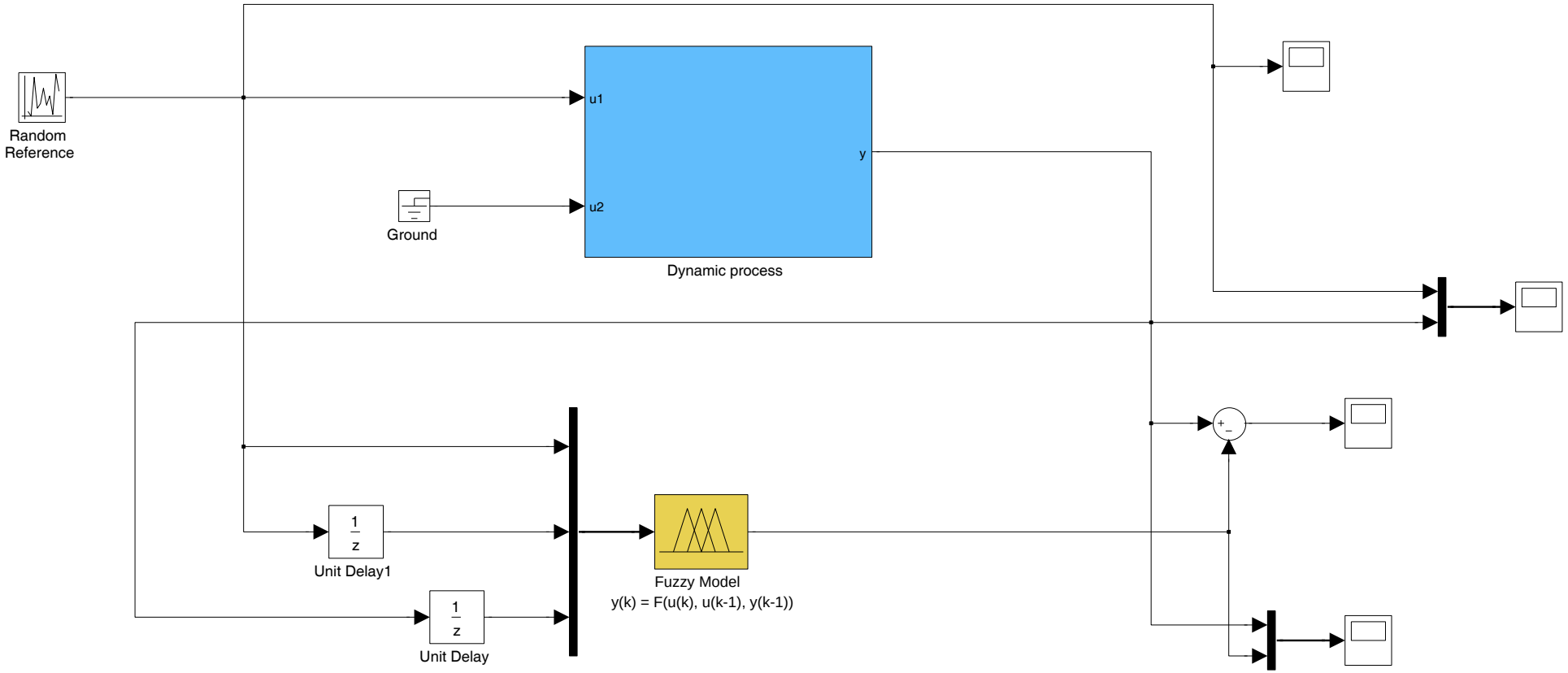

Random
Reference
u1
u2
y
Ground
Dynamic process
Set-point
X
Psim
Pattern Data
Tsim
Target Data
Random
Number per il
riferimento
Rumore per u

