

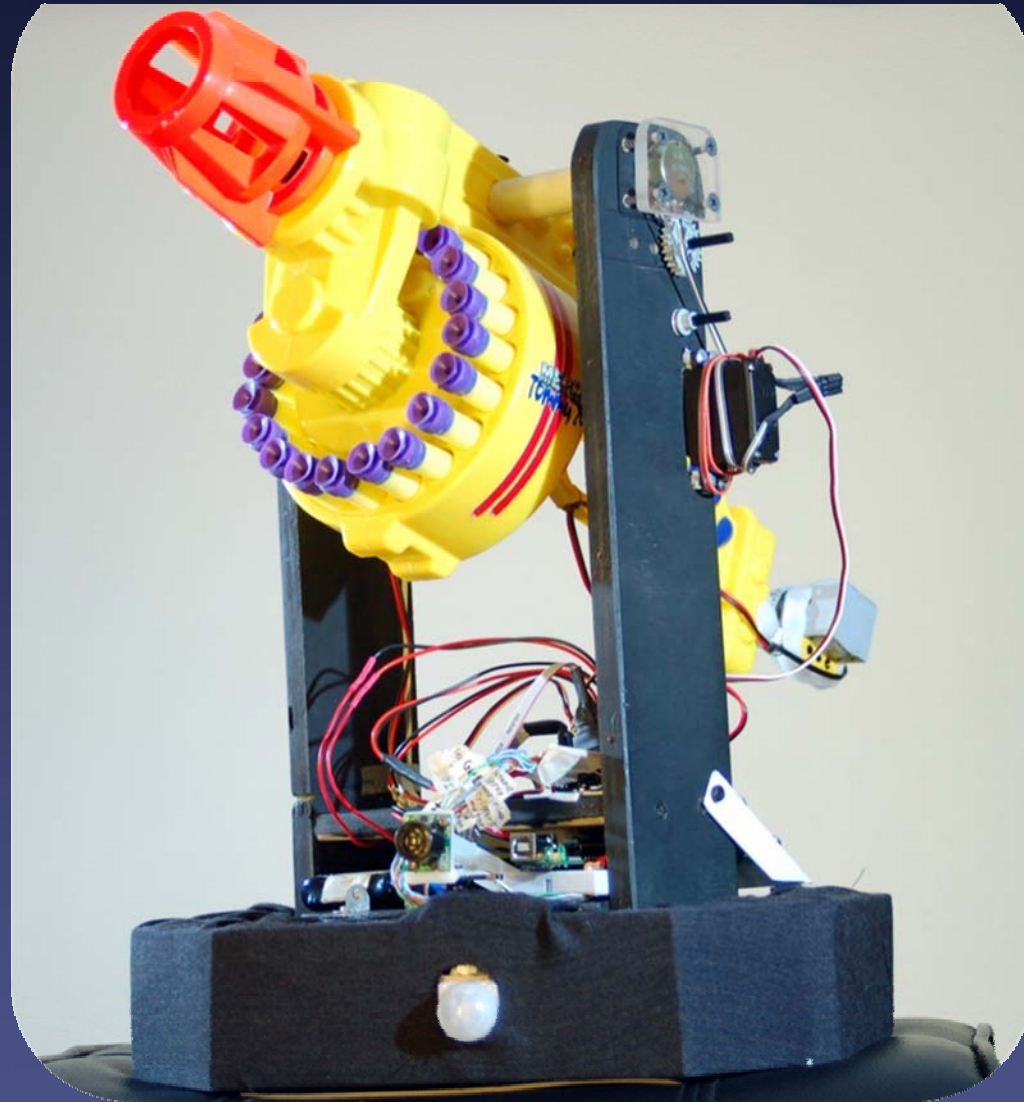
# Property Protecting Turret

*Andrey Ivannikov*

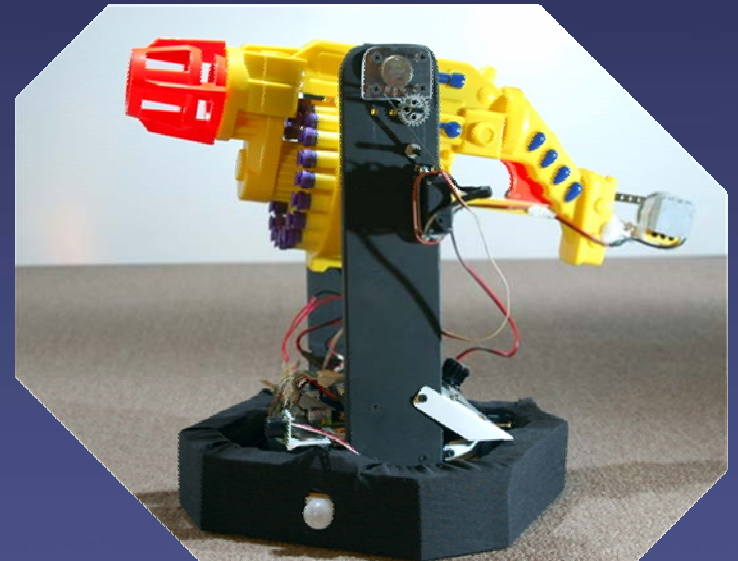
*Eric Poon*

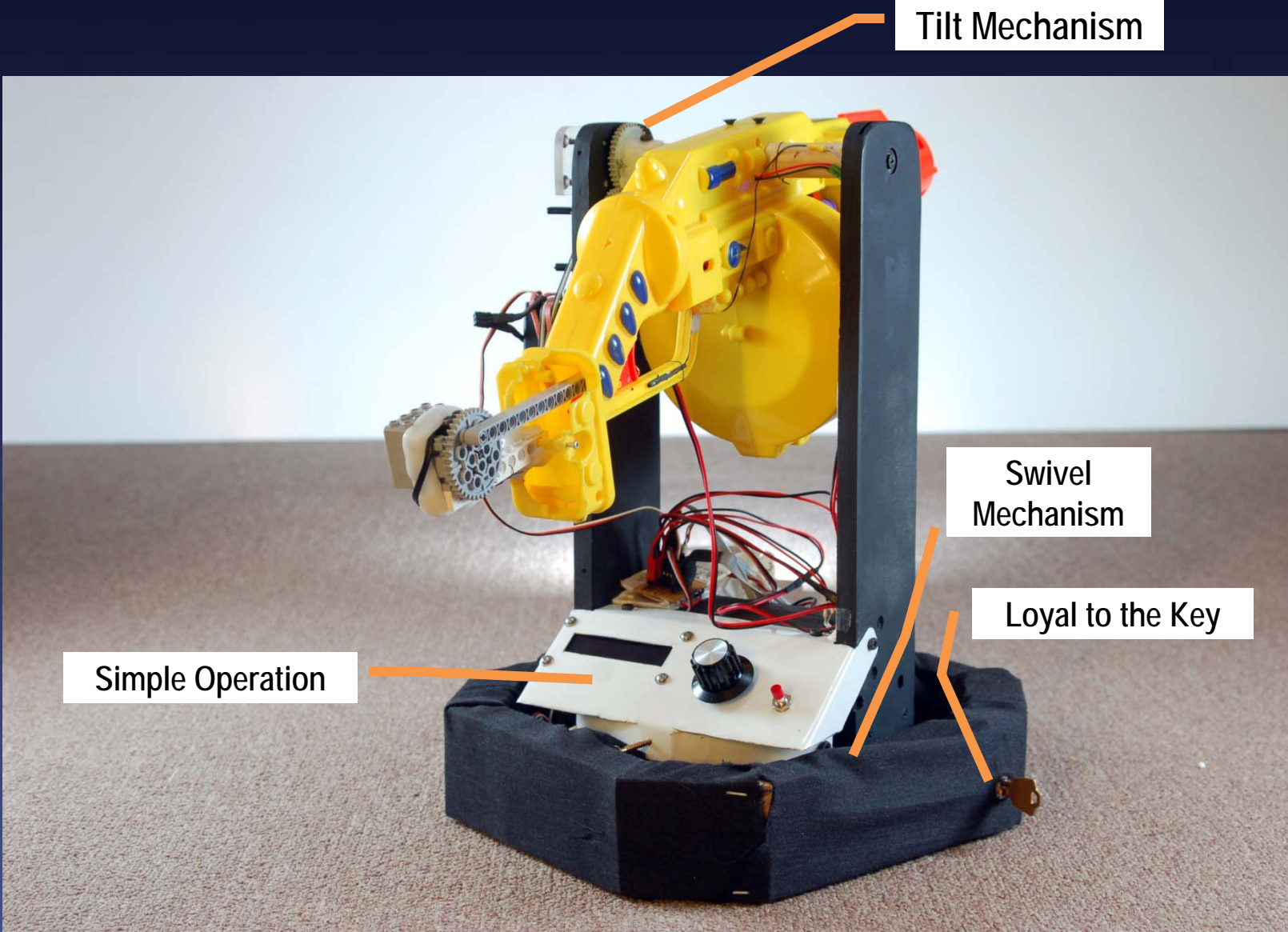
*Ilya Brutman*

# Prototype of the PPT



- Robotic Sentry gun
- Protects your property
- Fully autonomous
- Shoots with foam darts
- Friendly user interface
- Fully customizable





Tilt Mechanism

Swivel Mechanism

Loyal to the Key

Simple Operation

# Usefulness

- Eliminates need for night shift guards
- Compact, can be placed anywhere
- Angle of scan can be adjusted for maximum flexibility

# Mechanical Specifications

- Base and turret mostly constructed with wood
- Lego motor for trigger actuation
- Small DC motors for firing
- 3 Servos for:
  - Distance sensor movement
  - Swivel of the turret
  - Tilt of the gun



