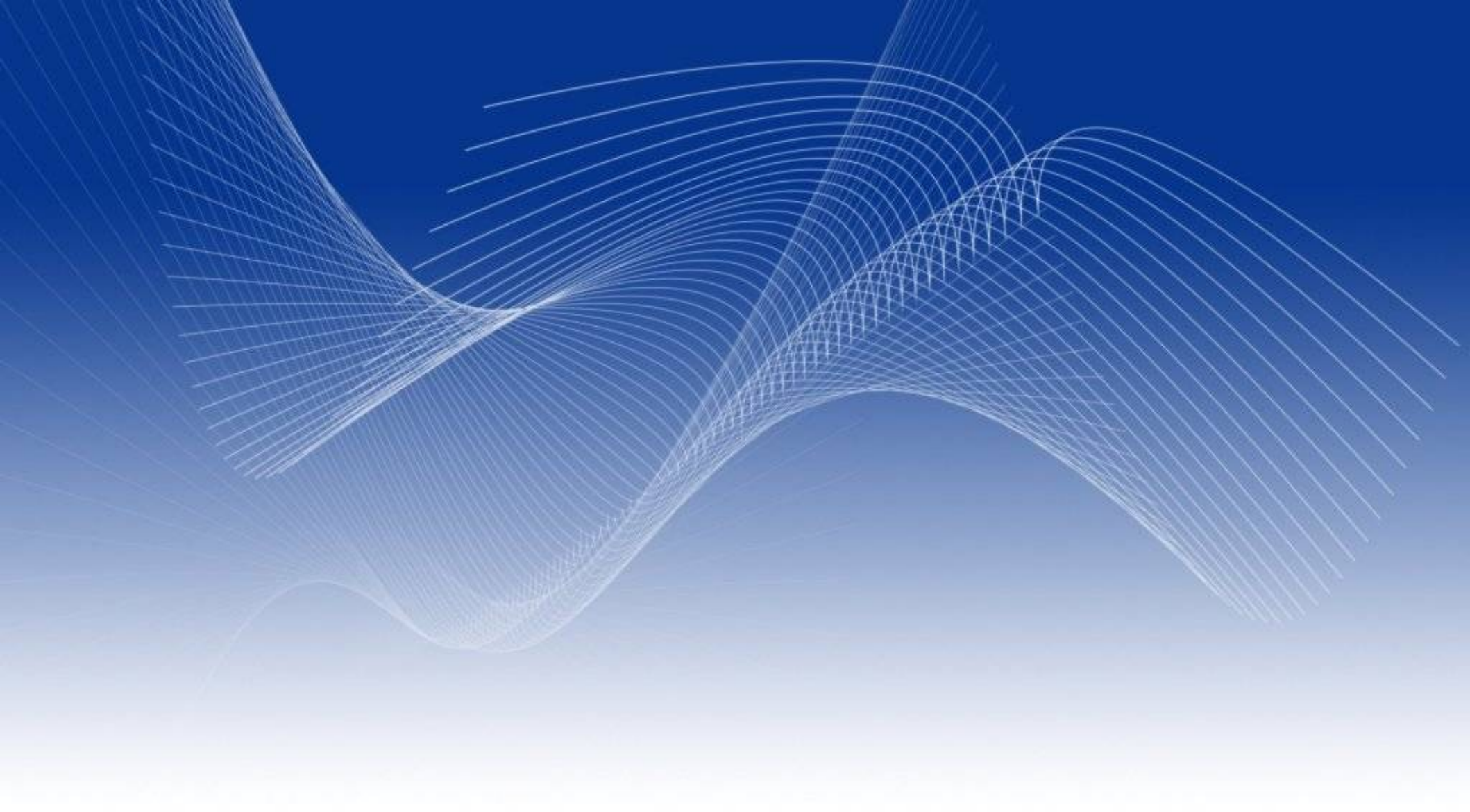


Personalizing CS1 with Robots

Jay Summet, Deepak Kumar, Keith O'Hara,
Daniel Walker, Lijun Ni, Doug Blank, Tucker Balch

I'd like to thank the academy..