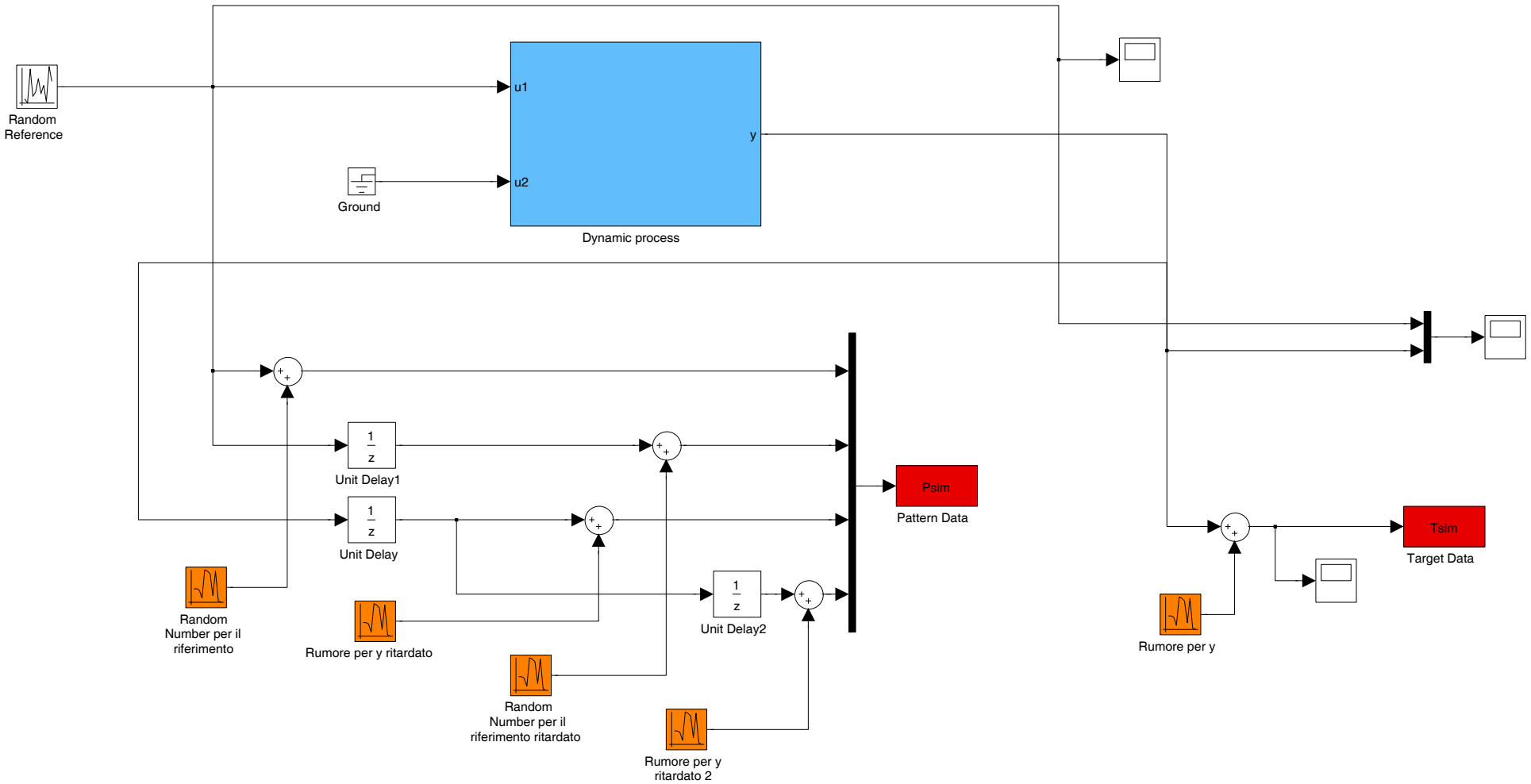

Random
Reference
u1
u2
y
Dynamic process
Ground
Set-point
X
Error
Output comparison
Fuzzy Model
y(k) = F(u(k))