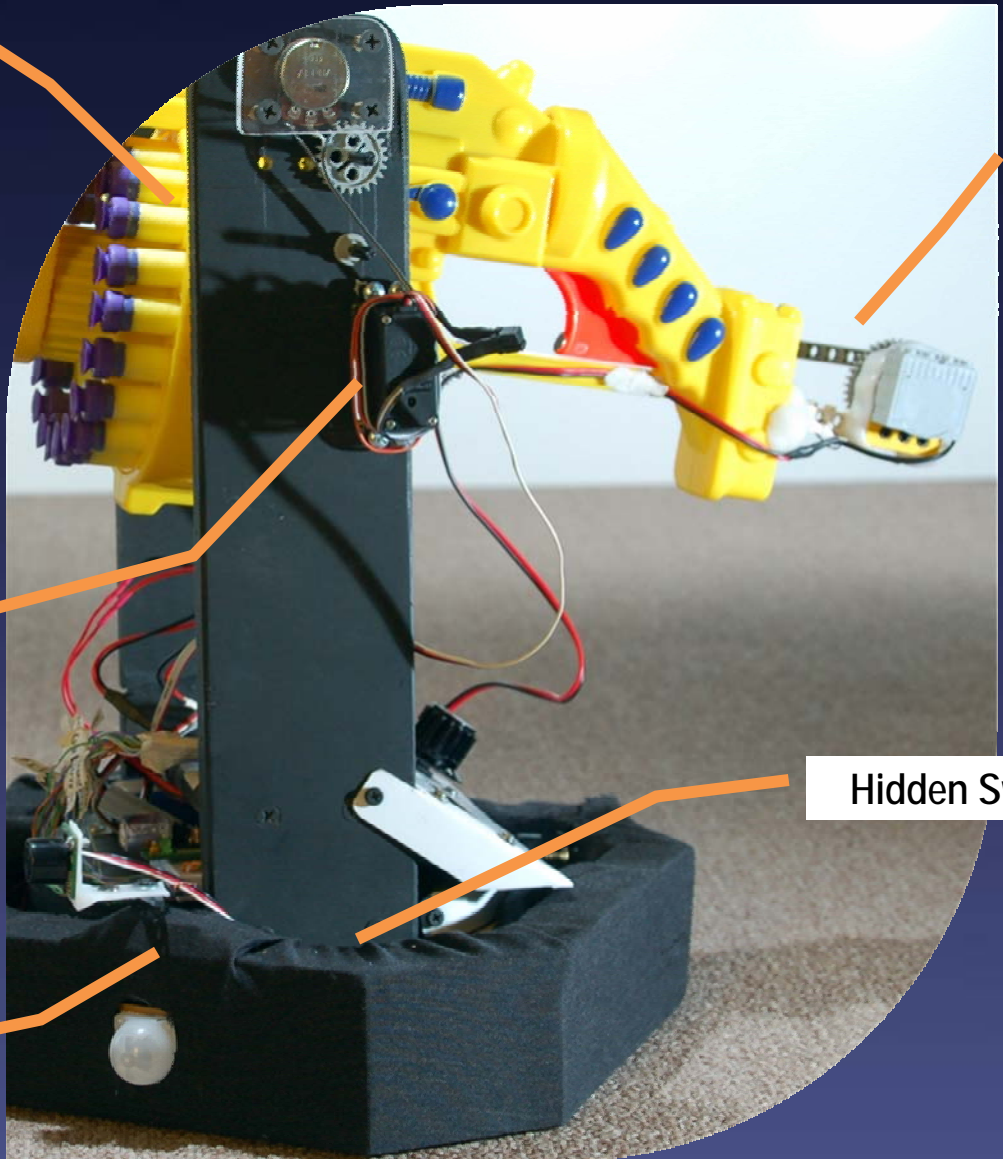
Bullet Firing  
Motors Hidden  
Inside Gun

