The Automated Gardener

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Overview

- What is Mechatronics?
- Our Goal: A robot Planter
- The Schematics
- Featured Part: Skid steering
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- Future Goals
- Acknowledgements

What is Mechatronics?

Mechatronics is the synthetic integration of:

➢ Mechanical Engineering
➢ The Control Theory
➢ Computer Science
➢ Electrical Engineering
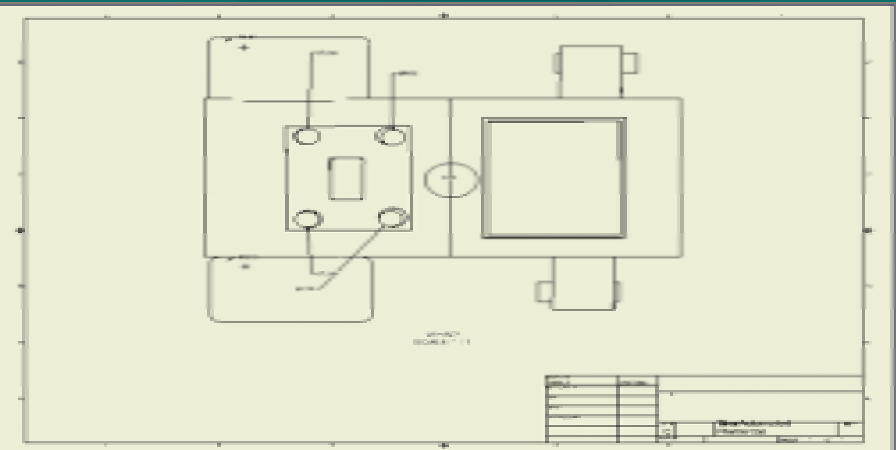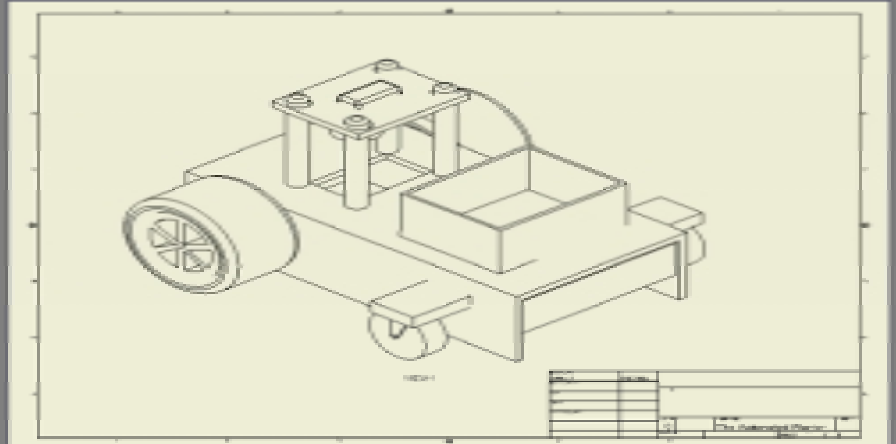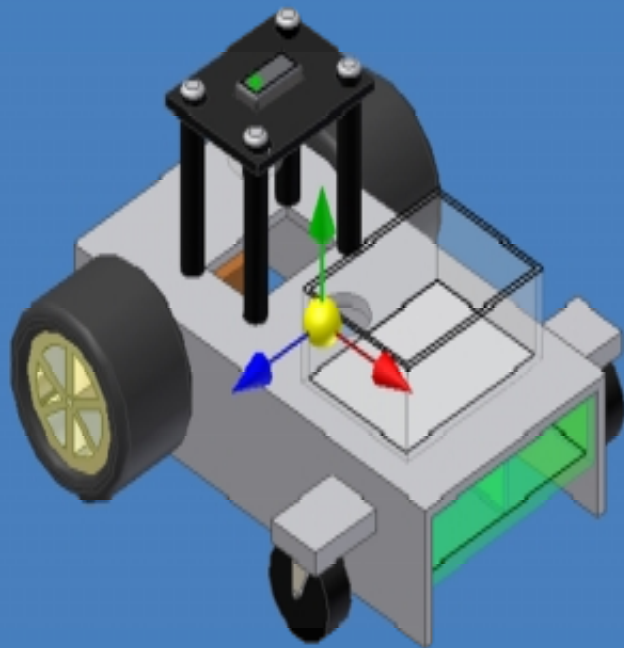
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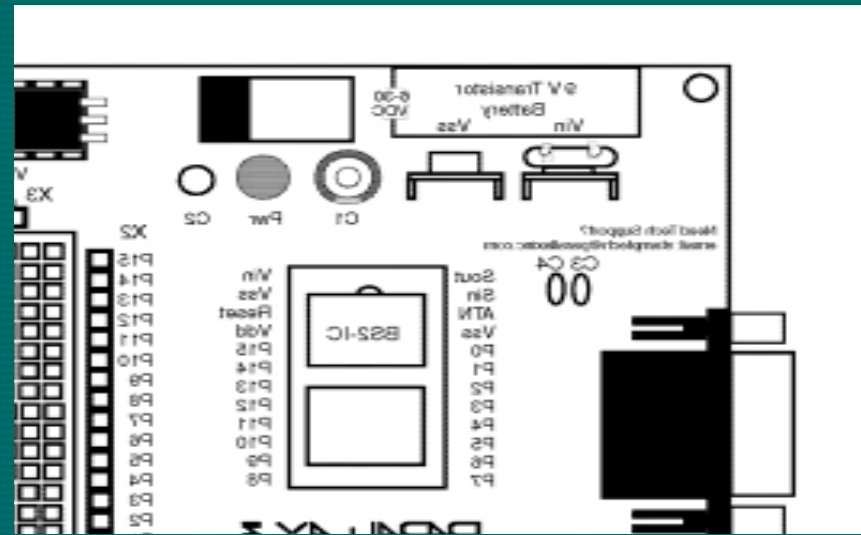
Our Goal: A Robot Planter

