

Summer at the RVR

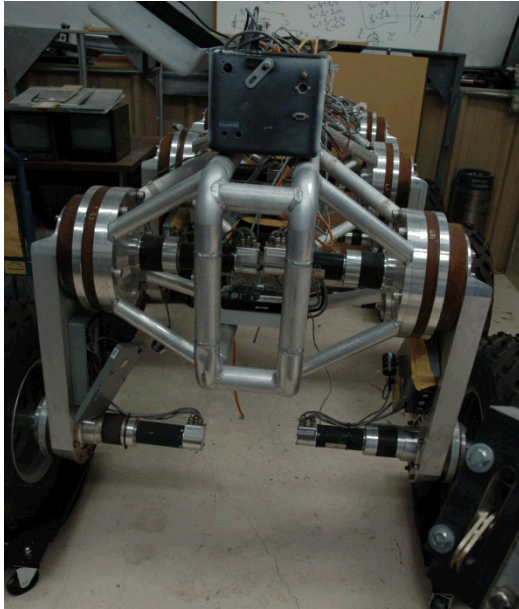
July 27, 2011
Erica McDowell
STAR Program



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The Robotic Vehicle Range



Facilities



Jaguar Robots – GPS



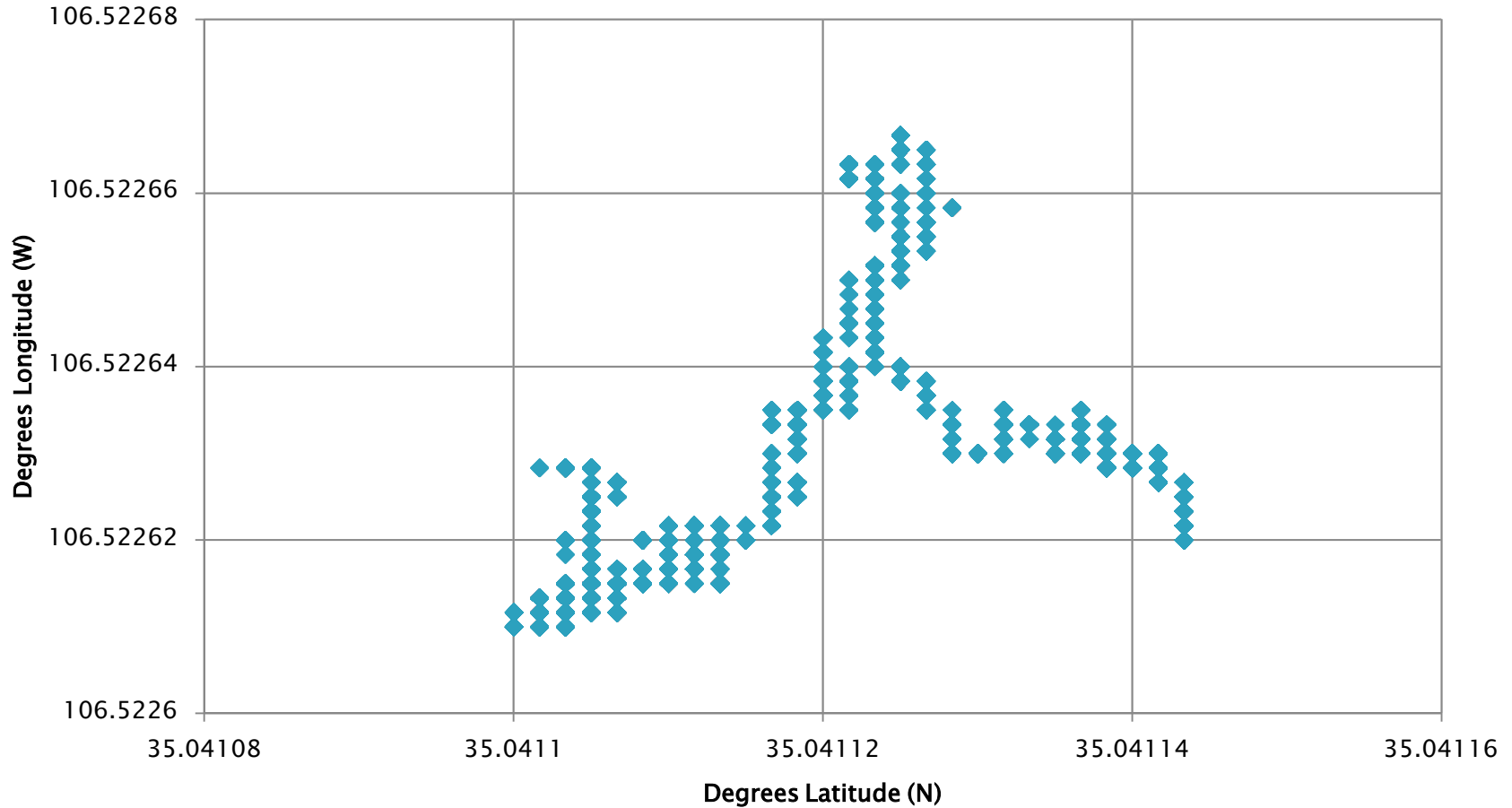
▶ Data parsing to determine accuracy and drift

