

Intro to Robotics Tools of the Trade

ME 2984

“If the only tool you have is a hammer, you tend to see every problem as a nail.”
- Abraham Maslow



K.H.A.N. KIT ORDERING

- Three Options
 - We order a complete kit for you
 - You order a complete kit for yourself
 - Custom Order (Expert Mode)
- If uncertain, choose Option 1
- We have posted a survey to record people's plans
 - If you haven't e-mailed us already, please respond by noon on Friday



Operating Systems - Linux

- POSIX History (Happy Belated Birthday!)
- Do One Thing and Do It Well
- Open Source Community
- The Distros

UBUNTU 14.04

- Famous for being user-friendly
- 14.04 is special
- Package Management
- ROS supported

- Text based computer interface
- Massive toolbox
- Pipes and Filters

A TI-83 Plus calculator is shown, displaying a list of words and their letter counts on the screen. The words are: THIS (4), THAT (4), THERE (6), HERE (5), and HUGE (5). The word 'SUCCESS' is displayed at the bottom of the list. The calculator is a TI-83 Plus model, as indicated by the label on the top right of the screen.



ENTER THE MATRIX

```
jpz@fawkes: ~/me2984
File Edit View Search Terminal Help
jpz@fawkes:~$ pwd
/home/jpz
jpz@fawkes:~$ mkdir me2984
jpz@fawkes:~$ cd me2984
jpz@fawkes:~/me2984$ echo "Hello class!" > notes.txt
jpz@fawkes:~/me2984$ ls
notes.txt
jpz@fawkes:~/me2984$ cat notes.txt
Hello class!
jpz@fawkes:~/me2984$
```

Commands

User

Computer Name

Current Directory



WHAT'S IN A NAME?

- Names have power
 - Framing
 - Communication
 - Ownership
- Be aware of RFC
1178
 - <http://www.faqs.org/rfcs/rfc1178.html>





COMMON COMMANDS

- pwd - “Print Working Directory”
- ls - “List Files”
- mkdir - “Make Directory”
- cd - “Change Directory”
 - Note, ~ means home
- man - “Manual”
- rm - “Remove”
 - Beware the [Pixar Incident](#)



COPY OF NEW NEW NEW SLIDE V.1 (4)

- Tracks changes to a set of files over time
- Safety Belt
- Enables collaboration
- Common Operations
 - Check Out
 - Check In
 - Branch
 - Merge