- This paper would not be possible without the following assistance:
  - Deepak Kumar – Wrote the book!
  - Keith O'Hara – Programmed the Fluke!
  - Daniel Walker – Built the Fluke!
  - Doug Blank – Wrote the Software!
    (& current IPRE Director)
  - Tucker Balch – Made us do it!
    (past IPRE director)
  - Microsoft Research – Provided the Funding!

Institute for Personal Robots in Education (IPRE)

- IPRE is a joint effort between Georgia Institute of Technology and Bryn Mawr College, sponsored by Microsoft Research.
- IPRE has developed an (inexpensive) robot platform, (free) textbook, and (free) curriculum, that use personal robots to teach CS1.
- This talk is not about IPRE, for more information see:

www.RobotEducation.org

This talk does not replace the paper!

- In this talk I will be covering what it is like to teach using personal robots.
- Read the paper for more in-depth coverage on the following topics:
  - The Hardware
  - Myro – The software
  - Our free textbook!
  - Our curriculum
  - Early results
  - Future Work

We have some experience teaching with robots...

- As part of the IPRE development, Georgia Institute of Technology and Bryn Mawr College have have test taught **TEN** (10) CS 1 with robots classes starting in Spring 2007
- GaTech – 66% male
- Bryn Mawr – 99% female
- I have taught 4 semesters (5 classes)
  - Summer 2007 – 25 students
  - Fall 2007 – 110 students
  - Fall 2008 – 265 students (2 sections)
  - Spring 2009 – 130 students

Teaching CS1 with “context” - The Personal Robot

- Teaching CS1 with a robot, not teaching robotics.
- Assumption: Teaching CS1 using some form of context is good.
- IPRE's context is a personal robot.

Student ownership (at least for a semester)

- Students purchase and own their robot.

  or...

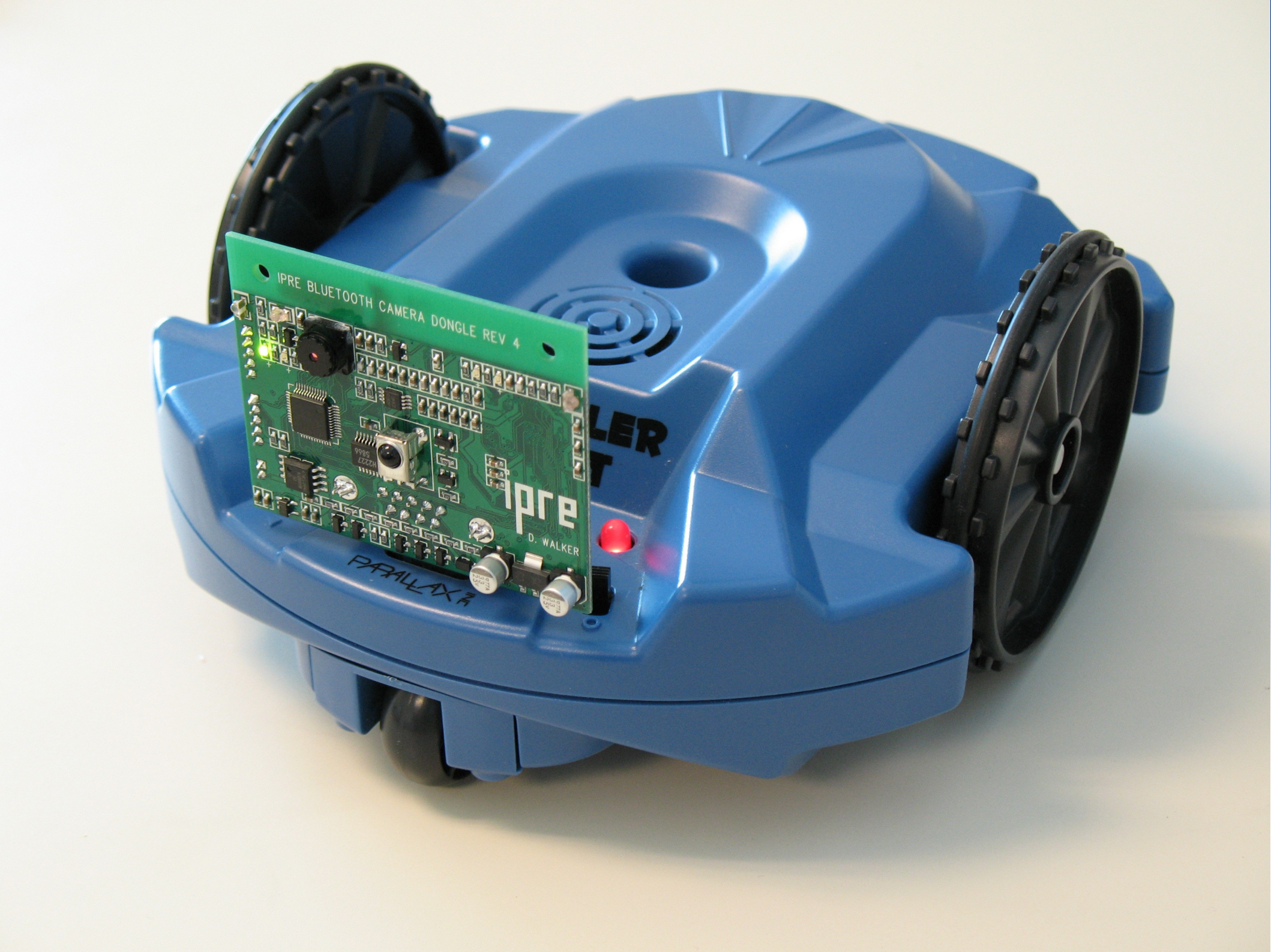
- Students “check-out” a robot for the entire class, and can take it home.