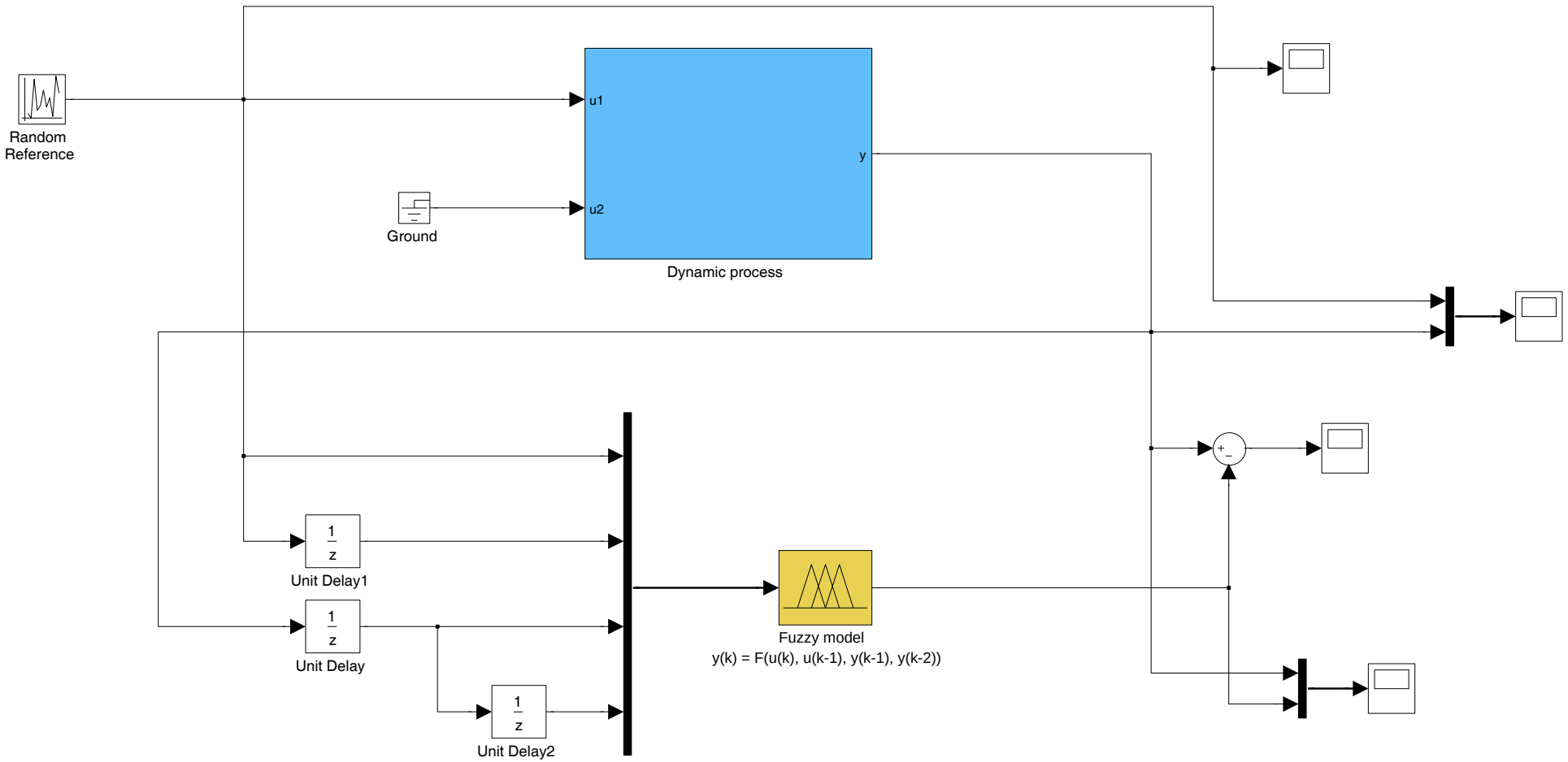

Random
Reference
u1
u2
y
Ground
Dynamic process
Set-point
X
1
z
Unit Delay
Psim
Pattern Data
Tsim
Target Data
Random
Number per il
riferimento
Rumore per y ritardato
Rumore per u