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```

```
f = open("filename")
for line in f.readlines():
    #process(line)
```

SAMPLE CODE

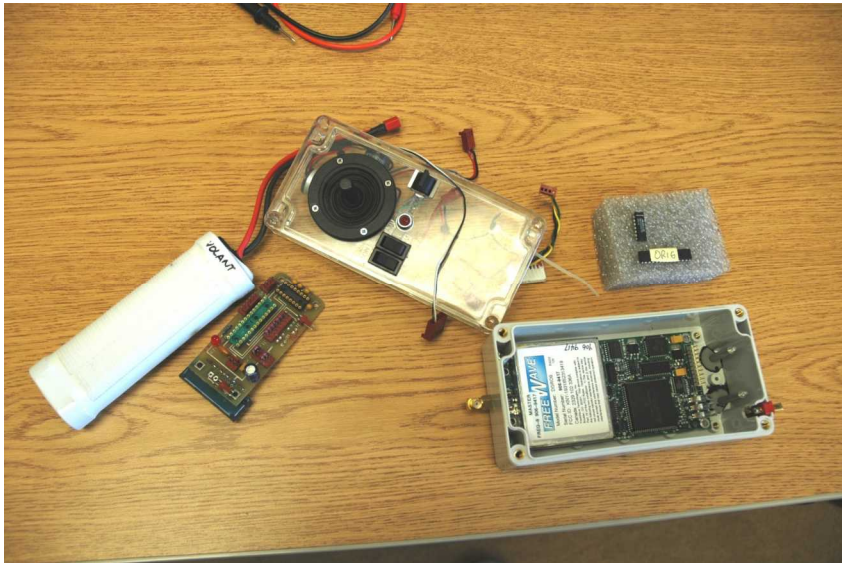