  As opposed to...

- A lab of robots that students get to use during “approved class time”.

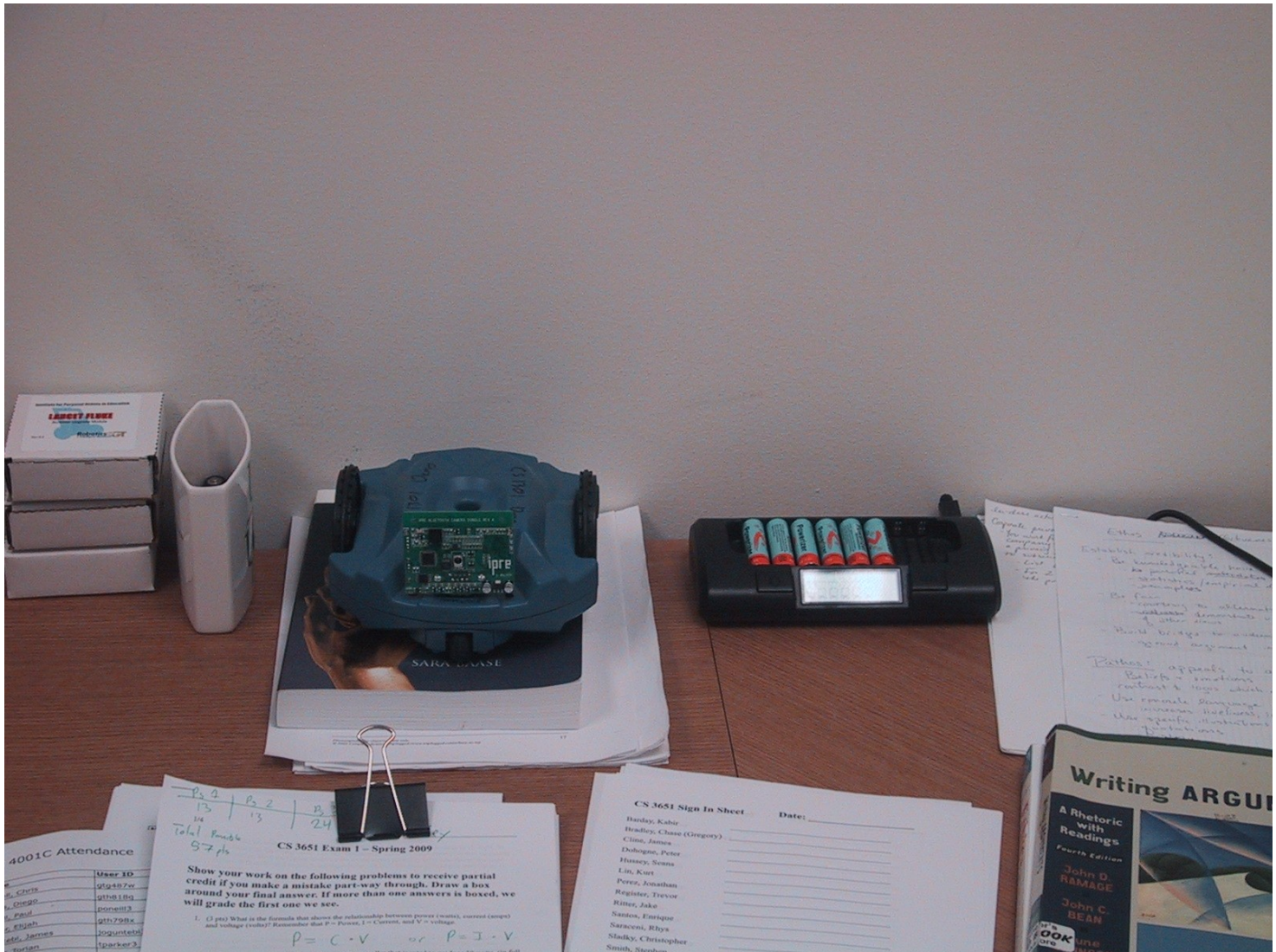
Scribbler Robot with Fluke

- Inexpensive enough so that every student has their own ($150-$200)
- Small enough to carry to class, dorm rooms, and home.
- Robust enough to carry to class, dorms...
- Cute and non-threatening.


IPRE BLUETOOTH CAMERA DONGLE REV 4
ipre
D. WALKER
PARALLAX

Impact on the Instructor

- You need a robot, and batteries, and Bluetooth for your computer.



Oh yes, and a little bit of knowledge...

- Myro currently only supports Python
  (Teaching CS1 with python is joyful!)
- Others have built Myro-like systems in, C++ and Scheme, etc....
- Next version of Myro runs on top of the CLR (.Net / Mono) so any CLR language will work! [IronPython, C#, Java (ikvm.net), IronScheme, Ada (A#) etc...]
- And you have to learn a little about the hardware...

