

# control-speed: moderate speed along a twisty trajectory

`control-speed` utility sets the speed of each waypoint in the path based on its position in a curve.

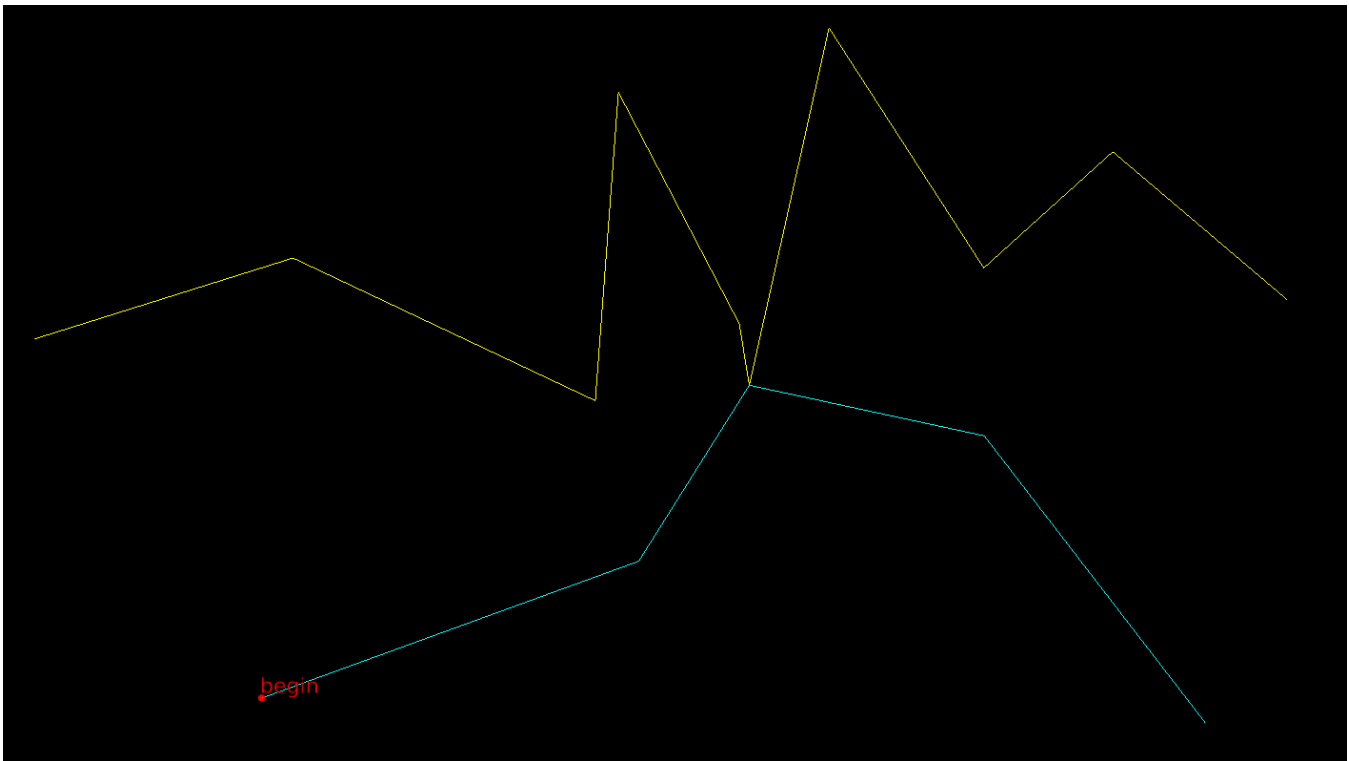
`turn` operation calculates the angle at each waypoint with respect to its adjacent waypoints and assigns the speed according to given maximum lateral acceleration. By passing `--stop-on-sharp-turn` or `--pivot`, `control-speed` can implement spot turn by outputting an extra waypoint with relative heading and no speed, for each sharp turn in the trajectory.

```
$ ( echo '0.0,0.0'; echo '0.3,0.3'; echo '0.6,0.6'; echo '0.6,0.9'; echo '0.6,1.2'; echo '0.9,1.2'; echo '1.2,1.2'; echo '1.5,0.9'; echo '1.8,0.6' ) > trajectory.csv

# moderate speed
$ control-speed turn --max-acceleration=0.5 --approach-speed=0.2 --fields=x,y --speed=1 < trajectory.csv > speed-turn.csv

# stop on sharp turns
control-speed turn --max-acceleration=0.5 --approach-speed=0.2 --fields=x,y --speed=1 --pivot < trajectory.csv > speed-pivot.csv

# visualise with trajectory as blue and speed as z axis in yellow
$ view-points "trajectory.csv;fields=x,y;shape=lines;title=trajectory" <( echo 0,0,begin )";fields=x,y,label;weight=8;color=red;title=origin" "speed-pivot.csv;fields=x,y,z;shape=lines;color=yellow;title=turn"
```



`control-speed decelerate` operation moderates the sudden decrease in speed in the trajectory by a given deceleration.

```
$ control-speed decelerate --fields=x,y,speed --deceleration=0.5 < speed-pivot.csv > speed-decelerate.csv

# visualise with speed as z-axis and orange color as the decelerated speed
$ view-points "trajectory.csv;fields=x,y;shape=lines;title=trajectory" <( echo 0,0,begin )";fields=x,y,label;weight=8;color=red;title=origin" \
    "speed-pivot.csv;fields=x,y,z;shape=lines;color=yellow;title=turn" "speed-decelerate.csv;fields=x,y,z;shape=lines;color=orange;title=decelerate"
```