Jaguar 3's Reported Location



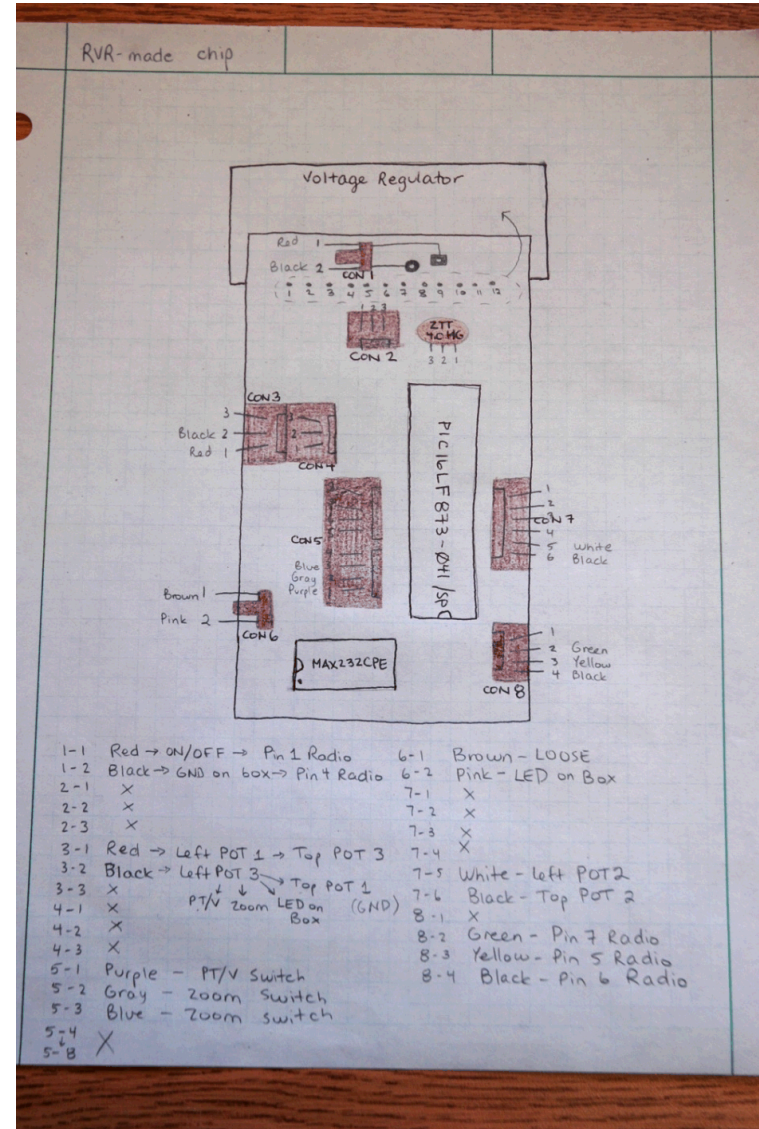
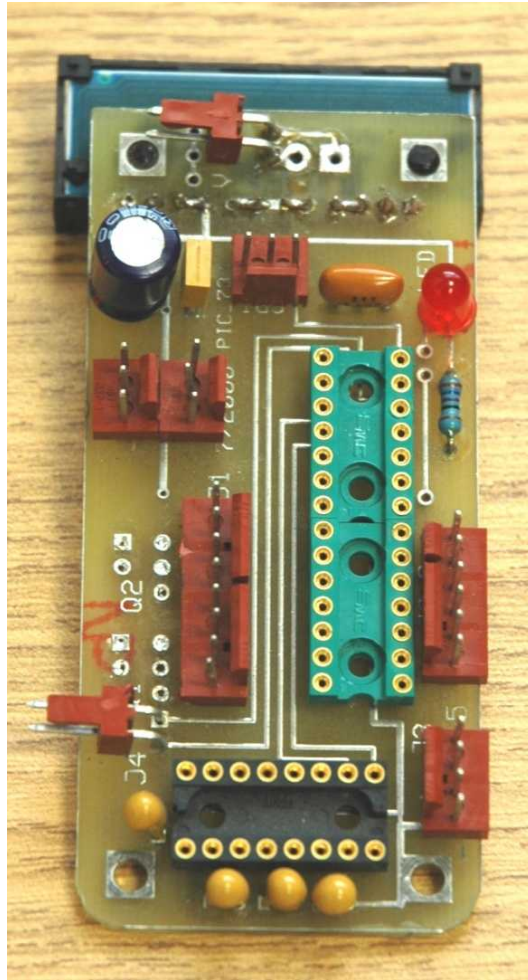
~16–17 feet of drift over 2 hours
~ 7–10 feet off actual location