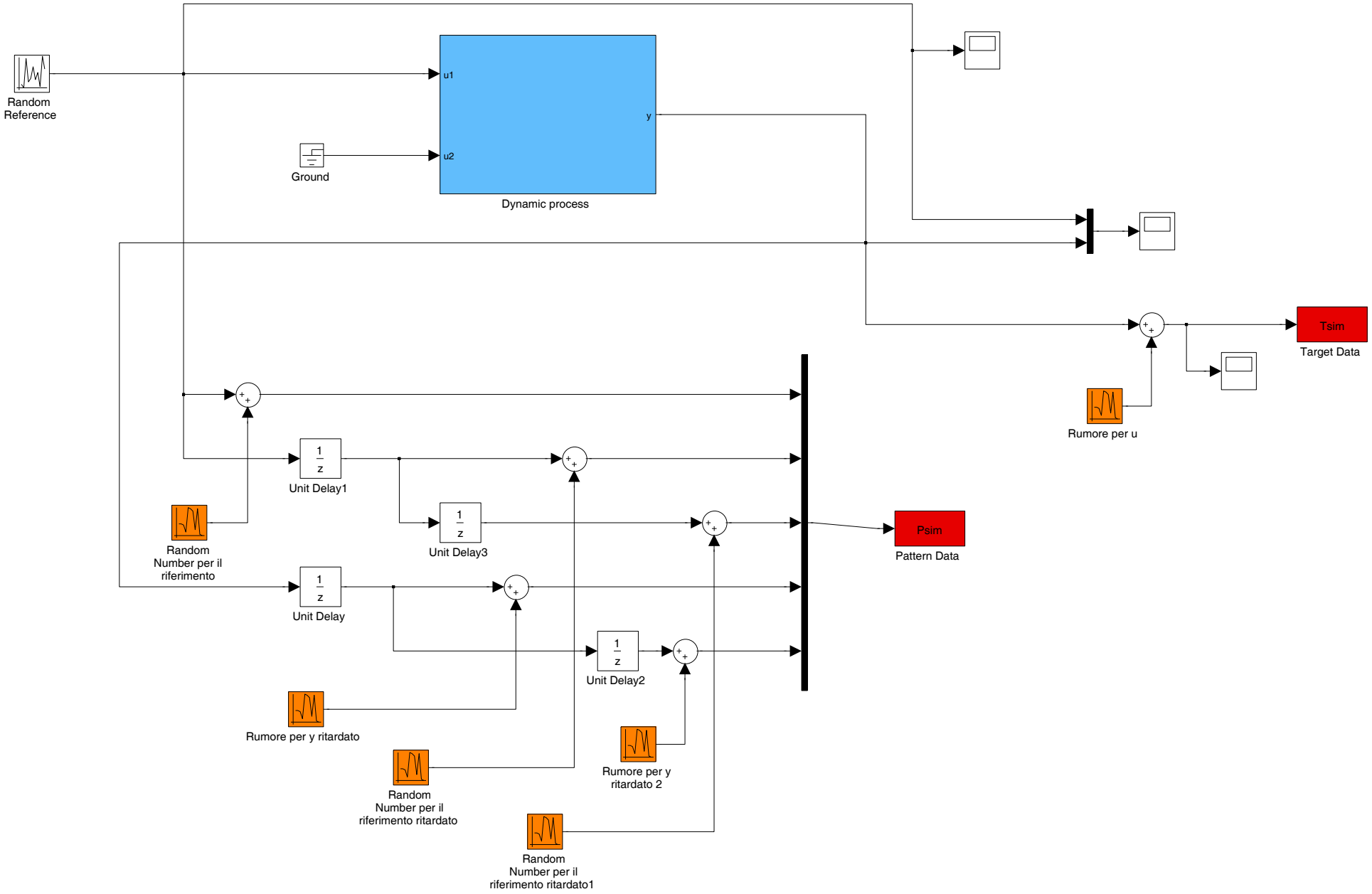

Random
Reference
u1
u2
y
Ground
Dynamic process
1
z
Unit Delay
Fuzzy Model
y(k) = F(u(k), y(k-1))