- Create a robot that will drill a whole, deposit seeds and water the soil

- Less time consuming

- Can be used by commercial growers as well as individuals in their home gardens

www.people.fas.harvard.edu/,,,/farming.jpeg
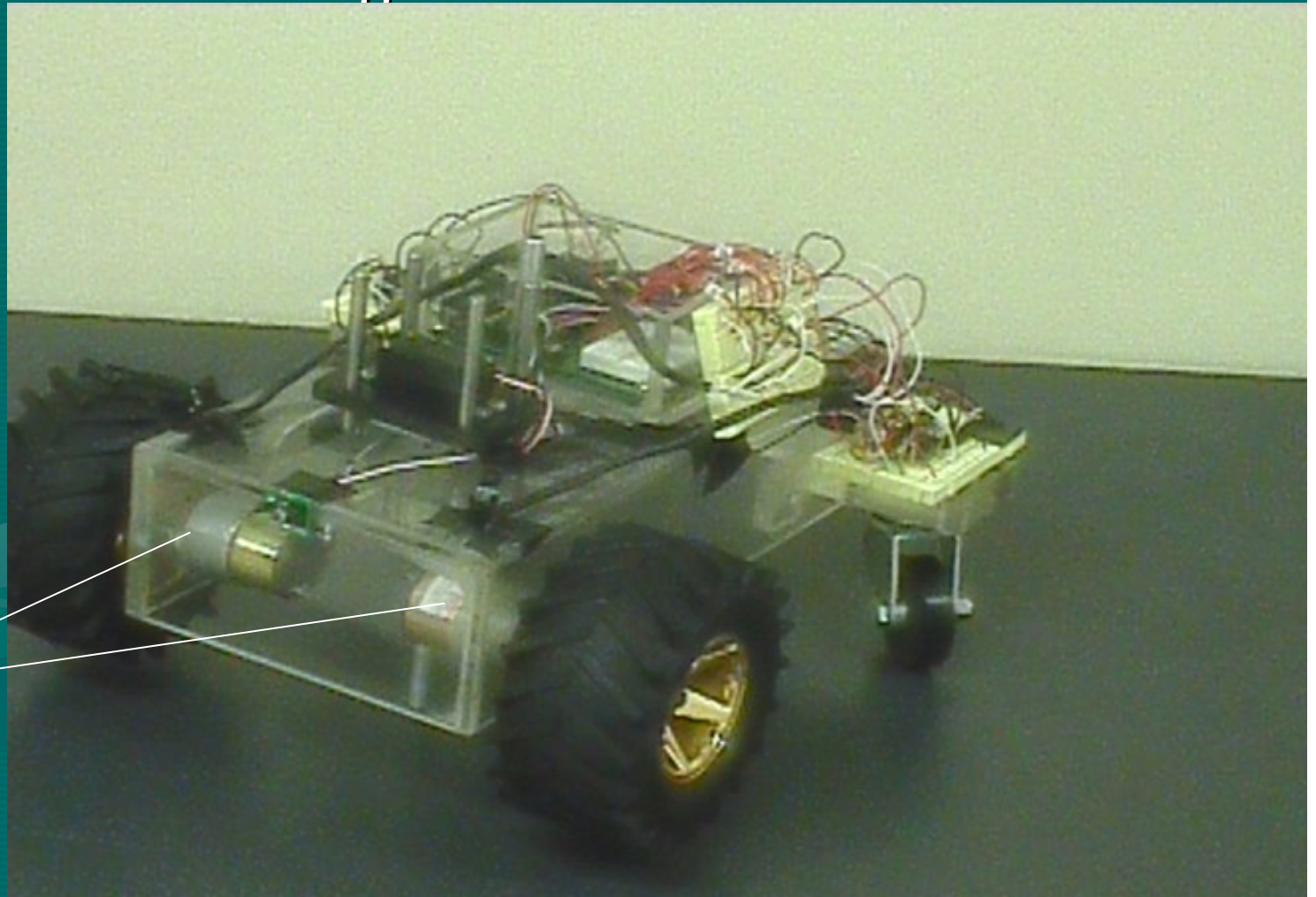
The Schematics

