

Movable Robot Routing in a Dynamic Environment Based on the hormone

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ABSTRACT

Robot routing and planning the incoming information from the sensors of the moving robot is an essential skill. Therefore, considerable research has focused on the technical challenges. One of these challenges is how the robot moves in the environment search path and what to do, and Environment map to find such a way to reach their goal. In this paper, inspired of the hormone secretion we suggest a design, that moving robot is able to pass the barriers, and using the information received from the target to find. In this plan sense messages exchanged between the robot and placed stations on the route, Intermediate stations as intermediate destinations as places where the robot through its planning to increase the accuracy of the robot is produce, It uses.

KEYWORDS: Routing, robot, hormone, dynamic environment.

1. INTRODUCTION

The new generation of robots that can independently operate automatically and intelligently, have the ability to create program to move from one point to another, So that this motion as quickly as possible, preferably, without encountering obstacles along the track. Also robot directs problem for respond to the needs of the late 1970s, that was introduced as one of the most important areas of robotics researchers were interested. Movable robot instructed using of router hormone secretion pattern as an algorithm that is inspired from nature and the human body.

Different routing methods can be divided into two categories. The first category includes diagram methods in which the routing is done based on dividing space into geometric shapes (road design Methods, Analysis of cell and ...) [1] [2] and the second category includes approaches based on potential field in which routing is based on the use of physical models for the robot and its surroundings is done [3] [4]. In this paper we use the idea of the body's endocrine glands hormones that we want to lead problem of mobile robot in a dynamic environment, pursue. Guidance and routing for a Movable robot, robot during its traverse from source to destination without collision with obstacles in the environment may find its path. In this regard, it is optimized and simplified way, benchmarks for selection are conducted.

Hormonal secretion pattern is similar to the method of potential field. Potential field method is a field or gradient in robot map creating the robot's current position that can lead to the goal. Field is defined as a differentiable function. The hub is located in the downhill direction the robot will follow. Main goal is as an attractive force and repulsive forces act as barriers. The resultant of dual forces will be applied to the robot. Thus, the robot will move towards the target of the obstacles. And if new objects are placed in the field of robot path is changed so that the impact on them.

In this paper the method proposed is based on the logic of sending and receiving messages between the robot and stations in the area to reach the desired goal accomplished. We consider That modeling of mobile robot routing chemical secretions called hormones, we propose a scheme to provide, That Movable robot is able to pass the barriers And using the information received from the target to find.

2. The study of Hormone

The internal glands in the body of creatures' impact on the special cells activity by Freeing materials called hormone in the blood that we label them goal cells. In fact goal cells have special hormones recipients (figure 1). Indeed hormone is a kind of chemical message sender oozing by a gland without a odium. In other words the Collection of cells in the gland form constructs a chemical material that have displaced in the body by blood rotation.

When an appropriate order sends to the glands the chemical message sender enters to the blood rotation. This chemical sender spreads in all of the body to act special task in the tissue.

Most hormones impact on the different tissues. After freeing they can freely or dependent on the special proteins spread in the blood rotation. Human body needs to the relation mechanisms to continue his activity. Two mechanisms of hormones and nerves do different tasks according to their kinds. The main factor in the influence of hormone on the goal cells is the recipient in the goal cells. These recipients in the goal cell can be as a inter-cell or membrane cell.

There are two kinds of hormone recipients: ER-alpha and ER-beta. The spreading of these two is different for example ER-alpha exists on the generation system and ER-beta on the other tissues.

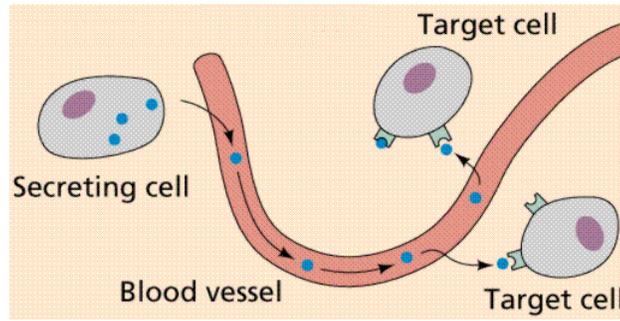


Fig. 1. Transfer Mode of hormones in the body

Hormones at the inter gland system play an important role in controlling of the body physiological balance such as arrangement of the blood sugar density and the body heat degree [5]. They include following characteristics:

- 1-Especiality: one type of hormone is only for goal or special function at tiny gland System.
- 2-Massage sender: hormone has no energy but it says to the received organ what to do.
- 3-Exploitation: a little amount of hormone can play an important task such as Maintain physiological balance.
- 4-Correlation: different hormones may cooperate or not after maintaining environment balance.
- 5-Longevity: each hormone has its long of life. Its density will decrease until it gets a Way.

Hormone has unique benefits in the best of decision. This idea depends on the Control of hormone and relation. Its benefit is that each knot only needs to gather its Neighbor information instead of throughout information for controlling the form of robot that is a vital part of distributed system [6].