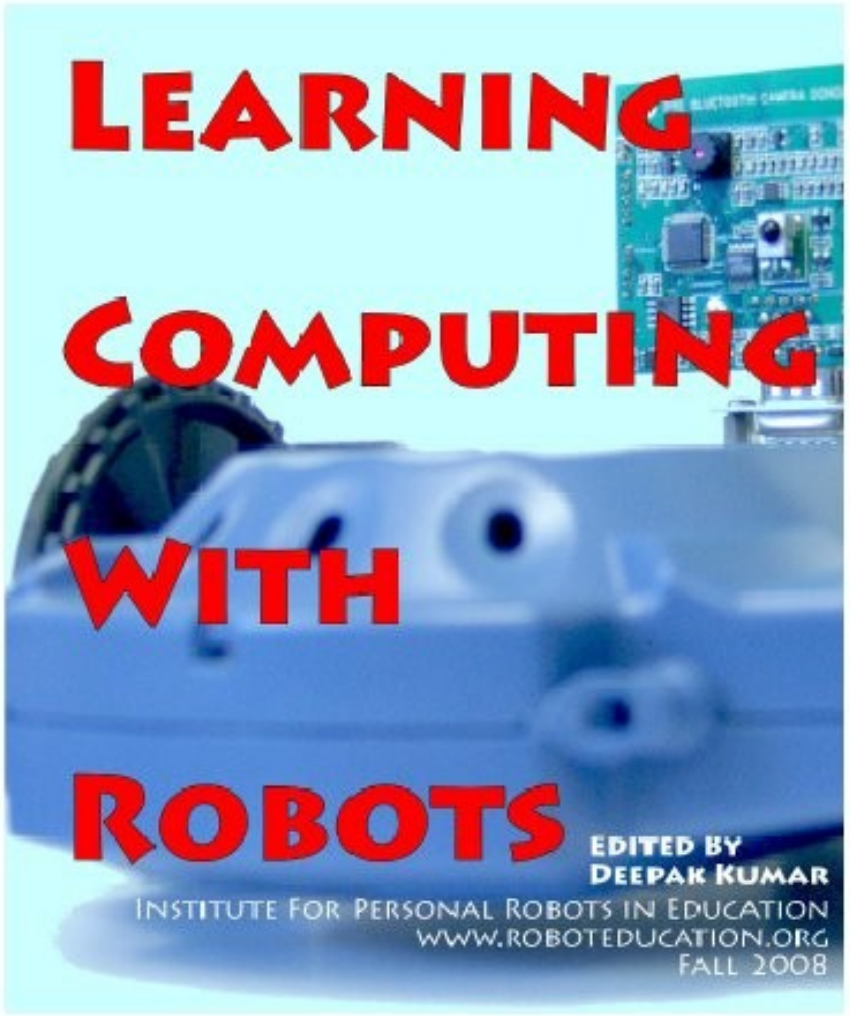
Myro/Robot/Python demo!

You may also want some curriculum material...

- Robot Assignments:
  - Make it sing and dance
  - Avoid Walls
  - Find the lamp
  - Find the yellow target
  - Create special FX (manipulate pixels in camera images)
