```
function [fx, Fx] = coordinatedTurnMotion(x, T)
%COORDINATEDTURNMOTION calculates the predicted state using a
 coordinated
%turn motion model, and also calculated the motion model Jacobian
%
%Input:
%   x           [5 x 1] state vector
%   T           [1 x 1] Sampling time
%
%Output:
%   fx          [5 x 1] motion model evaluated at state x
%   Fx          [5 x 5] motion model Jacobian evaluated at state x
%
% NOTE: the motion model assumes that the state vector x consist of
 the
% following states:
%   px          X-position
%   py          Y-position
%   v           velocity
%   phi         heading
%   omega       turn-rate

% Your code for the motion model here
fx = [x(1,1)+T*x(3,1)*cos(x(4,1));
    x(2,1)+T*x(3,1)*sin(x(4,1));
    x(3,1);
    x(4,1)+T*x(5,1);
    x(5,1)];

%Check if the Jacobian is requested by the calling function
if nargout > 1
    % Your code for the motion model Jacobian here
    Fx = [1 0 T*cos(x(4,1)) -T*x(3,1)*sin(x(4,1)) 0;
        0 1 T*sin(x(4,1)) T*x(3,1)*cos(x(4,1)) 0;
        0 0 1 0 0;
        0 0 0 1 T;
        0 0 0 0 1];
end

end
```

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