Volant

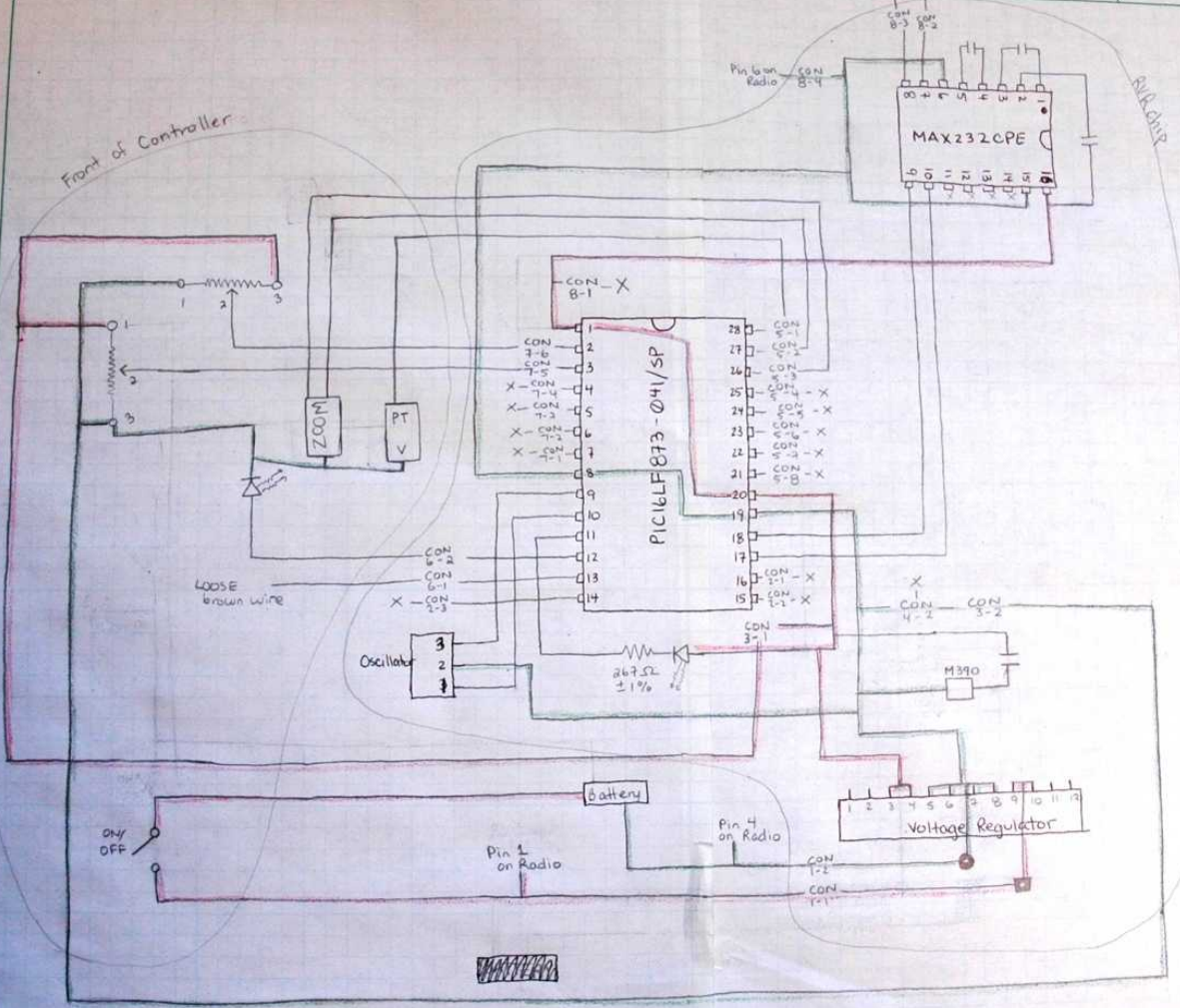
- ▶ Radio-controlled robot with smashed controller