Trigger Actuation

Tilt Servo

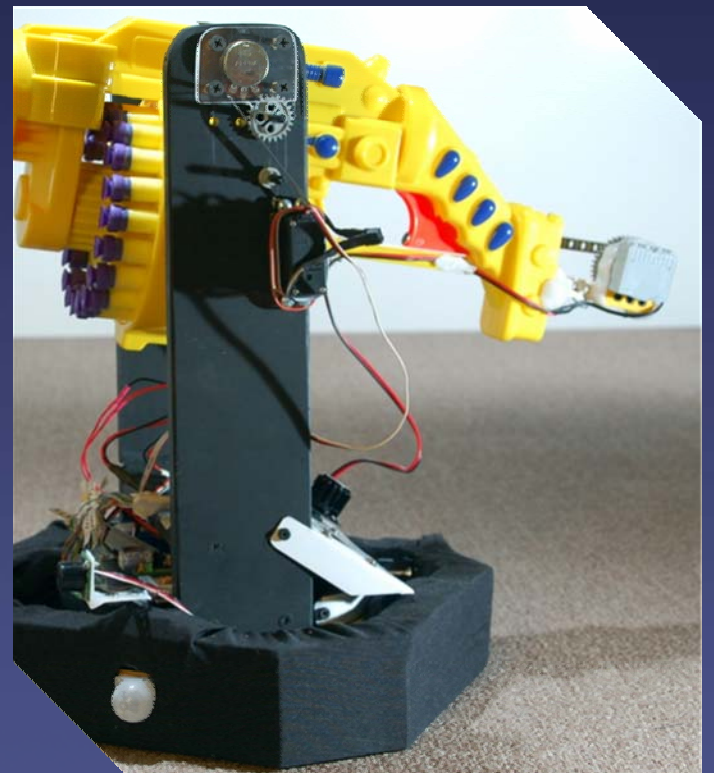
Hidden Swivel Servo

Distance  
Sensor Servo

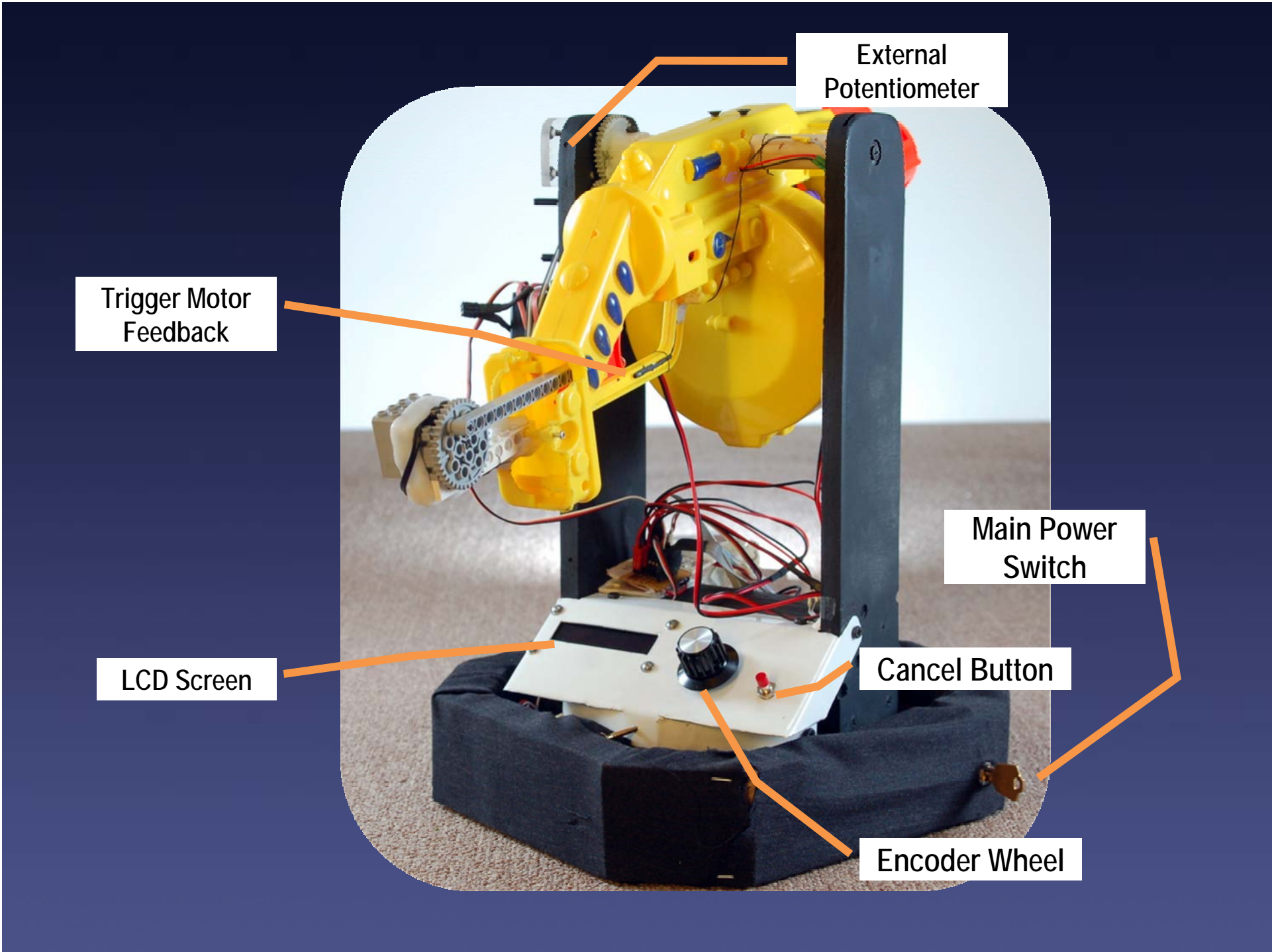


# Electrical Specifications

- Reed switch for trigger motor feedback
- External potentiometer for tilt feedback
- IR Motion Detector
- Ultrasonic Distance Sensor
- User Interface:
  - Serial LCD Screen
  - Encoder
  - Cancel button