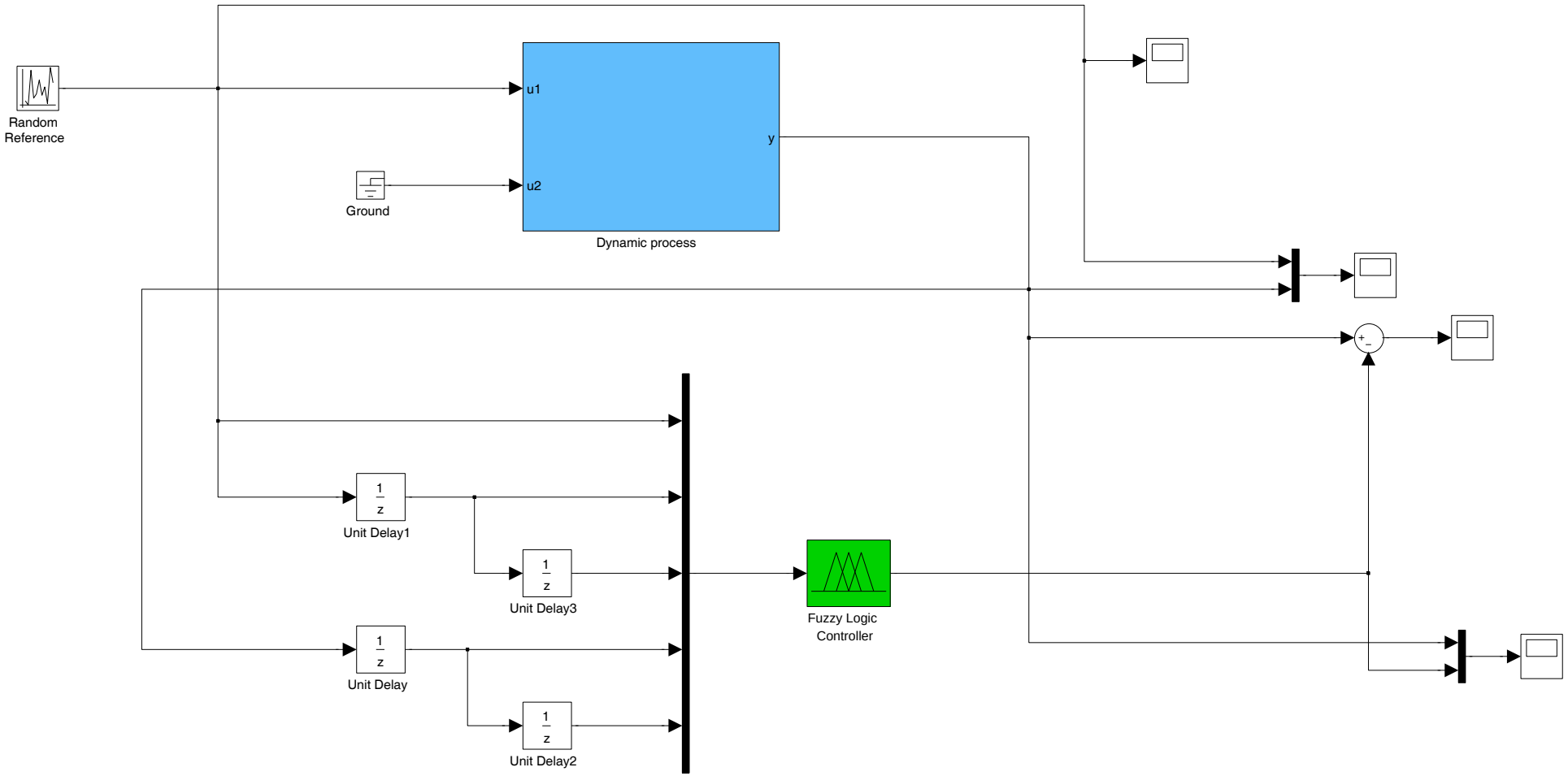

Random
Reference
u1
u2
y
Ground
Dynamic process
Set-point
X
1
z
Unit Delay1
Psim
Pattern Data
1
z
Unit Delay
Tsim
Target Data
Random
Number per il
riferimento
Rumore per y ritardato
Rumore per y
Random
Number per il
riferimento ritardato