  - Create robot movies (robot actors, camera robots)
  - Put on a live robot performance
- Robot themed test problems

wiki.RobotEducation.org

Free Textbook



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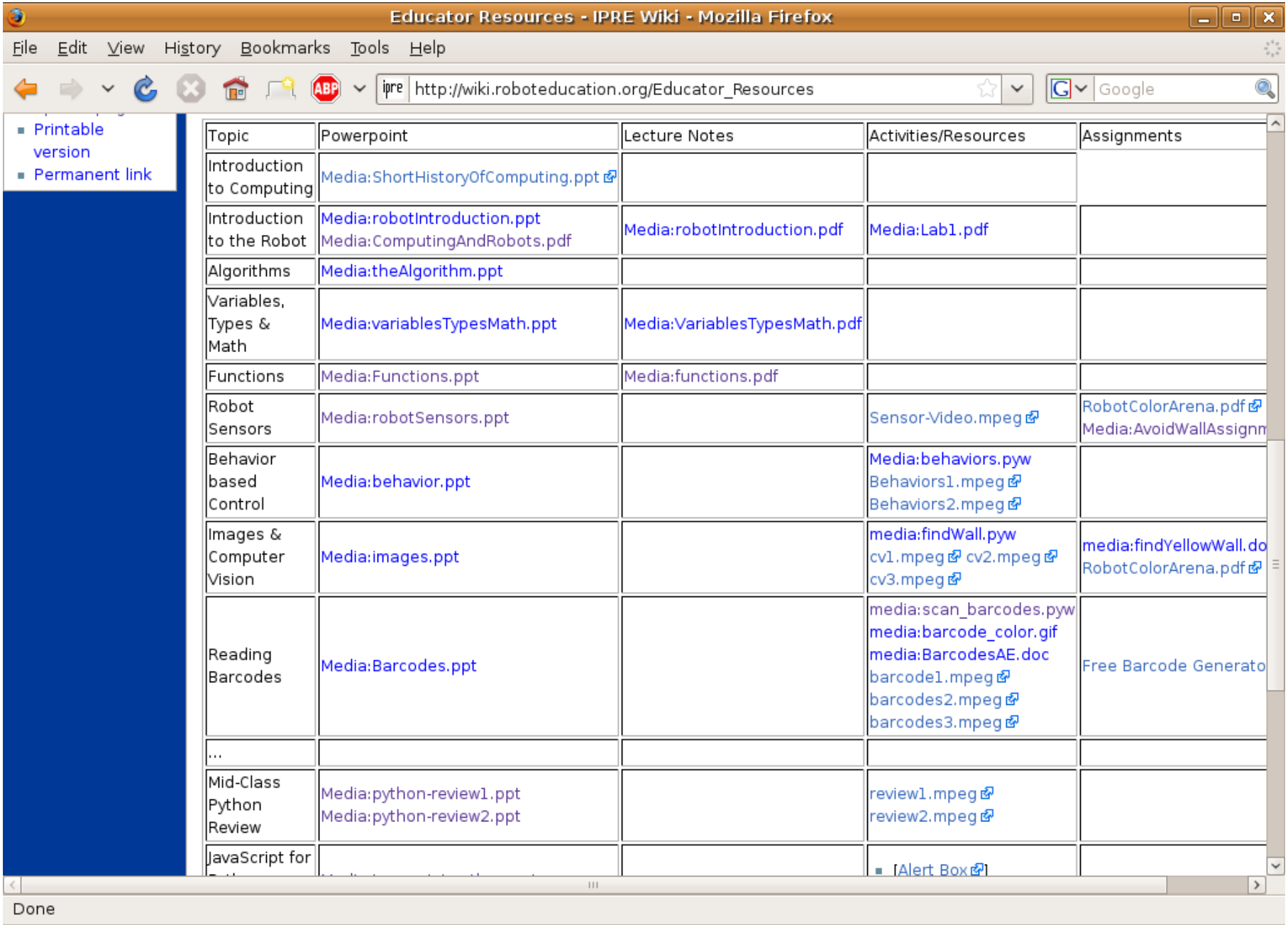