3. Adapted information from Hormone:

This theory was introduced by WM shen [7] [8] [9]. He introduced two protocols: AC and ADC. In both of them each hormone interacts in sending message activity like robot [8]. Zhang and Liu [10] introduced the model of p2p networks based on (HP2PON) that have complete interaction with the distributed knots. Trumler introduced the artificial hormones as a general way for making self-determined system based on networks that can use in the case networks [11]. For controlling and connecting, hormone has these characters:

- 1-This is not distance but transferring is done by all networks.
- 2-Special goal may react to special act.
- 3- Longevity and could be go away with time or purpose.

4. Description of suggested way:

Guiding mobile robot issue defines as movement of robot to a goal and passing of external obstacle in a dynamic environment using sensors and IC, PE, RF that its task is receiving robot signal, identification the environment and communication based on received information from robot and prepares an appropriate plane to reach the goal.

In this article with the use of radar idea, (MAC) is used for transferring message between source and target. This protocol in fact consists of two source messages: RTS and CTS. These two show source and target existence in environment .Sender with sending RTS to inter knots, manifests awareness. After receiving the RTS package, if the distance is ready, with sending CTS, reacts to environment. Receiving the CTS package sender can start to send data.

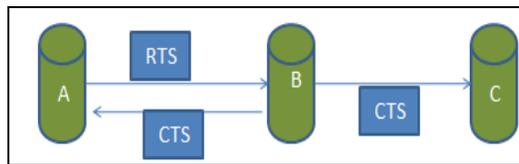


Fig.2. Message sending

In figure 2 station A wants to send a message to station B. A sends RTS to its neighbor stations that is B. At this time from station B a CTS message is sent to A and C. So from CTS C knows that A and B are in interaction and this shows existence of an active station. After receiving message from B, data will establish between two stations. The sensor that we use in robot designing is a kind of ultrasonic waves with sound frequency. These sensors are usually used in manifesting things. The range of these sensors (SRF02) is between 18cm to 4m.

In this article because the movement of robot is in a dynamic environment and Because its unidimension and robot use electronic sensors for receiving and sending message, so the movement of robots will search carefully.For facilitation, we assume robots like holonomic [12]. With this hypothesis the things

Around robots such as obstacles will manifest linearly. Robots observations are composed of two kinds of information. The first type is measurement from distance sensor that is put on the robot and shows timely position.

Relation1:

$$Ut = (\delta trans, \delta \theta) \tag{1}$$

In relation 1 $\delta trans$ Displacement of the robot and $\delta \theta$ Circulation is done by robots.

The second is that the observation at t (zt) that is done by sensors, shows distance from obstacles $Z_t=(r_1,b_1,\dots,b_n)$.

4.1. Movement quotation:

Device of first order nonlinear differential equation, consider:

Relation 2:

$$\dot{x} = \frac{d}{|d|}y + x(r_b^2 - x^2 - y^2) \tag{2}$$

$$\dot{y} = \frac{d}{|d|}x + y(r_b^2 - x^2 - y^2)$$

Scholarly such as Puncaro and Bandiscon worked on these Mechanisms. The answer is in the form of circle with radius R. If the ratio $d/|d|$ becomes Positive, the rotation is like clock rotation and if it becomes 1, the rotation will be opposite clock rotation. d Vertical distance from the center of the robot to the goal line that has been drawn. In this system, x and y are the distance from obstacle focal that the robot should circle around it. Their derivations are the ratio of speed to obstacle center in dekart System. Their answer according to time is in following relation 3.

Relation 3:

$$\begin{cases} y = \frac{\sin(t + t_0)}{\sqrt{\frac{1}{r_b^2} ce^{-2r}}} \\ x = \frac{\cos(t + t_0)}{\sqrt{\frac{1}{r_b^2} ce^{-2r}}} \end{cases} \tag{3}$$

The answer polar coordinate system in Relation (4) below.

Relation 4:

$$\theta = t + t_0, r = \frac{1}{\sqrt{\frac{1}{r_b^2} ce^{-2r}}} \tag{4}$$

General answer is the curve which is movable like an eddy to a center and when they arrive it, circle around it. The answer is in the below:

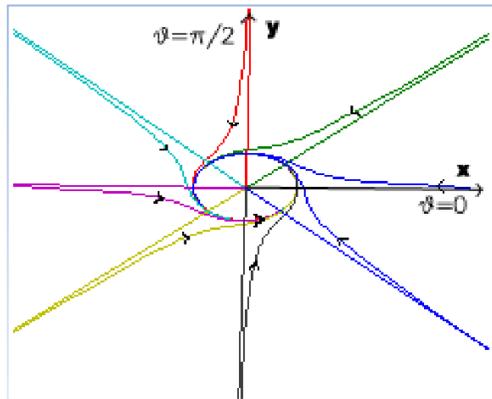


Fig.3. Draw the general solutions equation (2) along with the asymptotic

for each negative C, the answer is like figure3. The robot gains its ratio distance to station like dynamic and circles the obstacle (figure 4).

