Positions:

$$x_n(t) = a_{x_n}t^3 + b_{x_n}t^2 + c_{x_n}t + d_{x_n}$$
$$y_n(t) = a_{y_n}t^3 + b_{y_n}t^2 + c_{y_n}t + d_{y_n}$$

Accelerations:

$$\ddot{x}_n(t) = 6a_{x_n}t + 2b_{x_n}$$
$$\ddot{y}_n(t) = 6a_{y_n}t + 2b_{y_n}$$