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Study on Complete Coverage Algorithm for Robots

Presenter: Shuai Li
Department: Electrical & Computer Engineering
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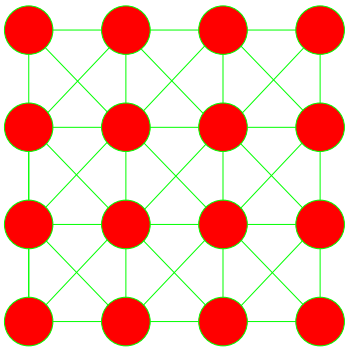
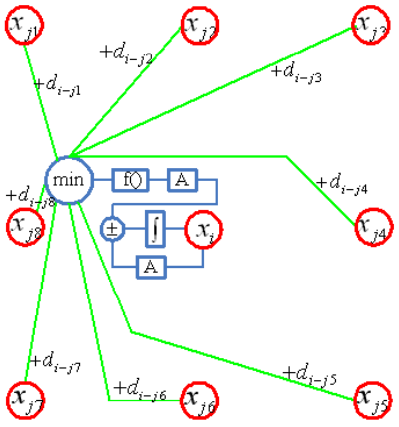
Basic Research Method: locally connected regress neural network



Spatial structure of a 2-D neural network



The two layered structure of an individual neuron

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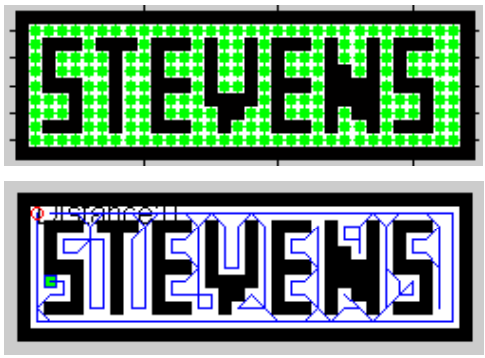
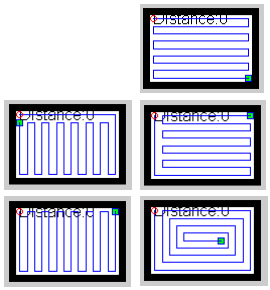
Research Results

Complete coverage path planning for Omni-directional robot:





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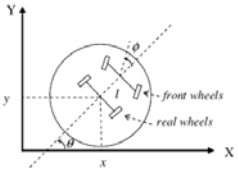
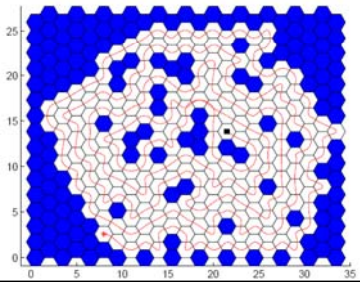
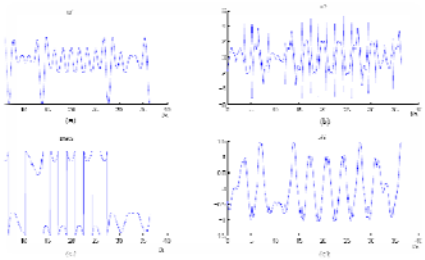
Research Results

Complete coverage path planning for car-like robot(with non-holonomic constraint):

$$\begin{bmatrix} \dot{x} \\ \dot{y} \\ \dot{\theta} \\ \dot{\phi} \end{bmatrix} = \begin{bmatrix} \cos\theta \\ \sin\theta \\ \tan\phi/l \\ 0 \end{bmatrix} \rho u_1 + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} u_2$$







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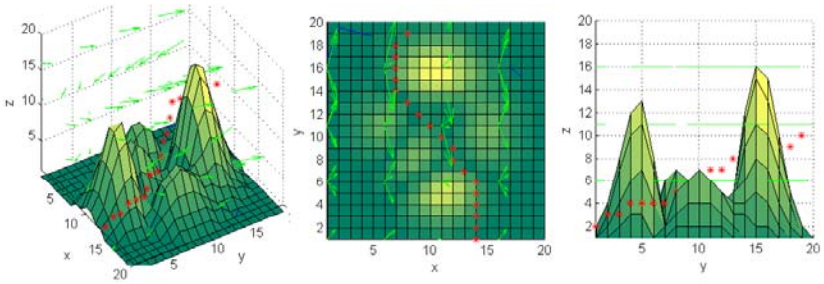
Research Results

path planning for AUV in 3D underwater environment with complex current fields :



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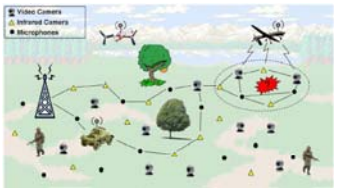
Possible Applications

- cleaning robots, painter robots, lawn mowers, land mine detection
- security patrolling
- sensor network node coverage deployment
- Search, rescue and exploration

Advantages of this Research:

1. High efficiency.
2. Easy to be implemented with hardware.
3. Can completely cover everywhere.



Next Steps considerations:

Study situations with multiple robots cooperation.

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Thank you for your attention!

Any questions?