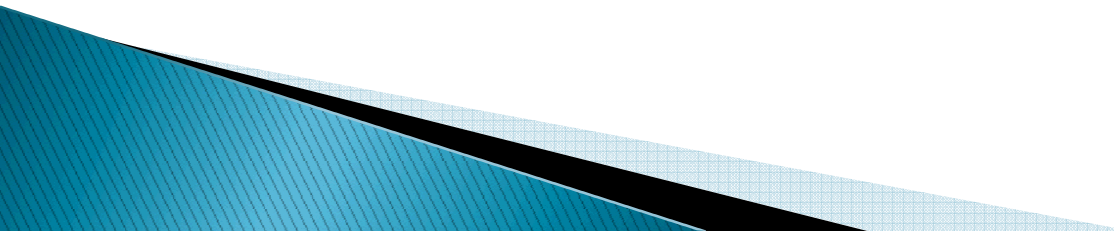
Reverse Engineering



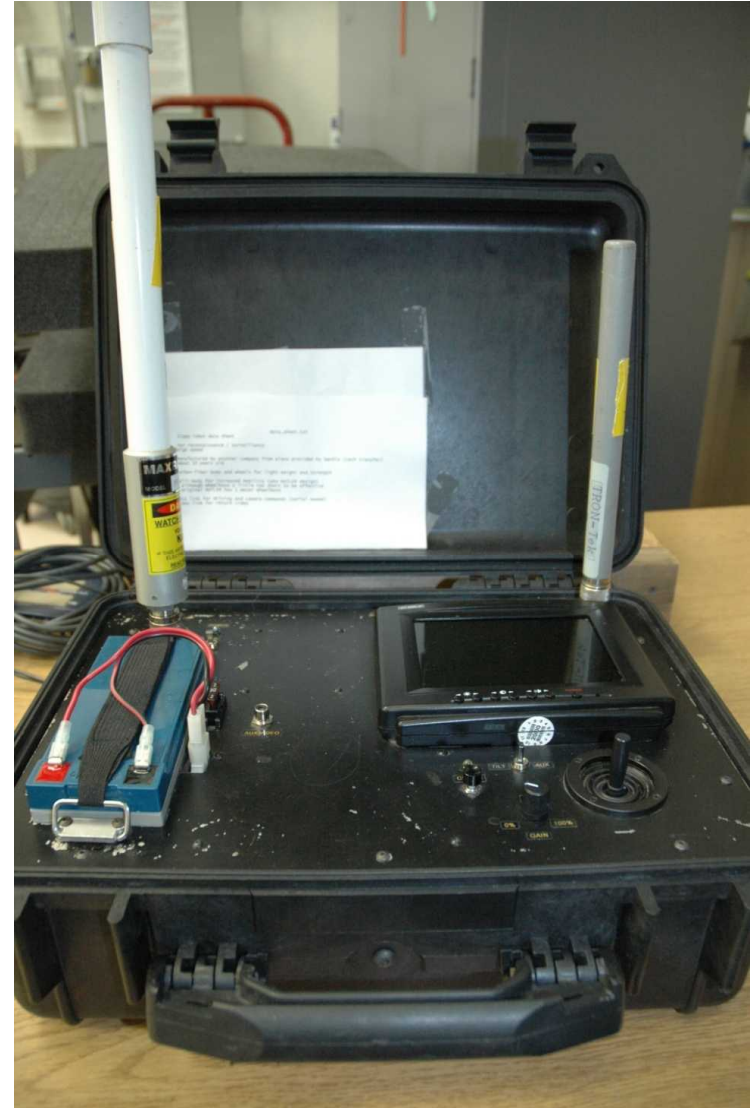
Volant Controller



Repair

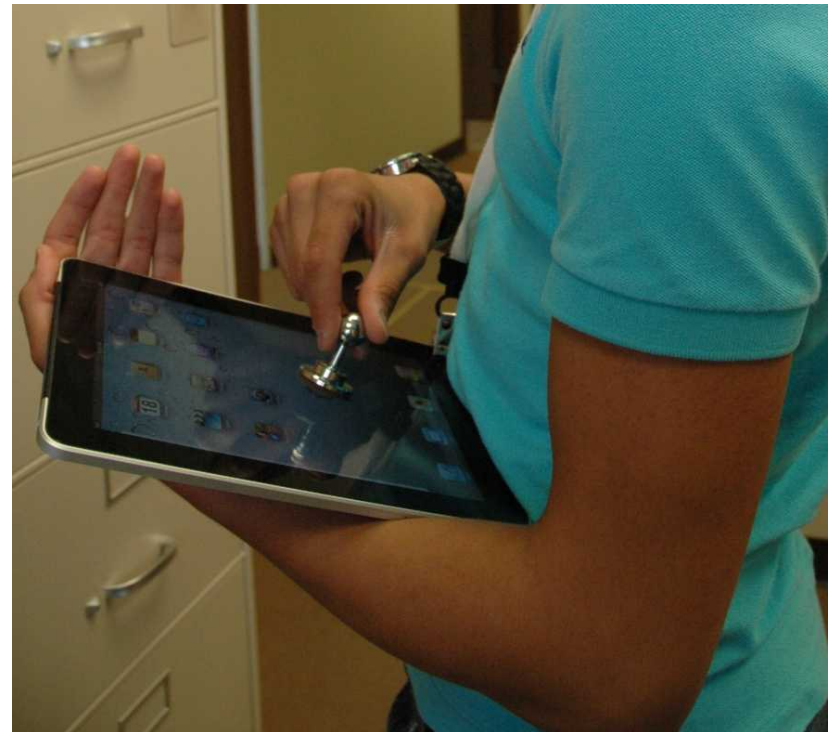
- ▶ Understand how the controller works
 - ▶ Fix wiring and make the controller more durable for the future
 - ▶ Possibilities for modernization
- 

