

# Robotic Caregivers: From Dreams to Reality

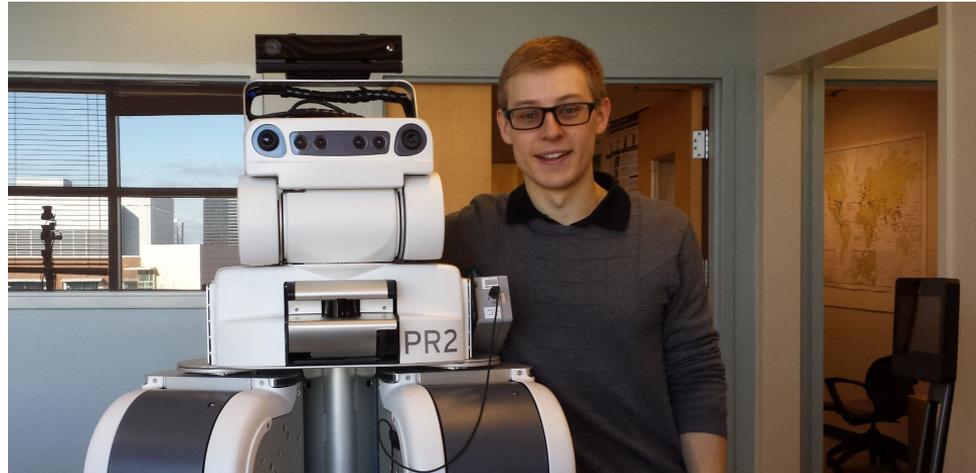
Fall 2021  
Lecture 1



*Charlie Kemp*  
<https://charliekemp.com>

# Special Thanks

As a graduate student, Prof. Zackory Erickson co-developed and co-taught the original version of this course with me in spring 2020 and spring 2021. He is now a tenure-track faculty member in the Robotics Institute at CMU.



<https://zackory.com/>

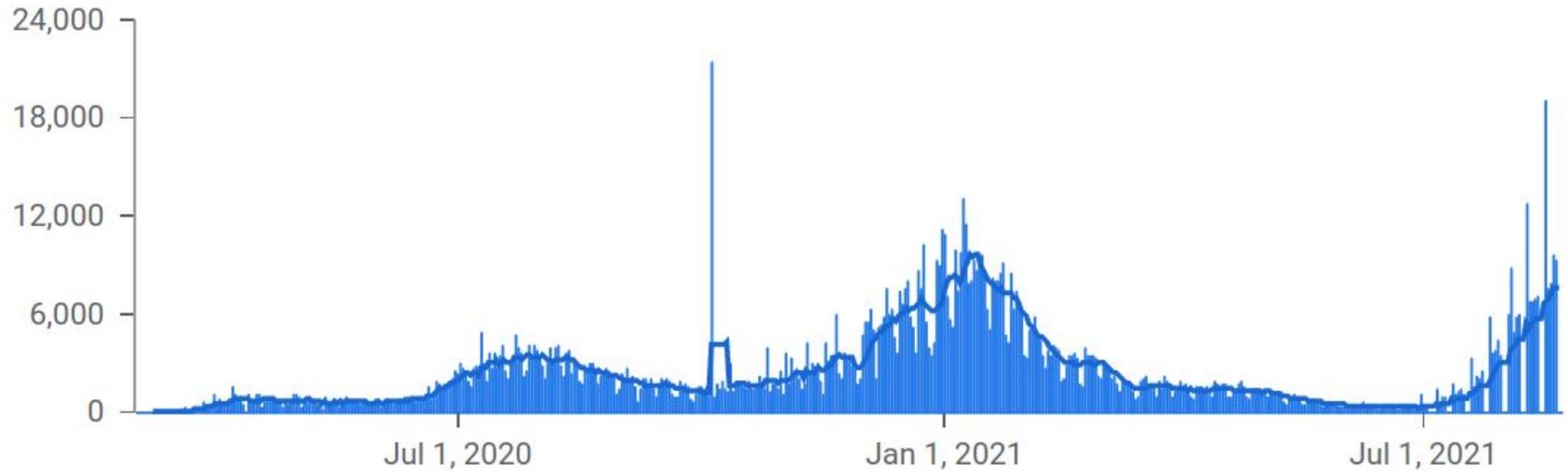
# Cases

Georgia

Cases:

New

Total



Each day shows new cases reported since the previous day

<https://www.sciencemag.org/news/2021/08/grim-warning-israel-vaccination-blunts-does-not-defeat-delta>

# Conflict of Interest Statement (Prof. Charlie Kemp)

Hello Robot produces the Stretch RE1 robot that teams will use for their projects. In addition to being an associate professor at Georgia Tech, Dr. Kemp is a co-founder and the chief technology officer (CTO) of Hello Robot Inc. where he works part time. He owns equity in Hello Robot and is an inventor of Georgia Tech intellectual property (IP) licensed by Hello Robot. Consequently, he receives royalties through Georgia Tech for sales made by Hello Robot. He also benefits from increases in the value of Hello Robot.

# Meet Your Project Robot



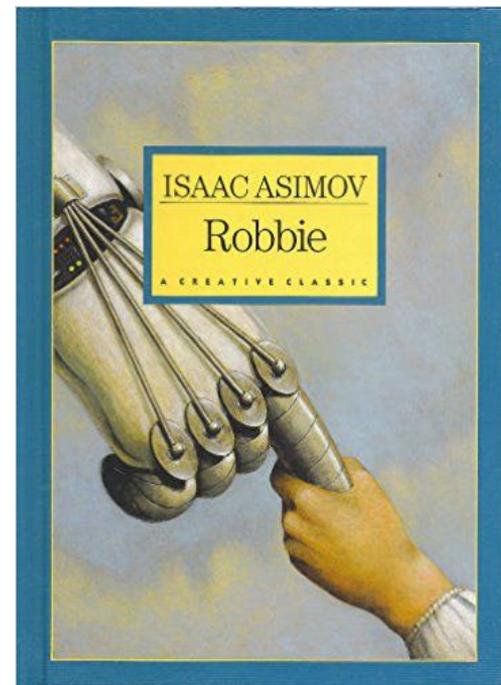
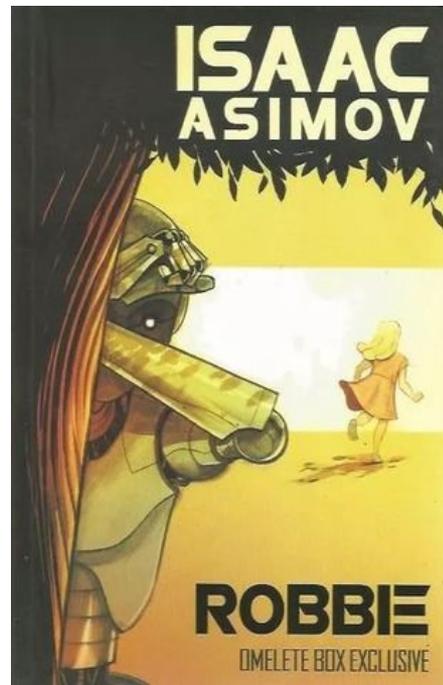
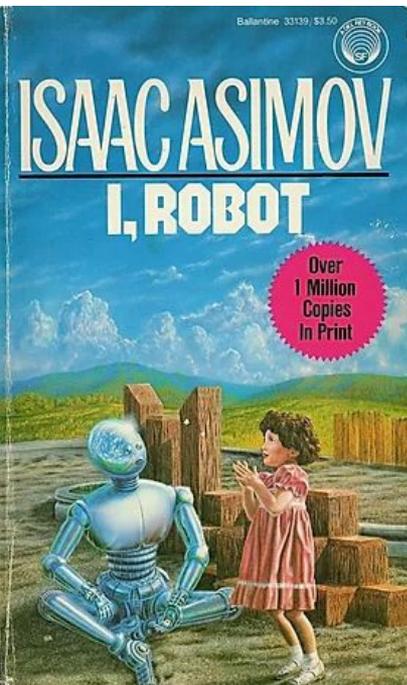
# The Dream

