RoboJackets

BattleBots - Outreach - IGVC - RoboCup - IARRC

Electrical Training

Session 1

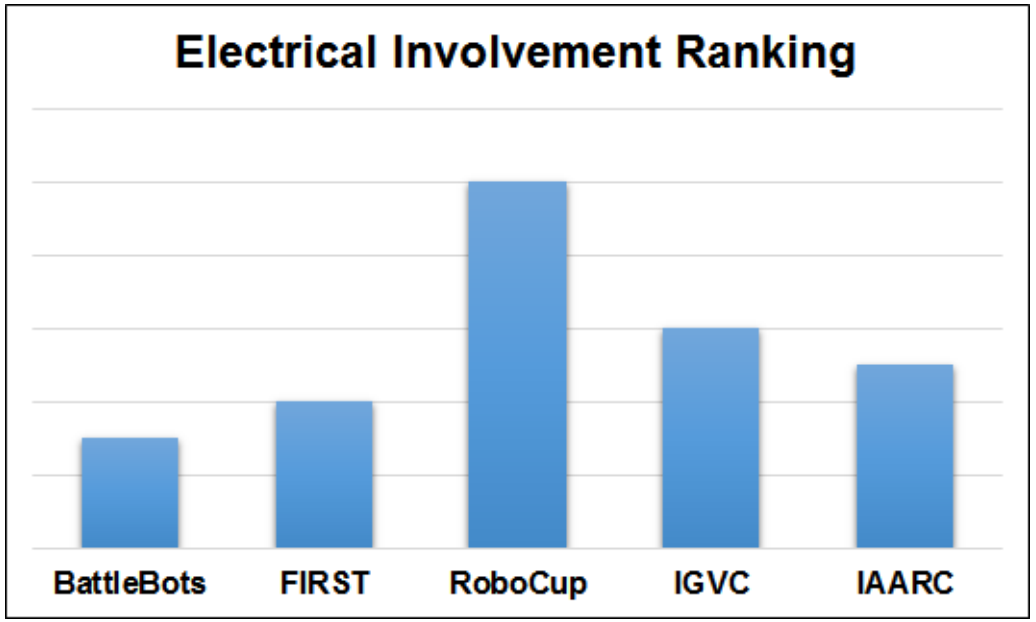
September 8, 2014

Outline

- Electrical teams within RoboJackets
- Challenges of each team
- Skills within each team

Team Involvement

- Each team has different electronics challenges and solutions
- Electronic assembly vs. electronic design



Skills Necessary for all Teams

- Basic electronic knowledge
- Basic soldering
- Wire crimping
- Multimeter Use

Electrical Challenges

- **BattleBots**
- FIRST
- RoboCup
- IGVC
- IAARC

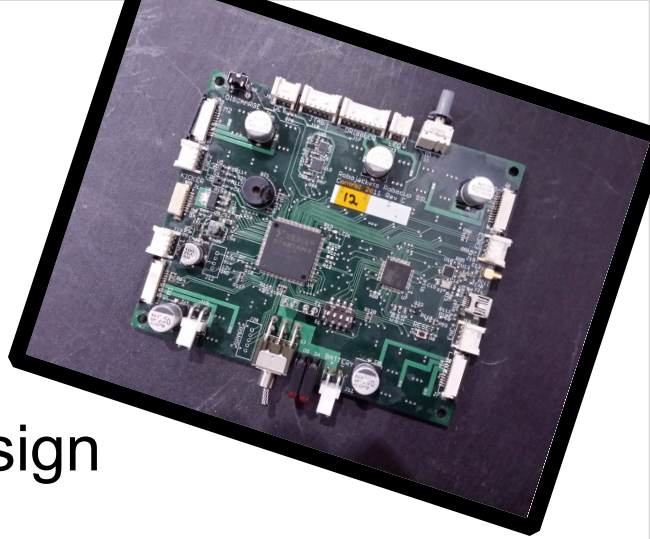
- Motor operation
- Wireless control interface
- Concerned with power and durability
- Low focus for precision

Electrical Challenges

- BattleBots
- **FIRST**
- RoboCup
- IGVC
- IAARC

- Similar to BattleBots
- Standard electrical parts
- Less emphasis on durability
- More emphasis on precision

Electrical Challenges



- BattleBots
- FIRST
- **RoboCup**
- IGVC
- IAARC

- Main focus on design
- Low focus for high power
- Must have extreme precision and accuracy
- All electrical boards are custom designed

Electrical Challenges

- BattleBots
- FIRST
- RoboCup
- **IGVC**
- IAARC

- Both store-bought modules & custom designed boards
- Multitude of electrical tasks with many robot sensors
- Must operate high-powered motors

Electrical Challenges

- BattleBots
- FIRST
- RoboCup
- IGVC
- **IAARC**

- Medium-power motor control
- Large emphasis on system stability & durability
- Interface for software & hardware with standard development board

Extended Resources

- **RoboJackets Wiki**
  - http://wiki.robojackets.org
  - Disorganized, but valuable because it's the storage location for documentation of past projects
- **Redmine**
  - http://redmine.robojackets.org
  - Used by RoboCup for managing tasks
  - Must have user account for login (more details later)

What is electricity?

