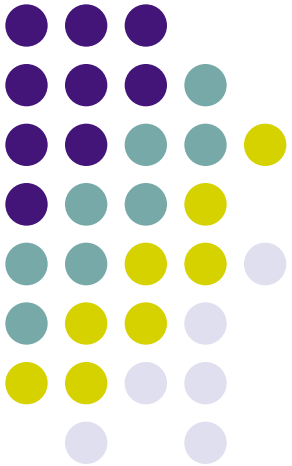
# Sketch Review
# Purple Team A

Harvesting Energy from
Kinetic Motion:
2 Concepts



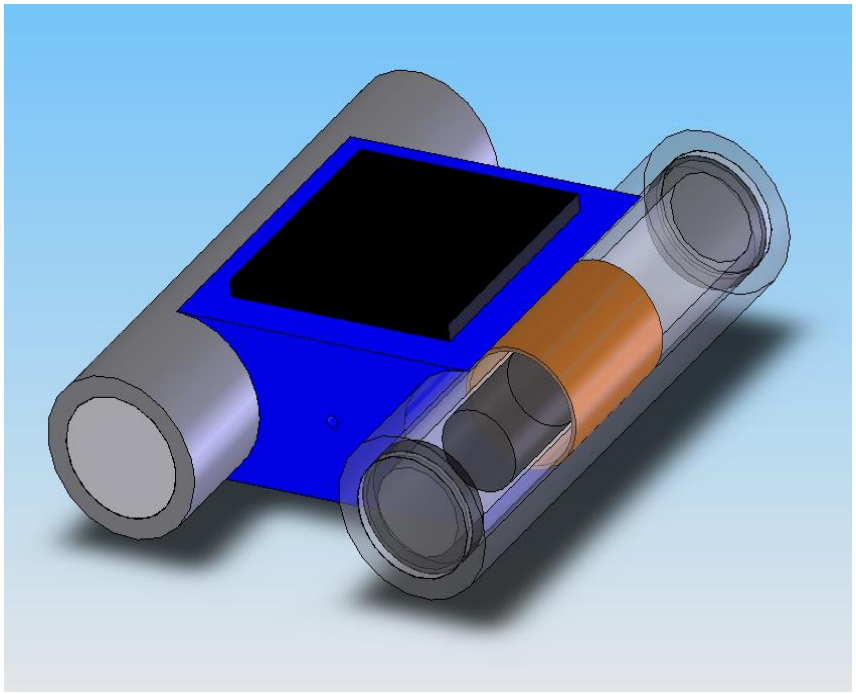
# Concept #1: Kinetic Jogger

- Joggers already use electronics attached to their arms.
- Kinetic energy from the arm can even provide enough power for these portable electronics.

# Jogging Market

- In 2003, 36 million people in the US went jogging or running.
- Of these, 10.5 million ran more than 100 times over the course of the year.
- 3.8 million MP3 players sold in 2003, expected to be 4.1 million in 2004.
- Many serious and leisure runners listen to music while running.

# Kinetic Harvesting Technology



- Cylindrical rare earth magnet moves through copper coils.
- Magnet has surface flux ~5200 Gauss.
- Magnet acts as an intertial mass.  Arm motion oscillates coils in and out of magnetic field, inducing current.
- Natural motion should provide at least 0.2 W.

# Parameters

Rare Earth Magnets:

- Diameter: ¾”
- Flux at Surface: 5200 Gauss
- Length: ¾“

Copper Coils:

- 5 Layers of 18 Gauge Wire: 0.0403 (in.) Diameter
- Coil Resistance = 0.183 Ohms

Deflector Magnets

- High flux near surface

# Calculations

- **Power calculations**

  $\Phi$ = Flux * Area

  = $2.63*10^{-4}$ (Tesla * $m^2$)

  Assuming that magnet travels whole entire tube at same frequency as arms (1 to 1.5 Hz)

$$\bar{\varepsilon} = -N * \frac{d\bar{\Phi}}{dt} = .131 \ \ to \ \ .196 \, (Volts)$$

$$P = \frac{\bar{\varepsilon}^2}{R} = .0934 \ \ to \ \ .210 \, (Watts)$$

# Materials Costs

- 4 rare earth magnets: $20
- 8 end magnets: $4
- Plastic casings: $2
- Electronics: $10
- Total cost = $36
- NEVER HAVING TO REPLACE YOUR BATTERIES: PRICELESS