- Intelligent robots that care for us
- Help us overcome our limitations
- Help us flourish as human beings
- Are affordable and accessible



# Examples from Science Fiction

# 1939 - "Robbie" short story by Isaac Asimov



# 1980 - Star Wars: The Empire Strikes Back



# 2009 - Moon



# 2012 - Robot & Frank



# 2014 - Interstellar



# 2014 - Big Hero 6 (Baymax)



# A Grand Challenge

- Multidisciplinary
  - Computational
  - Biomedical
  - Mechanical
  - Human factors
  - Sensing
  - Electronics
  - Business
  - ...



# Prof. Kemp's Background

- [For this class, please call me Prof. Kemp or Dr. Kemp](#)
- Trained in computer science, AI, and robotics at MIT with [Rod Brooks](#)
- Founded the multidisciplinary [Healthcare Robotics Lab](#) in 2007
  - ~16 years working on robotic caregivers
- Third time teaching this class, previously taught biomechanics, PBL, mobile manipulation
  - Hesburgh Award Teaching Fellow & Class of 1940 Course Survey Teaching Effectiveness Award
- Biomedical engineering faculty, adjunct faculty in interactive computing and electrical and computer engineering
- Co-founded startup in 2017

<https://charliekemp.com>

# You are the future

- Many dreams will become a reality in the next 10 years
- Surprisingly little education, research, and commercialization to date
- My goal is to enable you to help make caregiving robots a reality



# I want your help

- This is the first time teaching the course this way
- New for Georgia Tech
- New for the world?
- Please help make it something special that really matters



# When we are in class

- I'll strive to be fully committed to you.
- Please take advantage of it



Grades

# Grading Philosophy

- I want everyone to make an A

*A a*

# Grading Philosophy

- I want everyone to make an A
- You have to earn it

*A a*

# Your Grade

- 33% : Class Participation
- 33% : Midterm Project
- 34% : Final Project

# Attendance is Mandatory

A **5% penalty** to your class participation will be assessed for each unexcused absence.

# Conversion to Letter Grades

<i>min</i>		<i>max</i>	<i>letter grade</i>	<i>meaning</i>
85.0 <=	numeric_grade		A	“Excellent”
70.0 <=	numeric_grade	< 85.0	B	“Good”
60.0 <=	numeric_grade	< 70.0	C	“Satisfactory”
50.0 <=	numeric_grade	< 60.0	D	“Passing”
	numeric_grade	< 50.0	F	“Failure”

