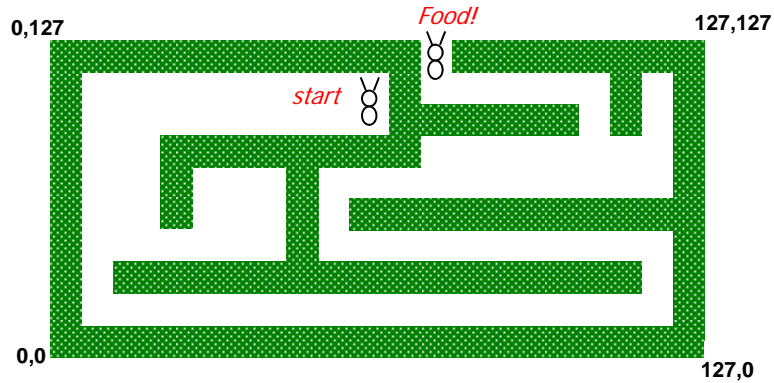


Extra credit (worth 10pts equivalent in a midterm)

Design the robotic ant's brain with virtual maze representation

- Due last day in class, Friday, December 5; printouts only
- Graded on clarity and completeness of explanation
- No questions will be answered, no late submission accepted



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1

The maze

◆ Virtual maze

- 128 × 128 grid
 - ↳ Stored in memory
 - ↳ 16384 8-bit words
- YX is maze addresses
 - ↳ X is the ant's horizontal position (7 bits)
 - ↳ Y is the ant's vertical position (7 bits)
- Each memory location says
 - ↳ 00000001 ≡ No wall
 - ↳ 00000010 ≡ North wall
 - ↳ 00000100 ≡ West wall
 - ↳ 00001000 ≡ South wall
 - ↳ 00010000 ≡ East wall
 - ↳ 00100000 ≡ Exit

Can have multiple walls
Example: 00001100
⇒ Walls on South and East

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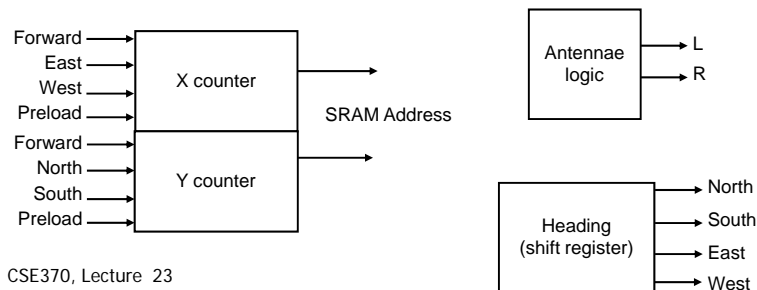
2

Design of different components

Predesigned:



Submit the designs for:



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3

Recommendations

- ◆ Memory controller
 - Move horizontally: Increment or decrement X
 - Move vertically: Increment or decrement Y
- ◆ Shift register for heading
 - N: 0001
 - W: 0010
 - S: 0100
 - E: 1000
 - Rotate right when ant turns right
 - Rotate left when ant turns left
- ◆ Combinational logic for antennae logic

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4