All Designs Created on Discret's Autodesk Inventor

Featured Part: Skid steering
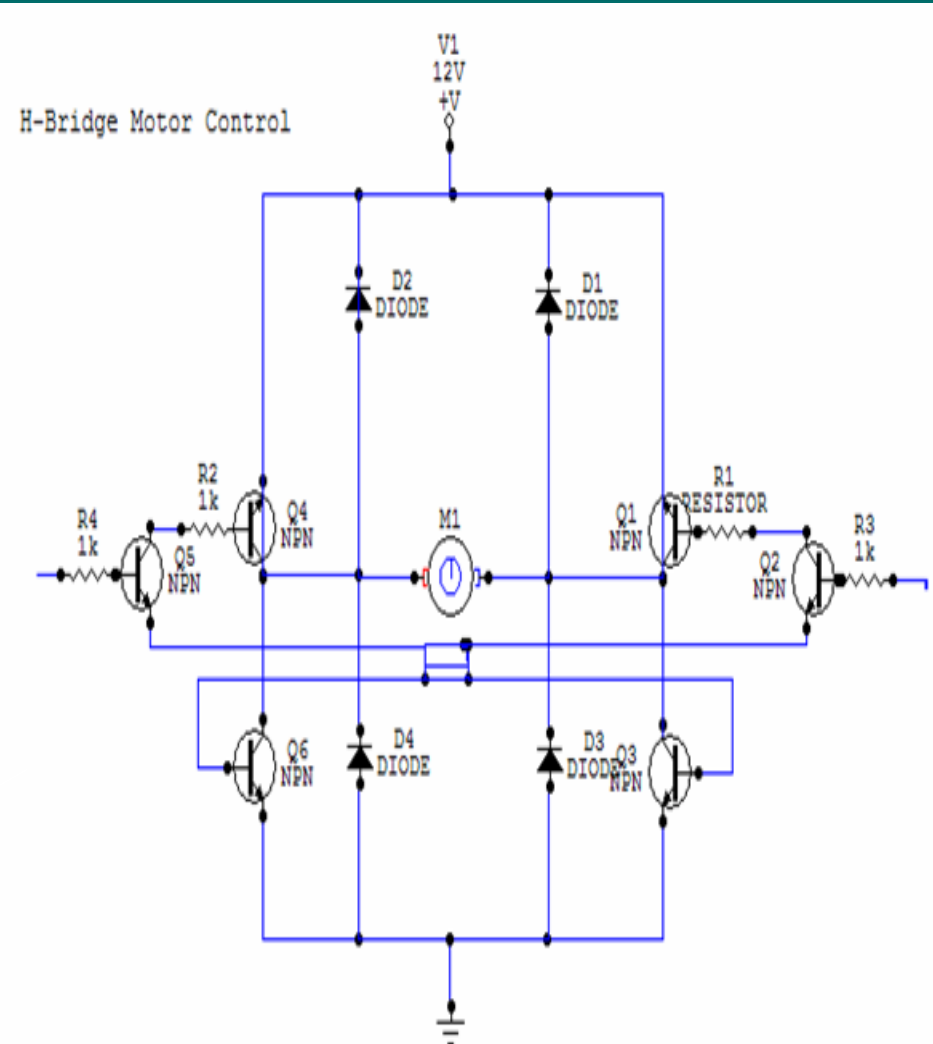
- Allows an easier turning radius
- Traction
- Power