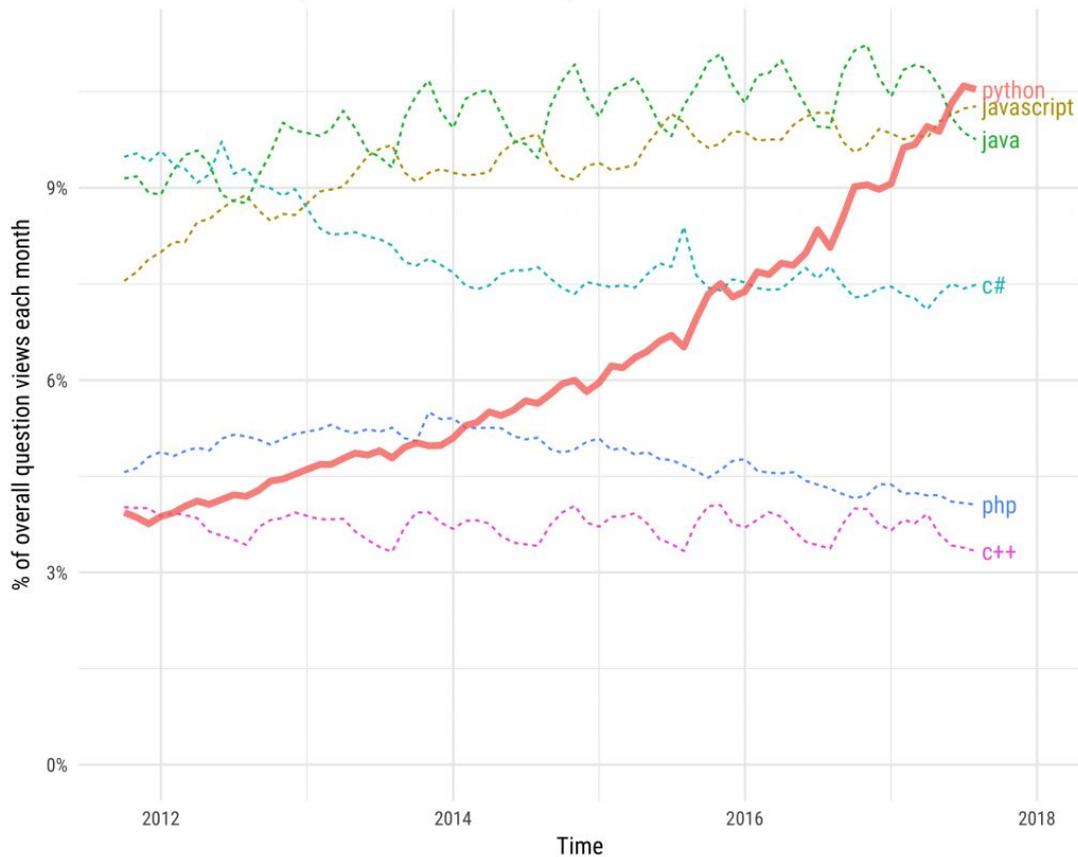
The words in quotes are the standard Georgia Tech interpretations of letter grades from the Registrar's website:

<http://registrar.gatech.edu/info/grading-system>

Your first assignment:  
**Make sure you know Python 3**

## Growth of major programming languages

Based on Stack Overflow question views in World Bank high-income countries



<https://stackoverflow.blog/2017/09/06/incredible-growth-python/>

# Examples of Learning Resources for Python 3

<https://www.learnpython.org/>

<https://developers.google.com/edu/python/>

<https://www.codecademy.com/learn/learn-python-3>

<https://docs.python.org/3/tutorial/index.html>

<https://www.tutorialspoint.com/python3/>

<https://www.youtube.com/watch?v=YYXdXT2l-Gg&feature=youtu.be>

# Practice in Google Colab

Created by Prof. Zackory Erickson

[Google Colab Notebook](#)



Your second and third assignments:

**Read the Syllabus & Midterm Problem Statement**

# Class Website

<https://sites.gatech.edu/robotic-caregivers/>

# Your Fourth Assignment

Read the safety manual for the Stretch RE1.

[https://docs.hello-robot.com/robot\\_safety\\_guide/](https://docs.hello-robot.com/robot_safety_guide/)

In the next class, you'll begin using it!

# Next Class

- Form teams
- Get to know your teams
- Teleoperate the Stretch RE1
- Discuss the midterm project

# Share your stories

- Name
- Current status (e.g., undergraduate, master's, PhD)
- Relevant background
- Why are you interested in this class?

# Your first four assignments

1. Before Wednesday
  - a. Read [the syllabus](#)
  - b. Read [the Stretch RE1 safety manual](#)
  - c. Read [the Midterm Problem Statement](#)
2. Over the next two weeks
  - a. Make sure you know Python 3