Equations

The initial positions

$$f(id,x,n,d) = x - \frac{(n-1)\times d}{2} + d \times (id-1)$$

We call $f(id,n,d)$ as $f_{InitialPos}$

id is the id of each drone

x is the initial x position

n is number of drones

d is the distance between drones

The waiting time

$$f(id,t) = id \times (t-1)$$

We call $f(id,t)$ as $f_{WaitTime}$

id is the id of each drone

t is the input time

Go to any position in straight path

$$f_1(x_1,y_1,x_2,y_2,v,t) = \begin{cases} x_1 + \frac{v\times(x_2-x_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t & \left(\left|\frac{v\times(x_2-x_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t\right| < |x_2-x_1|\right), \\ x_2 & \left(\left|\frac{v\times(x_2-x_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t\right| \geq |x_2-x_1|\right) \end{cases}$$

$$f_2(x_1,y_1,x_2,y_2,v,t) = \begin{cases} y_1 + \frac{v\times(y_2-y_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t & \left(\left|\frac{v\times(y_2-y_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t\right| < |y_2-y_1|\right), \\ y_2 & \left(\left|\frac{v\times(y_2-y_1)}{\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}} \times t\right| \geq |y_2-y_1|\right) \end{cases}$$

We call $f_1(x_1,y_1,x_2,y_2,v,t)$ as $f_{ApproachPosX}$, $f_2(x_1,y_1,x_2,y_2,v,t)$ as $f_{ApproachPosY}$

(x_1, y_1) is the initial position

$(x_2,\, y_2)$ is the final position

v is the speed

t is the input time

Wait then go to a position

$$f_1(x_1,y_1,x_2,y_2,v,t,w) = \begin{cases} x_1 & (t<w), \\ f_{ApproachPosX}(x_1,y_1,x_2,y_2,v,(t-w)) & (t \geq w) \end{cases}$$

$$f_2(x_1,y_1,x_2,y_2,v,t,w) = \begin{cases} y_1 & (t<w), \\ f_{ApproachPosY}(x_1,y_1,x_2,y_2,v,(t-w)) & (t \geq w) \end{cases}$$

We call $f_1(x_1,y_1,x_2,y_2,v,t,w)$ as $f_{WaitAndApproachPosX}$, $f_2(x_1,y_1,x_2,y_2,v,t,w)$ as $f_{WaitAndApproachPosY}$

(x_1, y_1) is the initial position

$(x_2,\, y_2)$ is the final position

v is the speed

t is the input time

w is the time the drone should be waiting

The position each drone should be of the Ferris Wheel

$$f_1(id, n, x, r, v, t) = x + r \times cos(\frac{id}{n} \times 2\pi + \frac{v}{r} \times t)$$

$$f_2(id, n, y, r, v, t) = y + r \times sin(\frac{id}{n} \times 2\pi + \frac{v}{r} \times t)$$

We call $f_1(id, n, x, r, v, t)$ as $f_{WheelPosX}$, $f_2(id, n, y, r, v, t)$ as $f_{WheelPosY}$

id is the drone id

n is the number of drones

x is the x of the center of circle

r is the radius of the circle

v is the speed

t is the time

Time taken for going to the right position in Ferries

$$f(n, y, r, d, v) = \frac{\sqrt{(y+r)^2 + (f_{InitialPos(\frac{n}{4},0,n,d)})^2}}{v} + f_{WaitTime}(\frac{n}{4}, 0)$$

We call f as $f_{ArriveTime}$

Time taken for a complete circle

$$f(r, v) = \frac{2\pi r}{v}$$

We call $f(r, v)$ as $f_{CircleTime}$

r is the radius

v is speed

The final equation of the Ferris Show

$$f(id, t, n, x, d, y, r, v, cn) = \begin{cases} f_{WaitAndApproachPosX}(f_{InitialPos}(id, x, n, d), 0, f_{WheelPosX}(id, n, x, r, i, t), f_{WheelPosY}(id, n, y, r, i, t)) & t < f_{ArriveTime}, \\ f_{WheelPosX(id,n,x,r,v,t-f_{ArriveTime})} & f_{ArriveTime} < t < \end{cases}$$