Skid Loaders

Power and Mobility

- DC motors can not be directly controlled from a Basic Stamp:

- Solution: H-Bridge: controls and limits the directional force of the motor as well as its speed

Designed on Circuit Maker

H-Bridge Motor Control

V1
12V
+V

D2 DIODE   D1 DIODE

R2 1k   Q4 NPN   M1   Q1 NPN   R1 RESISTOR   R3 1k

R4 1k   Q5 NPN   Q2 NPN

Q6 NPN   D4 DIODE   D3 DIODE   Q3 NPN

Power and Mobility (Con'd)

- Simple avoidance Method
- Line path following
- Moding System

```
'----------------------------------Turning Movement----------------------------------
MiddleIR:
 DIR13=1
   FREQOUT MidIR,1,38500

    HoldBit = IN13
     IF  HoldBit = 0 THEN GOTO IR  |
GOTO Stopping

IR:
 FREQOUT LftIR1, 1, 38500
  LftIR2 = IN11
    IF LftIR2 = 0 THEN Right
 FREQOUT RtIR1,1,38500
  RtIR2 = IN9
    IF RtIR2 = 0 THEN Left        `

    IF  number = 1 THEN Left
```
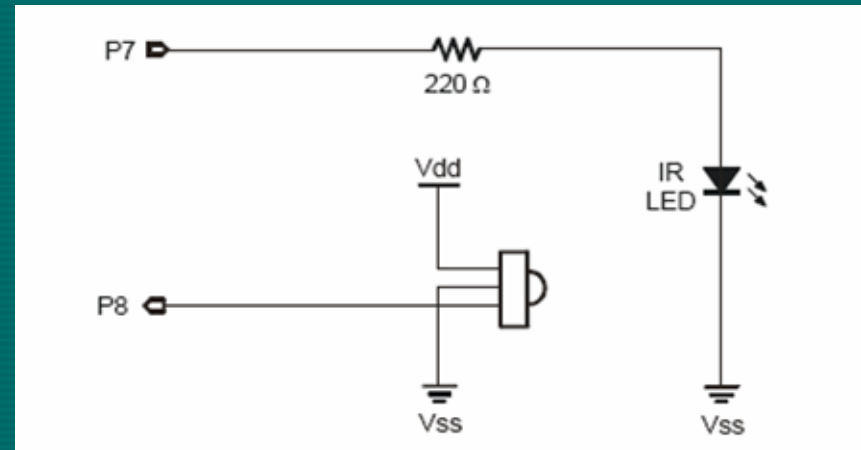
Obstacle Avoidance

- Centered around 3 IR (Infrared) sensors
- Avoids obstacles while maintaining a line-following path
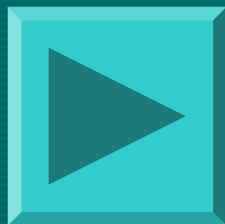
I.R wiring Diagram

I.R with built in receiver

http://www.parallax.com/detail.asp?product_id=28019

Results

Conclusion

- Robot follows Line Path

- Self-controlled form of Skid steering creates favorable turning conditions in tight spaces

- Efficiently completes the planting process - drill, seed and water.

Future Goals

Our future goal is to have a sensor able to determine the ph level of the soil in order to allow the robot to determine if the plant will be able to flourish

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