Arduino Programming Part 7: Flow charts and Top-down design

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Goals

Introduce flow charts

- * A tool for developing algorithms
- A tool for documenting algorithms
- A visual method of communicating about any sequential or iterative process
- Great for visual learners!

Top-down design

- $\ensuremath{^{\diamond}}$ One technique for creating a plan for large, multi-step problems
- Not tied to flow charts, but can be used effectively with flow charts

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Flow chart symbols Terminator Start or stop a sequence. May contain module name. Process A step in the process or computational algorithm Information from outside of Data input the algorithm or process Decision Choose a flow path for continuing the algorithm or process Flow indicators Connect other elements Connector or Junction Optional joint where flow indicators merge

Exercise I

Draw the flow chart to read and display the salinity value on the LCD monitor

Keep it simple

- * 5 or so symbols (not counting arrows)
- Describe only the high level actions

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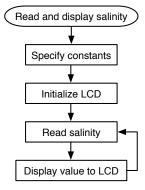
Exercise I

Your answer goes here.

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Exercise I



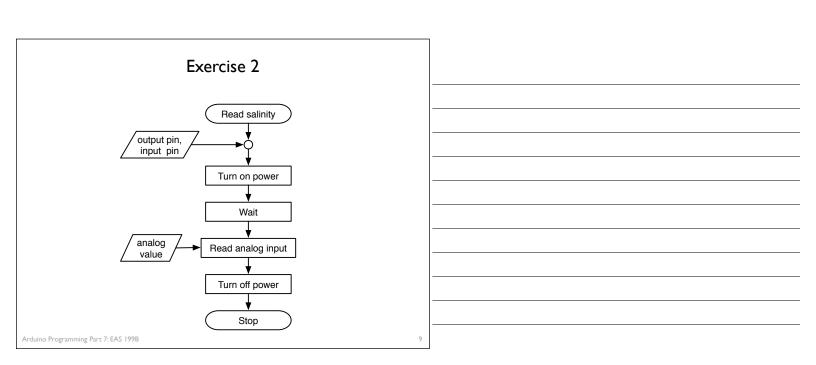
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Expand the "Read salinity" step in another flow chart * Keep it simple * "analog data" is an external input Read and display salinity Specify constants Initialize LCD Read salinity Display value to LCD

Exercise 2 Your answer goes here. Arduino Programming Part 7: EAS 199B

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Exercise 3 Expand the "Read analog input" step in another flow chart Compute the average of n readings * "analog data" is an external input Read salinity output pin, input pin Turn on power Wait analog Read analog input Turn off power

Stop

Exercise 3

Your answer goes here.

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Exercise 3 Read average analog input n readings, input pin Initialize: sum=0, counter=0 analog value Read analog input Add to sum, increment counter Counter<n? no Average = sum/n Stop Arduino Programming Part 7: EAS 199B

Top-down design

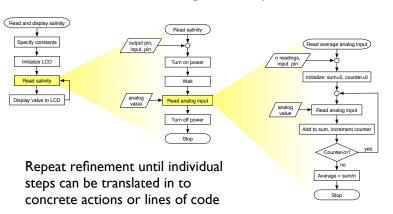
- 1. Start with a general statement of the solution
 - a. List the main steps
 - b. Don't worry yet about details
- 2. Pick one of the steps
 - a. Break this step into a manageable number of sub-steps
 - b. Don't worry about too many of the details
 - c. Apply step 2 to one of steps just generated

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Top-down design

Recursive refinement: from general to specific



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