Zippie- Another Broken Controller



Repair

- ▶ We found a loose screw that most likely shorted something inside the controller's box as well as an RS232 connector which had come loose
- ▶ Next Step: Modernize the controller, possibly using this iPad joystick

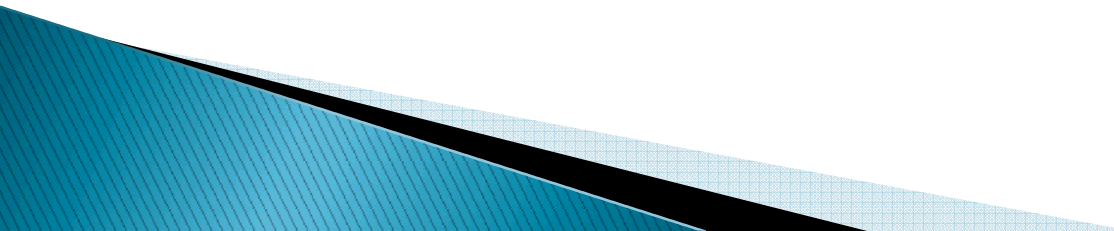


GPS Vests

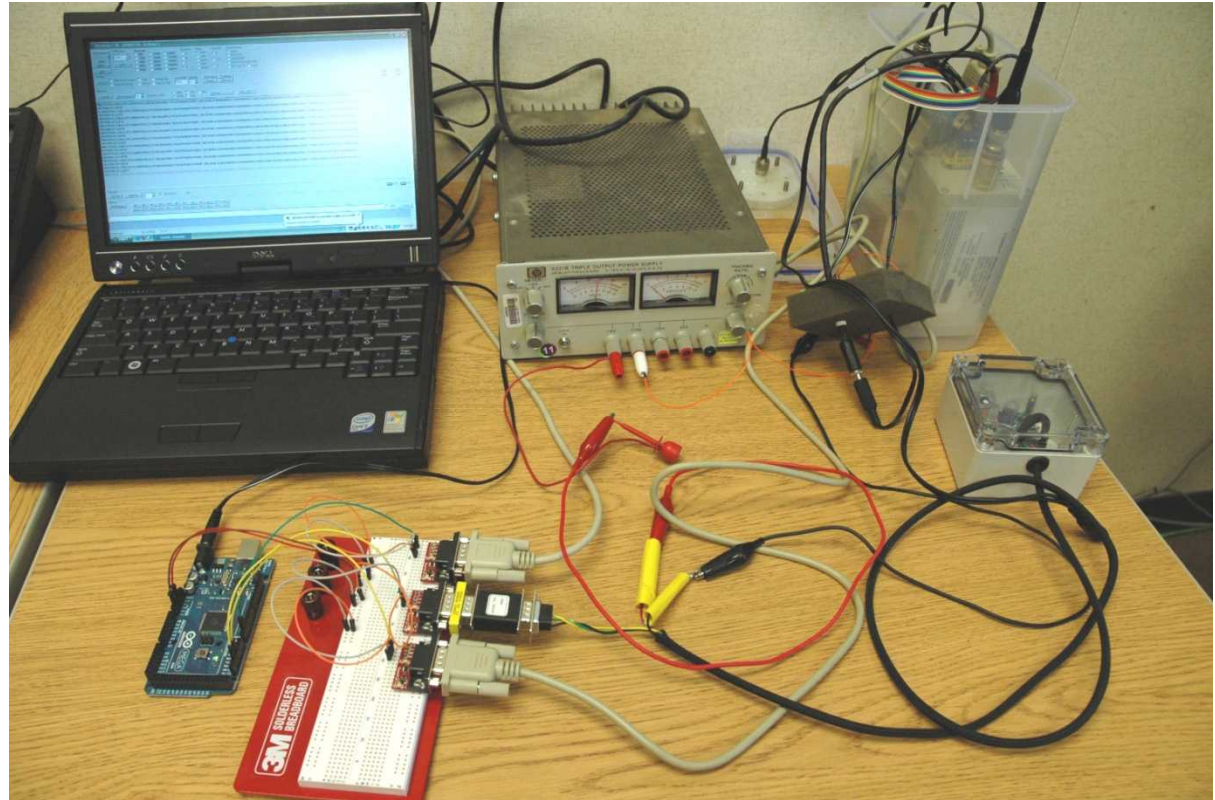
- ▶ GPS data from vests shows the location of the vest in a simulation
- ▶ Currently the vests have no way to tell which direction they are facing



