

```

function [tSeg, xSeg, uSeg, cmdSeg] = UAVFlyToWaypoint(x0, data, p)
% Final Project: Group 4
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% 9 Dec 2021
% UAVFlyToWaypoint
% Usage: [tSeg, xSeg, uSeg, cmdSeg] = UAVFlyToWaypoint(x0, wp, p)
%
% Fly a point mass aircraft model from an initial state to a waypoint
%
% State:      x = [V;gamma;psi;x;y;h;Tbar]
% -----
%   V      true airspeed
%   gamma  air relative flight path angle
%   psi    air relative flight heading angle
%   x      East position
%   y      North position
%   h      altitude
%   Tbar   normalized excess thrust
%
% Control:    u = [Lbar;phi;Tcbar]
% -----
%   Lbar    normalized excess lift
%   phi     bank angle
%   Tcbar   normalized excess thrust command
%
% Command:    cmd = [v;psi;h;x;y]
% -----
%   v       velocity command (true airspeed, m/s)
%   psi     heading command (rad)
%   x       eastward position (m)
%   y       northward position (m)
%   h       altitude command (m)
%
%-----
% Form:
% [tSeg,xSeg,uSeg,cmdSeg] = UAVFlyToWaypoint( x0, wp, data );
%-----
%
% -----
% Inputs
% -----
% x0      (7,1)  Initial state vector
% data      Feedback control parameters. Data structure with fields:
%           g      Gravitational acceleration
%           Kh     Altitude control gains
%           KL     Lateral control gains
%           Ks     Longitudinal control gains
% p        (.)   Flight parameters. Data structure with fields:
%           wp      (3,1)  Target waypoint position [x;y;h] (m)
%           Rmin    (1,1)  Minimum turn radius (m)
%           hDotMax (1,1)  Maximum climb rate (abs val) (m/s)
%           dT      (1,1)  Time step (s)
%           duration (1,1)  Max simulation duration (s)
%           stopSim = @(t,x) Anonymous function. Sim terminates
%                           when this evaluates to true.
%
% -----
% Outputs
% -----

```

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% tSeg    (1,N)    Time vector for this segment. Equivalent to "t" input.  
% xSeg    (7,N)    State vector across time for this segment.  
% uSeg    (3,N)    Control vector across time for this segment.  
% cmdSeg  (3,N)    Commands (v,h,psi) across time for this segment.  
%  
%-----
```

```
% Call UAV Steering using the waypoint to generate steering functions  
% [tSeg, vCmdFun, hCmdFun, psiCmdFun] = UAVSteering(x0, wp, p);  
% [cmd, cmdDot] = UAVGuidance( t, x, p );
```

```
% Define time interval (TODO: Decide on limits)  
tSeg = 0:p.dT:p.duration; % sec
```

```
% Call UAVSim on the steering functions to simulate the UAV  
[tSeg, xSeg, uSeg, cmdSeg] = UAVSim(tSeg, x0, data, p);
```

```
end
```