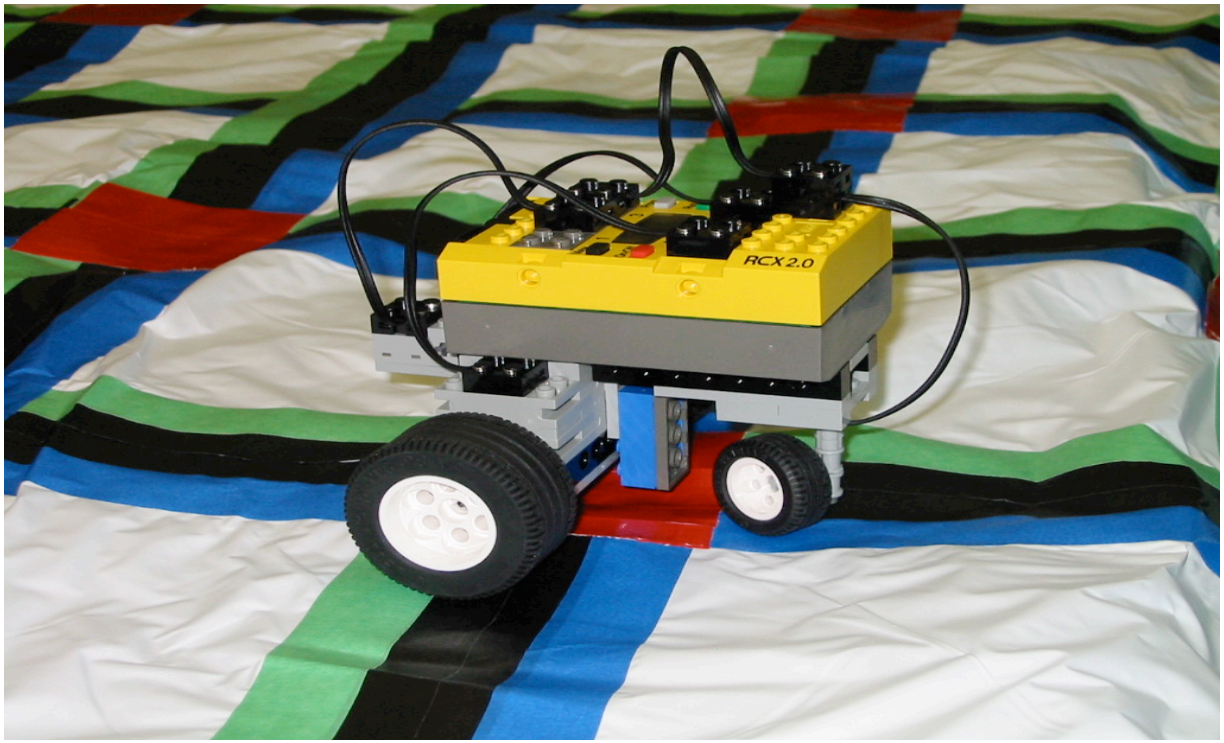
Agenda

- Introduction to Design Project
- Project Teams
- Technical Memo assignment

Lego Robot Project

Based on the TrackingRobot Java class introduced in CS 133 Practicum in week 2...



