Intro to Programming Robots to do Stuff

By Mark Aull, 2012
Syntax shown is C++
Takes advantage of hardware discussed in other tutorials
- Used to indicate what you want robot to do
- Other stuff is going on; you don't want to monopolize resources
- Flow chart implemented in switch statement: performs one operation determined by current state then moves on
Switch Statement

- Initialization code:
  - enum{start,modeA,modeB,modeC,modeD,done};
  - int currentmode=0;

- Implementation code:
  - switch (currentmode){
    - case start:
      - Perform operations related to start mode
      - if (question1)
        - currentmode=modeA;
      - else
        - currentmode=modeB;
      - break;
    - case modeA:
      - Perform operations related to modeA
      - if (question2)
        - currentmode=modeC;
      - Break;
    - case modeB:
      - Perform operations related to modeB
      - if (question3)
        - currentmode=modeD;
      - Break;
    - case modeC:
      - Perform operations related to modeC
      - if (question4==ans1)
        - currentmode=modeB;
      - else if (question4==ans2)
        - currentmode=modeD;
      - break;
    - case modeD:
      - Perform operations related to modeD
      - if (question5)
        - currentmode=done;
      - break;
    - }
  - }
An Example

- Go forward until an obstacle is reached or until a specified time limit
- Back up until a specified time limit is reached
- Turn until a specified time limit is reached
Switch statement

- see [http://www.min.uc.edu/robotics/research/tutorials/LibraryReference.doc](http://www.min.uc.edu/robotics/research/tutorials/LibraryReference.doc)
- Example uses 2000ms, 500ms, and 300ms as the timeouts
- Going forward state=0, going back state=1, turning state=2
- `clock()` returns time in ms program has been running
- `igvc.DoSomeRoboting()`; sends robot a velocity command (while limiting it using GUI slider), as well as drawing some of the graphics and calculating some values.
- Variables `igvc.Xvel` and `igvc.Zturn` used to set commanded velocity and turn rate in `igvc.DoSomeRoboting()`;
- Speed limits for speed and turn rate given in `igvc.LimVel` and `igvc.LimTurn`
Exercise: Generate flowchart

- Go north for 3 seconds, then go east for 2 seconds. Then you are finished.
- Hint: there are 5 states (including finished), and 4 questions.
Exercise part 2:

- Generate a switch statement that implements this process.
- Hint: *cub1.HeadEst stores the current heading, in radians, clockwise from North, i.e. east is about 1.57, south is +or- pi and west is -pi/2.