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Description of Generic Path Following Algorithm:

1. Define the path to be followed as a parametric function. (F = $F_x(T)\hat{i}+F_y(T)\hat{j}+F_z(T)\hat{k}$ where T is your parametric variable)

2. Place the object that will follow the path in its initial position P0 = (x, y, z) = (Fx(T_0), Fy(T_0), Fz(T_0)).

3. Set the desired speed for the object.

4. Get the amount of time passed since last update of object's position. (For a game, this will be the time interval between last call of main game loop and current call of main game loop, e.g., for 60 frames / sec, time would be approximately 1/60 = 0.0167 secs.)

5. Calculate desired distance object is to travel by multiplying speed * time.

6. Create a new point on the path, P1, just slightly ahead of P0, by adding a small increment (delta T) to the initial value of your parametric variable and calling your parametric function, P1 = (Fx(T0 + delta T), Fy(T0 + delta T), Fz(T0 + delta T). (Unfortunately this is a bit confusing, because I used T for the parametric variable name. The delta T here is NOT the change in time, it's just an arbitrarily small value selected to get a new point, P1).

7. Subtract P0 from P1 and place the result back into P1. P1 will then be a vector from P0 representing a tangent along your path (it will actually be a secant, but for small enough delta T they will be approximately the same).

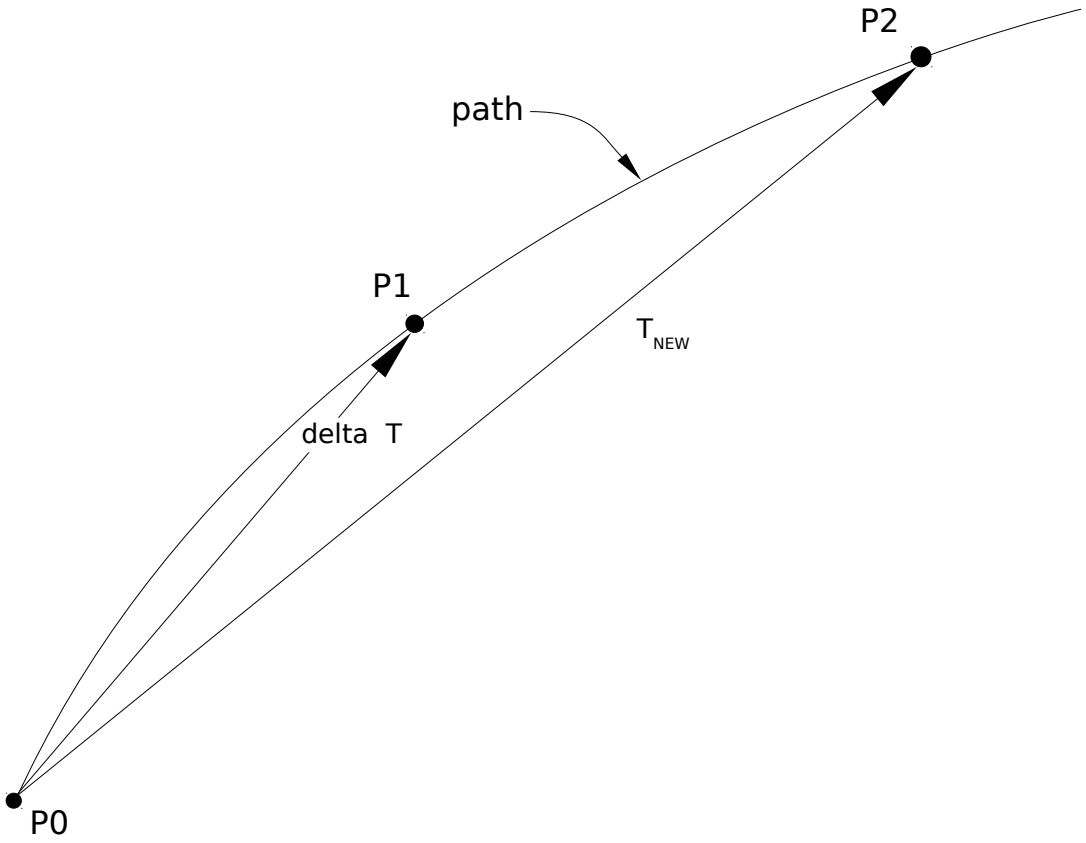
8. Divide P1 by delta T, this gives you an approximation of F'(t) – the derivative of your parametric function.

9. Now we need to find the new value of the parametric variable, T_{NEW}, to get the object to its new point, P2. The distance to be traveled (calculated in step 5) = $T_{INCREMENT}$ * F'(t). So $T_{INCREMENT}$ = distance / F'(t).

10. Add $T_{INCREMENT}$ to T_0 to get T_{NEW}. ($T_{NEW} = T_0 + T_{INCREMENT}$).

11. Feed T_{NEW} into your parametric function to get the updated position for your object, P2 = (Fx(T_{NEW}), Fy(T_{NEW}), Fz(T_{NEW})).

12. Move object to P2. P2 then becomes P0 for the next iteration. Return to item 3 above until you no longer wish to keep moving the object.


P2
path
P1
T_{NEW}
delta T
P0