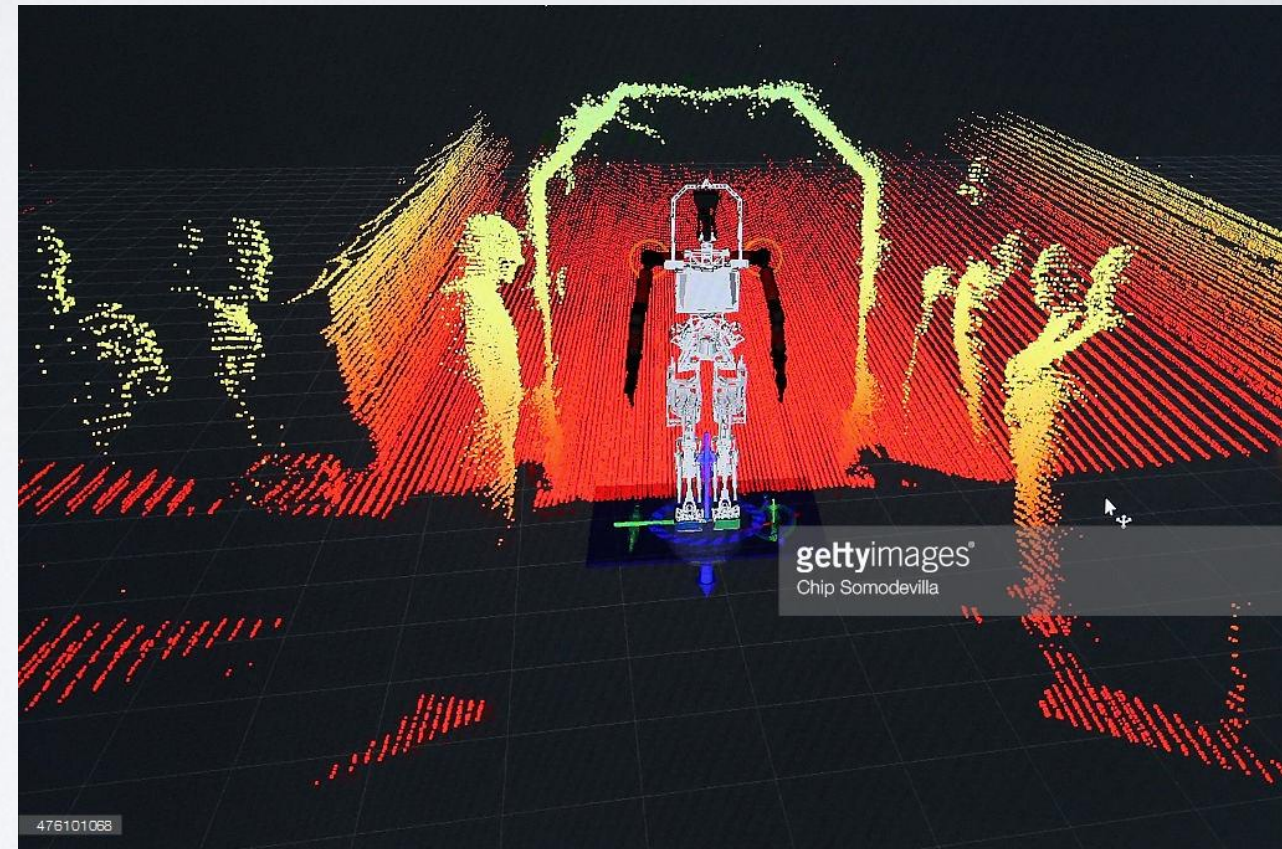
GIT

- Extremely popular open-source version control software
- Written by Linus Torvalds (creator of Linux)
- Fast, powerful, efficient
- Interface is intimidating from outside
 - Easy to learn by doing and tutorials

LET'S GIT INTRODUCED

ROS

- Open Source
Robotics Middleware
- Anonymous Publish-Subscribe
- Logging
- Conventions
- Tools
- Ecosystem





WE'RE GONNA NEED A BIGGER BOAT

- Robotics software can be like a pocket knife
- Anonymous Publish-Subscribe can help





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MESSAGE PASSING

- Data Driven
 - Don't care about locations
- Flexible
 - Can adjust connections
- Scalable
 - Connections can span computers