External  
Potentiometer

Trigger Motor  
Feedback

Main Power  
Switch

LCD Screen

Cancel Button

Encoder Wheel

# Electronic Specifications

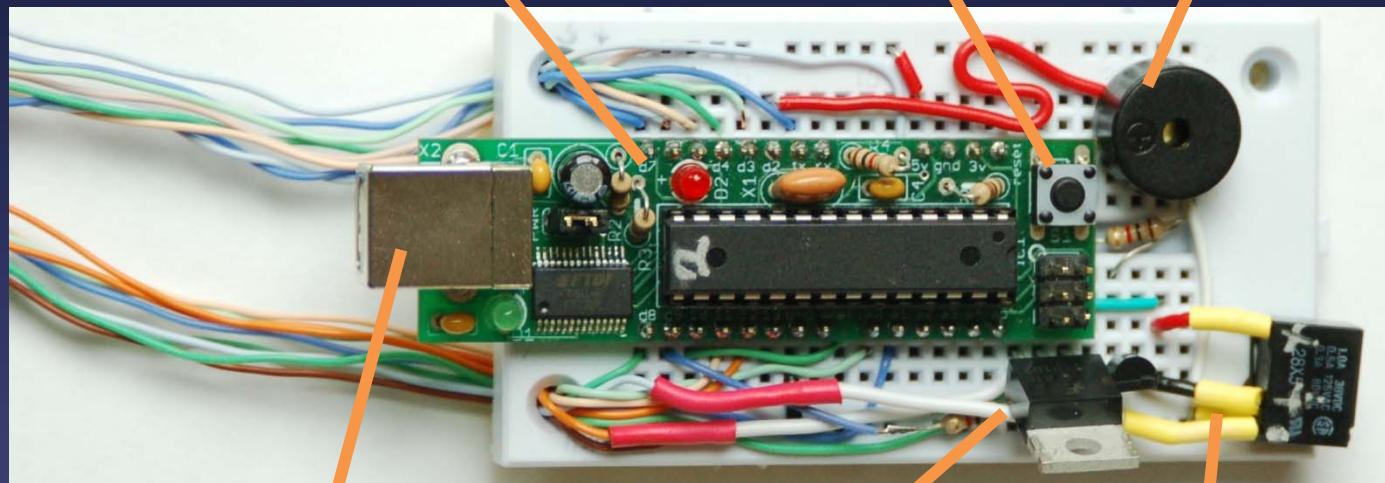
- Atmel ATmega328 microcontroller
- USB Interface
- 16Mhz internal oscillator
- 20 I/O pins with built-in resistors
- 6 Channel A2D
- 32KB of Flash
- 2KB SRAM
- 1KB EEPROM