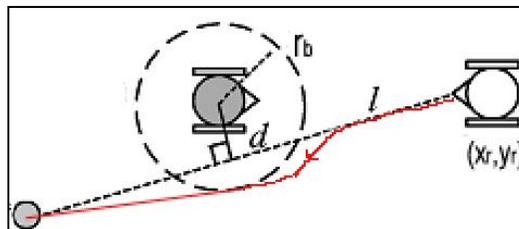


Fig.4. Manners get around circular obstacles

Assume an environment has a lot of stations that displace randomly. Each station has one sensor, control and relations unit for connecting to other knots such as robot.

Each station task is receiving environment information and transferring it to the robot for circling in the environment.

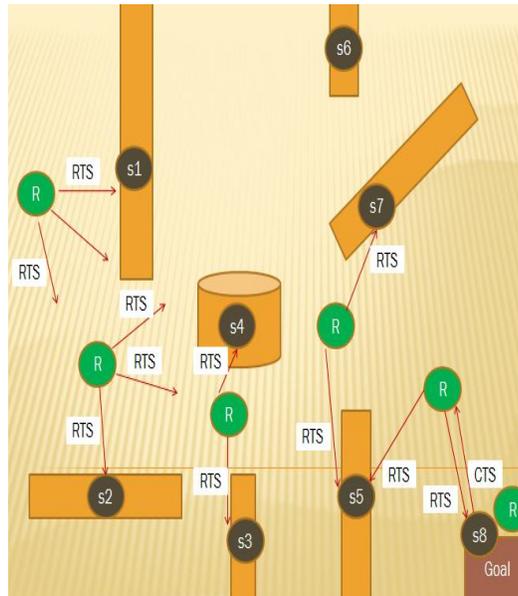


Fig.5. How to publish messages in the environment

We see in figure 5, the robot in the starting movement spreads RTS message in the environment. In fact assume a man seeks his missing in a busy city. The sender range spreads the signals from robot to environment around it that is nearly 1/5m. The station receives signal and after searching and processing, if there is a harmony Between robots and data station, a CTS message sends to robot.

In figure 5, in starting movement, the robot spreads one signal to environment and because there is only S1 station, so receives signals and does not react. Then using sensors it continues to radaring till arrives to another station. The other stations positions are like S1. The station S8 after receiving message, analogues it with properties and seeks characters with its own then makes a relation.

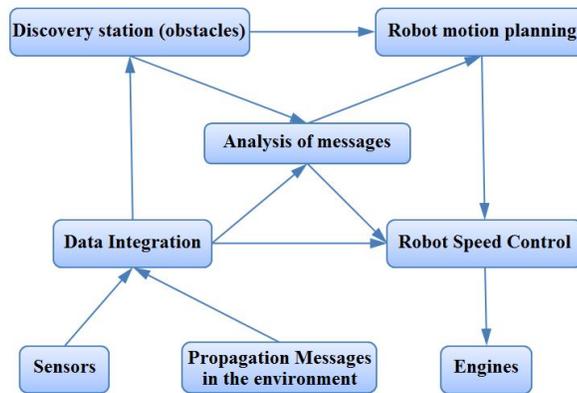


Fig.6. Block diagram of robot hardware

In figure 6 diagram, firstly sensors and receiver and senders, send their robots data for discovering obstacles and then analysis for center controlling. After these stages, movement of robot for controlling speed and movement from center controller reaches to engine and continues its usual way.

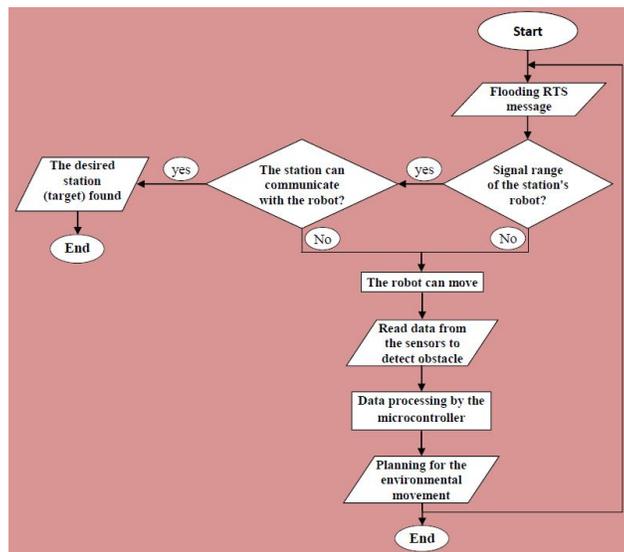


Fig.7. Flowchart the proposed scheme

5. Conclusion

Uses the hormones conception can do an important role in selecting a path for the robot is efficient. Therefore, in this paper, we apply hormones to Routing walking robot in a dynamic environment we have. Sensors, different sections based on hormone reception and its current state are doing. Analysis shows that the proposed scheme we use information received from the environment to find the desired goal routing can do better. Our future work is to apply graph Method based on the routing idea on hormones.

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