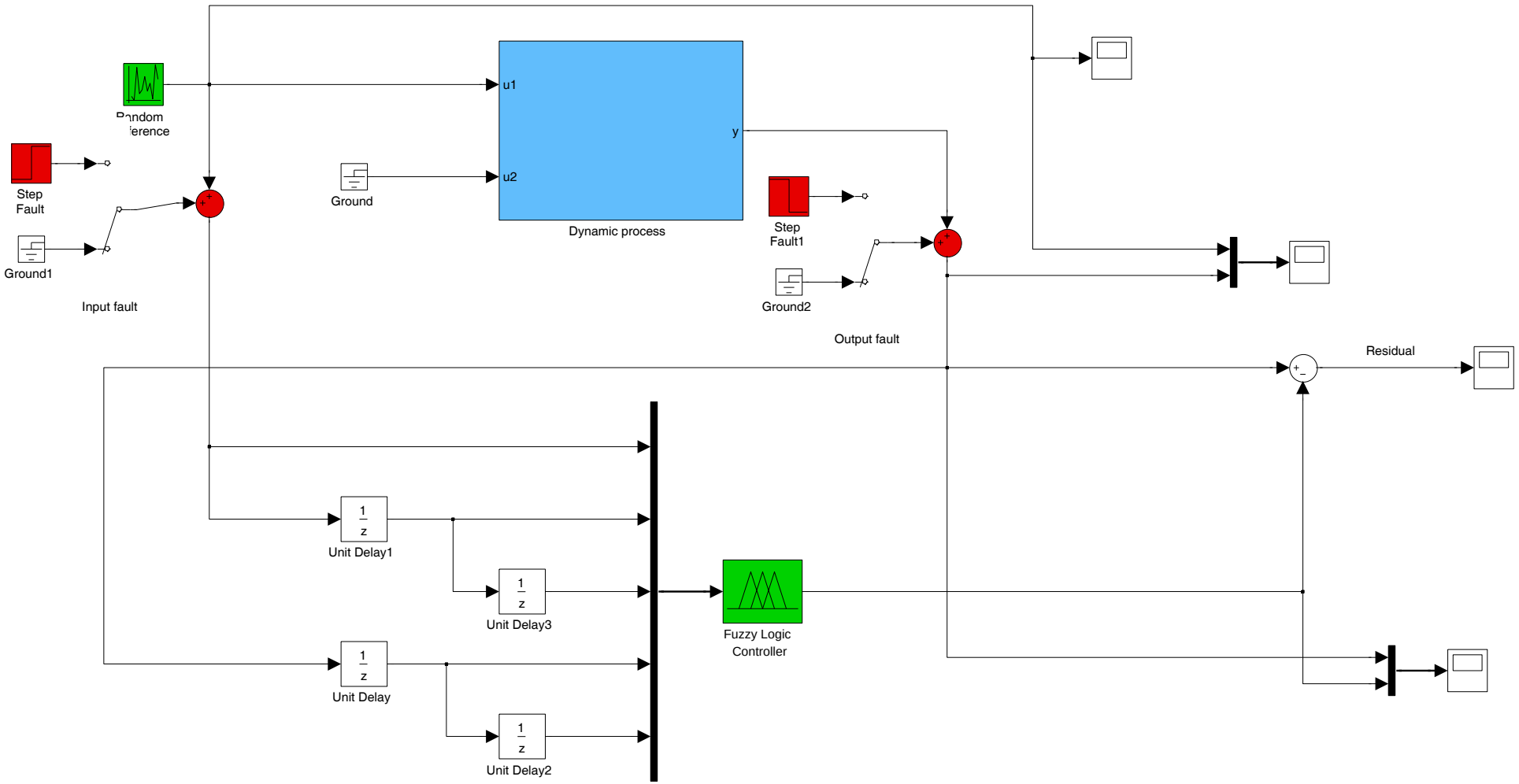

Random
Reference
u1
u2
y
Ground
Dynamic process
1
z
Unit Delay1
1
z
Unit Delay
Fuzzy Model
y(k) = F(u(k), u(k-1), y(k-1))


Random
Reference
u1
u2
y
Ground
Dynamic process
1
z
Unit Delay1
1
z
Unit Delay
Random
Number per il
riferimento
Rumore per y ritardato
Random
Number per il
riferimento ritardato
1
z
Unit Delay2
Rumore per y
ritardato 2
Psim
Pattern Data
Rumore per y
Tsim
Target Data


Random
Reference
u1
u2
y
Ground
Dynamic process
1
z
Unit Delay1
1
z
Unit Delay
1
z
Unit Delay2
Fuzzy model
y(k) = F(u(k), u(k-1), y(k-1), y(k-2))


Random
Reference
u1
u2
y
Ground
Dynamic process
Tsim
Target Data
Rumore per u
1
z
Unit Delay1
Unit Delay3
Unit Delay
Unit Delay2
Random
Number per il
riferimento
Psim
Pattern Data
Rumore per y ritardato
Random
Number per il
riferimento ritardato
Rumore per y
ritardato 2
Random
Number per il
riferimento ritardato1


Random
Reference
u1
u2
y
Ground
Dynamic process
1
z
Unit Delay1
Unit Delay3
Unit Delay
Unit Delay2
Fuzzy Logic
Controller


Random
Step
Fault
Ground1
Input fault
Ground
u1
u2
y
Dynamic process
Step
Fault1
Ground2
Output fault
Residual
1
z
Unit Delay1
Unit Delay3
Unit Delay
Unit Delay2
Fuzzy Logic
Controller