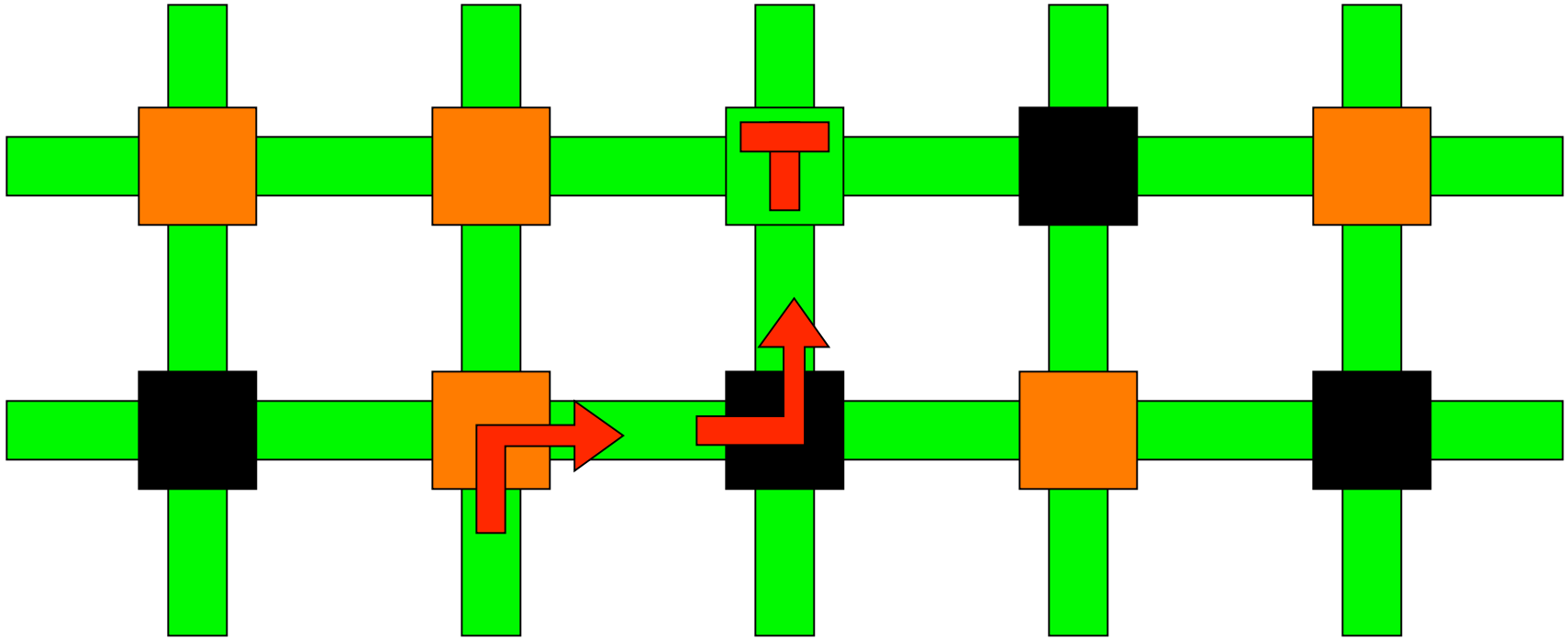
CS 133 Tracker Robot

Loop /* until stop */

- read sign posts: frontIsClear(), intersection colour
- take one of four possible actions:
  - move() forward to next intersection
  - turn left; move forward to next intersection
  - turn right; move forward to next intersection
  - stop

Lego Robot Project

The robot's task is to follow a "trail", defined by the colours of the world's roads and intersections.



leJOS

We will be running our own software on the Lego robots, not the software that comes with the Lego kit.

leJOS - tiny Java Operating System

leJOS compiler (works with JDK)

- Supports a stripped-down version of the Java language
- Provides classes for you to use to interface with the robot's input sensors and motors

Intellego - simulator for leJOS programs

Control File

Your solution will be a LegoTracker class that extends and implements Controller interface:

http://www.student.cs.uwaterloo.ca/~se101/LegoTracker.java

public abstract void **lightSensorListener**(int sensorNumber);
reacts to change in light-sensor value
public abstract void **touchSensorListener**(int sensorNumber);
reacts to change in touch-sensor value
public abstract void **setTimerExecution**(int elapsedTimer);
reacts to time-out event
private void **go**();
"main" program

Event-Driven Program

Most of your programming experience is probably with **data transformation** programs.

The Lego Design Project is an **event-driven** program.

Control flow: wait for event
calculate response
output response

Input/Output: sensors, actuators

Program may be responding to multiple events at the same time.