Compass Chip

- ▶ Will be added to vest to show which direction the vest is facing
 - ▶ Tasks:
 - Configure compass chip
 - Combine GPS and Compass data through an Arduino microprocessor
 - ▶ Serial communication
 - ▶ Programming and Hardware issues
- 

```
int data = 2;
int clock = 3;
int latch = 4;
int ledState = 0;
const int ON = HIGH;
const int OFF = LOW;
void setup()
{
  pinMode(data, OUTPUT);
  pinMode(clock, OUTPUT);
  pinMode(latch, OUTPUT);
}
void loop() {
  int delayTime = 100;
  for(int i = 0; i < 256; i++){
    updateLEDs(i);
    delay(delayTime);
  }
}
void updateLEDs(int value){
  digitalWrite(latch, LOW);
  shiftOut(data, clock, MSBFIRST,
  value);
  digitalWrite(latch, HIGH);
}
```

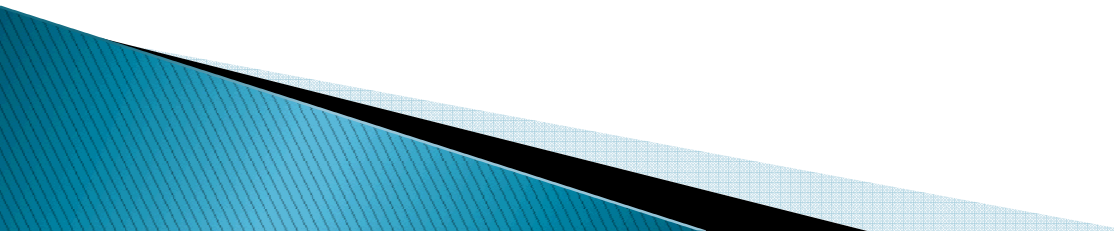


Area III

- ▶ Helped test and evaluate various sensors
- ▶ Omnitrax
- ▶ Motion Detection
- ▶ Underwater Grate



Omnitrax

- ▶ Underground electromagnetic field sensor being tested in the Exterior Intrusion Sensor Field
 - ▶ Tested the sensor's sensitivity by walking, running, crawling, and duck walking over the sensor
- 



Getting ready for testing

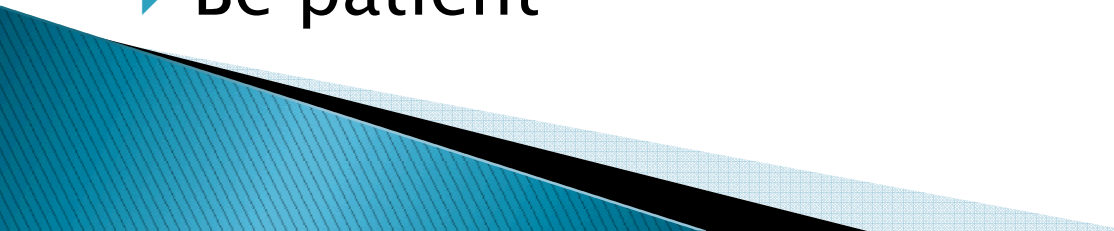


Duck Walk



Crawl

What I Learned

- ▶ Computers– programming, software, data parsing
 - ▶ Hardware– circuits, chip configuration
 - ▶ Have good experimentation strategies– attentiveness, consistency
 - ▶ Diagnose problems methodically
 - ▶ Don't get bogged down when things get tough– find a solution
 - ▶ Be picky with yourself
 - ▶ Be patient
- 

What I Enjoyed

- ▶ Working on REAL things
- ▶ Learning what it's like to work in an engineering-centered environment
- ▶ Being trusted to work on my own, without having my hand held
- ▶ Working with and meeting people my age



Thanks to...

- ▶ Jake Deuel– Manager
 - ▶ Jason Andersen– Mentor
 - ▶ Wendy Amai– Mentor
 - ▶ Nader Khalil, Kelsey Johnson– Students
 - ▶ Larry Anderson, Bob Anderson, Dennis Wilder, Daniel C de Baca, Robin Thompson– RVR
 - ▶ STAR Program and everyone who made my time here possible– I couldn't thank you enough!
- 