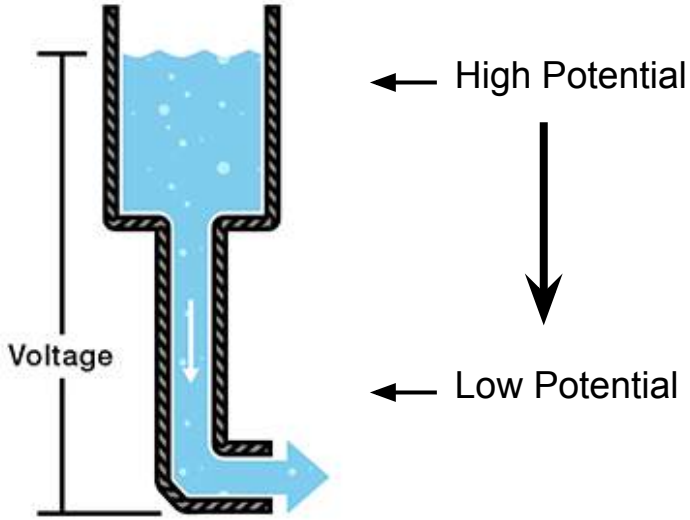
- The flow of electrons through a conductor
- Three (3) main concepts
  - voltage, current, resistance

$$V = I \cdot R$$

Ohm's Law

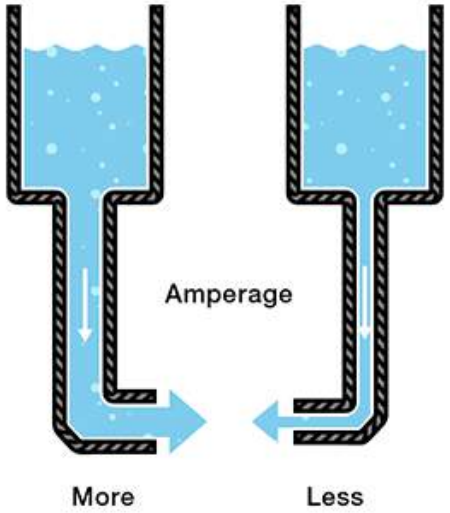
Voltage

- The *difference* between potential energy at *two locations*
- The *speed* of flow



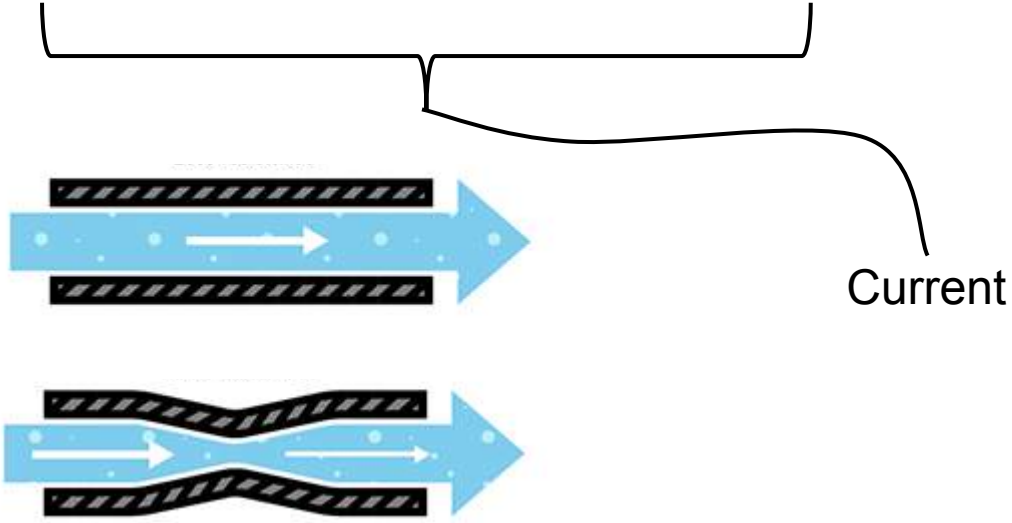
Current

- The *amount* that is flowing at any given moment



Resistance

- Controlling the amount allowed to flow



Revisiting Ohm's Law

- Changing resistance affects *voltage* & *current*
- Squeezing water hose analogy

$$V = I \cdot R$$

Further Reading

- https://learn.sparkfun.com/tutorials/what-is-electricity
- https://learn.sparkfun.com/tutorials/voltage-current-resistance-and-ohms-law
- Further Questions/Comments: jonathan.jones@gatech.edu

Topics for Next Session

- Elements used to control electricity
- Motors
- Crimping