Advanced Energy Vehicle (AEV)

Lab 02: AEV Arduino Programming Basics
AEV Project Objective
(Problem Definition)

INITIAL CONCEPTS
(Brainstorming)

EXPERIMENTAL RESEARCH
(System Analysis)

ANALYZE

COMPARE

PT 1
PT 2
PT 3
PT 4

DESIGN DECISION

RESEARCH

FINAL DESIGN

Present AEV Design
Learning Objectives

- Become familiar with the automatic control system hardware components
- Setup the AEV software on the Arduino IDE
- Introduction to basic function calls used for controlling the AEV
- Become familiar with uploading programs to the Arduino, testing the programs, and troubleshooting techniques.
Hardware

- The AEV controller consists of:
  - Circuit Board
  - Arduino
  - ATMega328
  - On/Off Switch
  - Start Button
  - Reset Button
  - 2x Toshiba Motor Chips
Hardware Connection Ports

- The AEV connection Ports

External Sensors
*** Do not plug these in! ***
This will be done in another lab

Battery Connection

Motor Connection

Note: The motors are brushless so the connections can be reversed to switch the polarity.
Arduino Software

- The backbone of the programming has been developed for AEV
  - Not expected to be a microprocessor programmer

- The software is contained within a folder called “Sketchbook” (Available for download on the course website).
  - The AEV controller is programmed by the user (you), using a series of function calls (Details provided in the AEV Lab Manual).
Setting up the Arduino Program

1. Go to the EEIC Course Website and download “Sketchbook”
Setting up the Arduino Program

1. Go to the EEIC Course Website and download “Sketchbook”

2. Open the Arduino and Set the Preferences
Setting up the Arduino Program

1. Go to the EEIC Course Website and download “Sketchbook”
2. Open the Arduino and Set the Preferences
3. Restart the Arduino IDE after setting the preferences
4. Setting the COM and PORTS correctly
Basic Function Calls

- `celerate(m,p1,p2,t);`
  - Four Arguments
    - `m`: Motor number 1, 2, 3, or 4 for all motors
    - `p1`: Start speed in % (0 – 100)
    - `p2`: End speed in % (0 – 100)
    - `t`: time of duration in seconds

- Example: `celerate(4,0,25,2);`
  - Will accelerate all motors from 0% to 25% full power in 2 seconds

- Example: `celerate(2,35,22,1);`
  - Will decelerate motor 2 from 35% to 22% full power in 1 second
Basic Function Calls

- `motorSpeed(m,p);`
  - Two Arguments
    - `m`: Motor Number 1, 2, 3 or 4 for all motors
    - `p`: Start Speed in % (0 – 100)
  - Example: `motorSpeed(2,27);`
    - Sets motor 2’s speed to 27% full power

- `goFor(t);`
  - One Argument
    - `t`: Time in seconds
  - Example: `goFor(5);`
    - Continues the LAST command for 5 seconds.
Basic Function Calls

- **brake(m);**
  - One Argument
    - *m:* Motor Number 1, 2, 3 or 4 for all motors
  - This function does not brake the AEV system but rather cuts the power from the motor.
  - Example: **brake(3);**
    - Cuts the power from motor 3.

- **reverse(m);**
  - One Argument
    - *m:* Motor Number 1, 2, 3 or 4 for all motors
  - Example: **reverse(1);**
    - Reverses the polarity of motor 1.
Questions?