Topic	Powerpoint	Lecture Notes	Activities/Resources	Assignments
Introduction to Computing	Media:ShortHistoryOfComputing.ppt			
Introduction to the Robot	Media:robotIntroduction.ppt Media:ComputingAndRobots.pdf	Media:robotIntroduction.pdf	Media:Lab1.pdf	
Algorithms	Media:theAlgorithm.ppt			
Variables, Types & Math	Media:variablesTypesMath.ppt	Media:VariablesTypesMath.pdf		
Functions	Media:Functions.ppt	Media:functions.pdf		
Robot Sensors	Media:robotSensors.ppt		Sensor-Video.mpeg	RobotColorArena.pdf Media:AvoidWallAssignm
Behavior based Control	Media:behavior.ppt		Media:behaviors.pyw Behaviors1.mpeg Behaviors2.mpeg	
Images & Computer Vision	Media:images.ppt		media:findWall.pyw cv1.mpeg cv2.mpeg cv3.mpeg	media:findYellowWall.do RobotColorArena.pdf
Reading Barcodes	Media:Barcodes.ppt		media:scan_barcodes.pyw media:barcode_color.gif media:BarcodesAE.doc barcode1.mpeg barcodes2.mpeg barcodes3.mpeg	Free Barcode Generato
...				
Mid-Class Python Review	Media:python-review1.ppt Media:python-review2.ppt		review1.mpeg review2.mpeg	
JavaScript for			[Alert Box]	

Concrete Student Output

- Students know that their peers will be watching when they demo their assignments.
- Assignments produce deliverables they want to show to their friends, siblings, even parents!
- Movies they can share with grandma over the Internet!

Videos of Student Projects

Some Early Results

Fall '07 Class	Success Rate	Students
Robots	90.97%	131 of 144
NonRobots	85.71%	78 of 91
MediaComp	73.06%	179 of 245
MATLAB	69.16%	740 of 1070

Take Home Points

- Students find the robots very motivating!
- Robots are fun, and not at all scary!
  (And the students are not afraid of them either!)
- Support material is available to make this easy!
- Go read the paper!
- Come talk with us!

Thank you!

- Questions?

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