Arduino  
Microcontroller  
Board

Hardware  
Reset

Speaker for UI



USB for  
Reprogramming

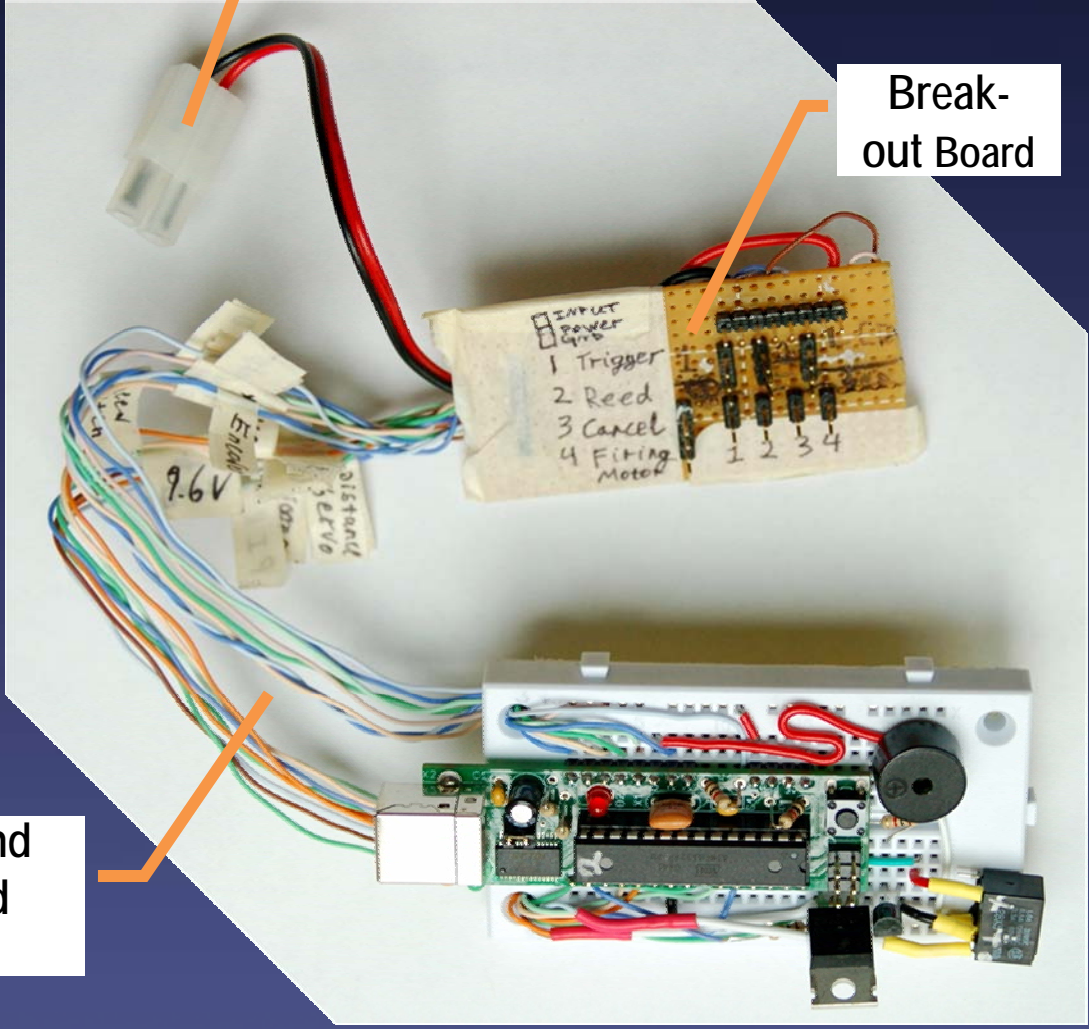
Darlington  
Transistor for  
Firing Motor

Relay and  
Transistor for  
Trigger Motor

Main Battery Connector

Break-out Board

Labeled and detangled wires



# Operation: Setup Mode

- Currently implemented options include
  - Angle of horizontal scan/activity
  - Maximum number of shots fired per target
  - Cool down period interval



# Operation: Scanning Algorithm

- Scans area and saves map
- Saved map includes:
  - Distance to objects
  - Uncertainty of readings
- Saves image of area without motion



# Operation: Attack Mode

- Constantly monitors area for movement
- Performs quick scan to see what moved
- Shoots target
- Waits for a cool down period
- Returns to monitoring area for movement



# Operation: Sanitizing of Readings

- Multiple readings are recorded per location
- Custom hysteresis set for each reading
- Movement is ignored if within threshold