Lego Robot Project Tasks

- **Move robot forward:** move robot forward one intersection along road. Stay on the road.
- **Turn robot right, left:** turn the robot 90 degrees (not, say, 75 degrees)
- **Detect ground colour:** determine the colour of the ground beneath the robot, using light sensors that report light intensity. Compensate for imprecise sensors.
- **Calibrate light sensor**: calibrate the light-sensor readings that associated with the world's colours before starting robot on trail
- **Integrate code:** integrate the code from the three subteams needs to be integrated into a single, coherent program that controls a robot.

Project Deliverables

Demo of simulator code is worth 20% of final report.
No marks associated with running software on robot.

Technical Memo	Wednesday, September 29
Draft Design Report	Thursday, October 14
Scheduling Exercise I	Friday, November 5
Simulation Solution	**Thursday, November 10**
Robot Demos and Races	**Wednesday, November 11**
Design Report	Monday, November 15
Scheduling Exercise II	Thursday, November18

Project Deliverables

Primary deliverable is the design report.

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Design Report

- Submit one report per **subteam**
- Follow the SE work-term-report guidelines
  http://www.softeng.uwaterloo.ca/Current/work_report_guidelines.htm
- Plan to write a report that is **20-25 pages** long, including front matter and not including appendices.

Design Report

Synthesis reports focus on the design and implementation of a product. Should present details of

- design decisions and their rationale
- design alternatives and why they were rejected
- qualitative assessment of final product

Analysis reports focus on (preferably quantitative) analysis of problem or of solution alternatives. Should present details of

- design alternatives
- data and measurements of analysis
- analysis results

Design Report

- **Keep good records of your problem-solving discussions** (e.g., about how to correct the robot when it strays from the trail), so that you can include them in your Design Report.

- **Keep good records of the data from your experiments** (e.g., associating light-sensor readings with colours, determining how long to run motors to turn robot 90 degree) , so that you can include them in your Design Report.

Project Deliverables

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Project Teams

Your task in lab today is to meet the other members of your project team. Teams are listed on the course web page.
http://www.student.cs.uwaterloo.ca/~se101/teams.jpg

10 Teams, each with

- 3 subteams
- 1 robot to control

Team A

Matthew Moody	Sam	Daniel Legg
Devin	Jacky	Andy
Chris Li	Justin	Mandeep

Team Coordination

- Exchange names, phone numbers, e-mail addresses with your fellow subteam members.
- Get to know your subteam and team members.
- Select a **name** for your team/robot.
- Decide how your team will delegate aspects of the project to the three subteams

Technical Memo

Write a **1-page** memorandum addressed to me (Prof. Atlee) that outlines your team's and subteam's respective plans for completing the LegoTracker robot project:

- How your team has decided to decompose the design project into subproblems,
- How the subproblems have been allocated to the team's three subteams
- How your subteam has allocated work to individual subteam members.

Technical Memo

The memo should follow the **format** shown on pg. 62 of your IPE textbook; or the format shown on the Memo lab exercise available on the course web page.

http://www.student.math.uwaterloo.ca/~se101/TechnicalMemo.html

Technical Memo

Your memo will be evaluated on its

- Format
- Adherence to the assignment's specifications
- Professional tone and content
- Grammar (Canadian spelling)

Team Contract

Along with your memo, you are to submit a signed contract promising to be an effective member of your project team:

1. I will make an effort to get to know my teammates.
2. I will go to all team meetings prepared and on time.
3. I will do my fair share of the project work.
4. I will take the time to teach my teammates and not do everything myself.
5. I will seek help and will not let my partners do all the work.
6. I will not force my ideas on my partners nor discount theirs offhand.
7. I will complete my work on time.

Technical Memo and Team Contract

Submit memo and signed contract **by Wednesday, September 29 at 4:30 P.M.**

Place your memo in the box marked SE101 which is immediately outside of the door of the WEEF lab.

Readings

- **This week's lab**

  Technical memos: IPE 6.1.2

- **Web review #2 before Monday's lecture**:

  Measured quanitities: IPE 10,11
  Sentence structure: Dupré 1,7,8,79,85,97

- **Next week's lecture**

  Error propagation: IPE 12