MESSAGE PASSING



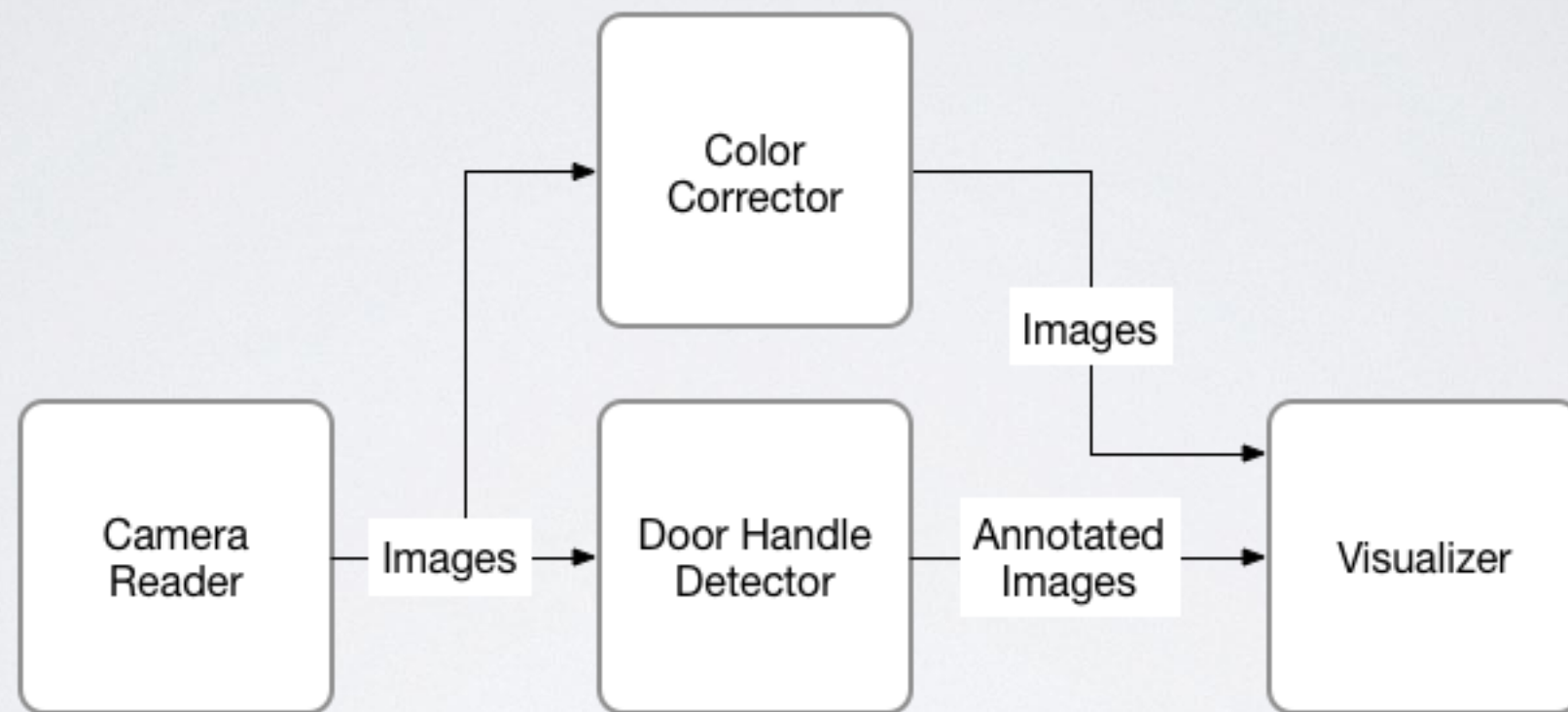


MESSAGE PASSING





MESSAGE PASSING





BUILDING SOFTWARE

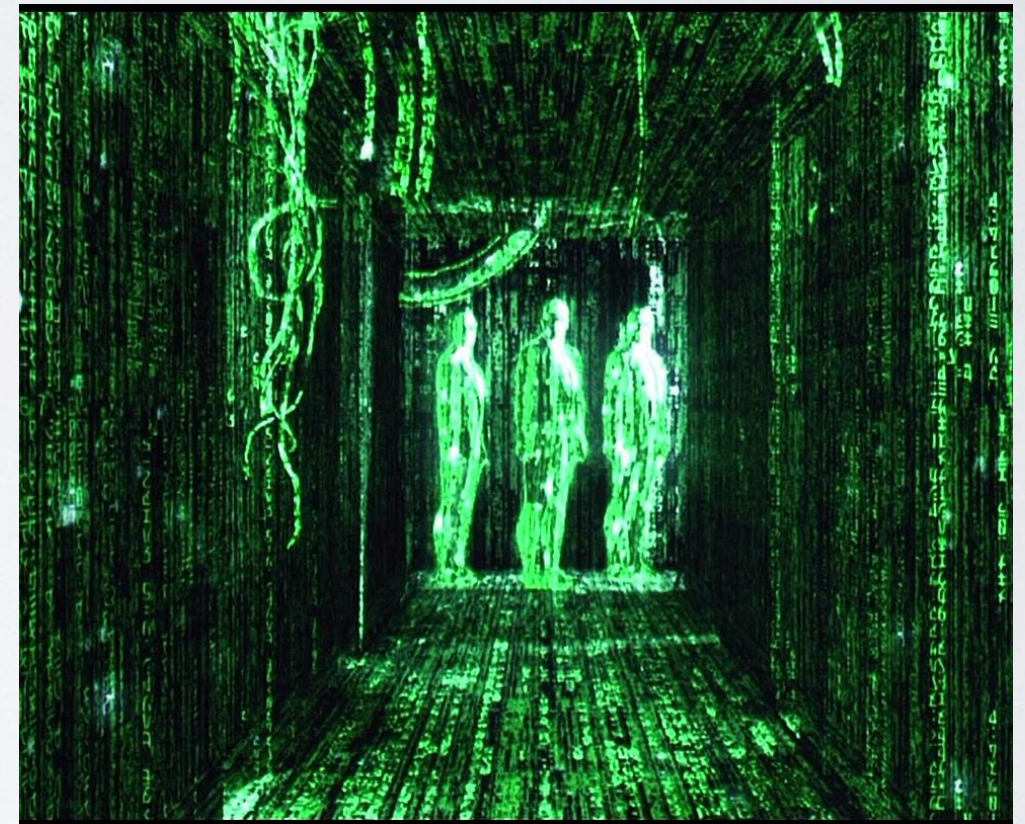
- Some programming languages require conversion from human-readable to machine-readable forms
- Many tools exist to handle various parts
 - Culminates in a build system
- catkin is the supported build system of ROS

ROS ECOSYSTEM

- Remember the T-Shaped Person
- Many experts share their developments as ROS packages
- Build bigger, better systems faster
- Discover new ideas more easily

GAZEBO

- Dynamics-based Robotics Simulator
- Decouples Hardware & Software Development
- Promotes Faster Iteration
- Allows for repeatable testing
- Safer



GAZEBO

- Video Credit: John Peterson



IT TAKES A VILLAGE

- All of these tools are open source, with strong communities
- Community support for help understanding
 - [Stack Overflow](#)
 - [Ask Ubuntu](#)
 - [ROS Answers](#)
 - [Gazebo Answers](#)
- But not doing your homework for you



DON'T FORGET

- Kit Survey due by Noon on Friday
- Assignment 1 is due Tuesday (09/02) at 11:59 PM
- Office hours curtailed today
 - E-mail us if you need additional help

QUESTIONS?