Project 1: Addressing Multiple Digital Lines

Questions?

Project 1

- Hardware:
  - Wire in a set of LEDs
  - (leave room for future components)
- Software:
  - Provide interface functions for the LEDs
  - Write a test loop() function

Project 1: Heading Display

4 LEDs in a circle:

- Represent heading with 8 different illumination patterns
- Interface function:

```
void display_heading(float heading)
```

  - Heading is between -180.0 and 180.0 degrees
  - Left-handed coordinate system

  - Do not deviate from this specification!

Project 1: Heading Velocity Display

10 LEDs in a line (use bar graph):

- Represent heading velocity
- Pairs of LEDs are connected to a single digital pin
- Interface function:

```
void display_heading_velocity(float velocity)
```

  - Velocity is a value between -300.0 and 300.0 deg/sec
  - Illuminate the two center LEDs if rate is near zero

Project 1: Test Function

- Add switch to circuit
- In `loop()`
  - One switch state:
    - Increment a simulated heading from -179 to 180
    - Display heading
    - If heading exceeds 180, reset to -179
  - Other switch state:
    - Increment heading velocity from -300 to 300
    - Display
    - If velocity reaches beyond 300, reset to -300

Code Specifications as Contracts

- You are implementing code that will be used for future projects and by your other group members

- Implement exactly the functions that we ask for
  - Name of function must be as specified
  - Parameter types and names must be as specified
  - Return values must be as specified

Documentation

Project-level documentation (top of each C (and H) file)

- Project #
- Date
- Group number
- Group members
- Group member responsible for the software

Documentation

Function-level documentation:

- Summarize what the function does in a sentence or two
  - This is for future users of your function
- Explicitly document the **inputs** (parameters) and **outputs** (return values) of the function
  - Include variable names and meaning of the variables, including units!
  - Discuss any other effects that the function has (e.g., changing pin state)

Documentation

- In-Line documentation:
  - Document the ***meaning*** of individual lines of code or small groups of lines
  - Document what you are doing and why
- See the project 1 specification for a link to an example

Project Groups

- Use assigned groups
- For each project, one person must take the lead on the software

Due by the Project Deadline

- Documented code (“ino” files) checked-in to the subversion or Dropbox tree
  - Useful for sharing with us and with your group members

- Demonstration/code review with me or the TA
  - Complete by Tuesday following the deadline
  - If completed before the deadline, then you may make changes for an improved grade

Due Shortly after the Project Deadline…

Personal Report: Catme will ask you to fill out a survey

- This will be used to provide feedback to you and your group members
- I will also use this to detect asymmetries in group member participation

Grading

Personal programming component:

- Each group member must collect 3 personal programming components over the semester
- One is available for each of the 10 projects
- Grading is generally binary (completed or not)
- A programming component will not count as yours if another group member must make substantial changes to the code in order to complete the project

Grading II

Group grade

- Assess circuit, program, functionality and documentation
- See the rubric for details

- In most cases, the group grade will be given to each group member
  - In cases of significant, repeated asymmetries, grades will be rebalanced to reflect relative contributions

Hardware in Lab

Bin in the lab will have:

- Spare parts
- Tools

Battery chargers are installed already

- Keep your batteries in a good state