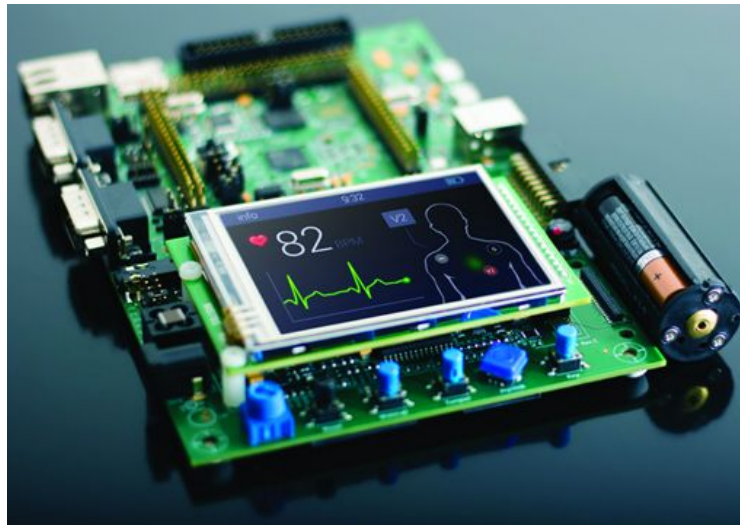# Embedded Software

CS 145/145L

Caio Batista de Melo

About Me

- Caio sounds like "Kyle"

- 4th-year PhD Candidate in CS

- BS & MS in Brazil

- Personal webpage:
  - caiobatista.com

- Research Interests
  - Emergent behavior detection, anomaly reasoning, self-adaptive systems
  - … -> Autonomous Vehicles

- Contact me
  - cbatista@uci.edu

Course Structure

- Lectures (T/Th, 8:00~9:20am), DBH 1100
- Lab Sessions
    - WebSoc & Follow TA Instructions
- Resources
    - https://canvas.eee.uci.edu/courses/45047
    - https://caiobatista.com/courses/uci/s22/cs145/
- TAs:
    - Mahyar Abbasian (abbasiam@uci.edu)
    - Jiyoung An (jiyouna2@uci.edu)
    - Xinyuan Lin (xinyual3@uci.edu)
    - Goda Devi Addanki (gaddanki@uci.edu)

Assignments

- Homework (20%)
  - 5 total, but lowest gets dropped
  - Reading & activities on zybooks

- Projects (60%)
  - 4 total
  - Build on top of each other
  - Allowed to work in pairs, but still responsible for your own work

- Final (20%)
  - Final project open for design

zyBooks

1. Sign in or create an account at [here](#)
2. Enter zyBook code: UCICOMPSCI145CSE145BatistadeMeloSpring2022
3. Subscribe

Please note that all author royalties have been declined and applied toward reducing the cost of this book.

Group Projects

- Can work in groups of two (pairs);

- You're still responsible for your individual submission;

- Both students should be in the same lab;

- Groups must be formed before submitting project 1;

- Please submit the team contract via Canvas:
  - https://caiobatista.com/uploads/courses/uci/s22/cs145/TeamContract.pdf
  - https://canvas.eee.uci.edu/courses/45047/assignments/929278

Parts Needed

Item	Vendor	Part #	Unit Price	Quantity	Price
Breadboard	www.digikey.com	438-1046-ND	$10.99	1	$10.99
Programmar	www.digikey.com	ATATMEL-ICE-BASIC-ND	$102.00	1	$102.00
Microcontroller	www.digikey.com	ATMEGA32-16PU-ND	$6.61	2	$13.22
9V Battery Connector	www.digikey.com	BS6I-ND	$0.98	1	$0.98
9V Battery	www.digikey.com	P687-ND	$1.92	2	$3.84
Display	www.digikey.com	67-1768-ND	$12.48	1	$12.48
LED	www.digikey.com	67-1068-ND	$0.37	10	$3.65
8MHz Crystal	www.digikey.com	CTX406-ND	$0.36	2	$0.72
5V Voltage Regulator	www.digikey.com	MC7805CT-BPMS-ND	$0.46	2	$0.92
0.1uF Capacitor	www.digikey.com	399-3526-ND	$0.99	10	$9.93
Push Button	www.digikey.com	P12230SCT-ND	$0.20	1	$0.20
Speaker	www.digikey.com	102-3851-ND	$3.61	1	$3.61
100 Resistor	www.digikey.com	CF14JT100RCT-ND	$0.04	10	$0.41
1K Resistor	www.digikey.com	CF14JT1K00CT-ND	$0.04	10	$0.41
10K Resistor	www.digikey.com	CF14JT10K0CT-ND	$0.04	10	$0.41
Keypad	www.digikey.com	GH5004-ND	$20.13	1	$20.13
Display Connector	www.digikey.com	A835AR-ND	$3.79	1	$3.79
					$187.69

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1 year ago…

As of 2022-03-22: $230

Same parts as 2 last offerings, you can try to buy from past students

Parts Needed

The list from Canvas can be directly imported into digikey!

1. Go to https://www.digikey.com/en/mylists/
2. Click on Upload a List
3. Choose the .csv you downloaded from Canvas
4. Double check the column names are correct
5. Finish importing it

Alternative Parts

Part	Link	Comments
ATATMEL-ICE-BASIC	https://www.microchipdirect.com/dev-tools/ATATMEL-ICE-BASIC https://www.mouser.com/ProductDetail/Microchip-Technology-Atmel/ATATMEL-ICE-BASIC?qs=KLFHFgXTQiAG498QgmqIdw%3D%3D https://www.amazon.com/MICROCHIP-Atmel-ICE-Basic-Kit/dp/B07MXRYWD9 https://export.rsdelivers.com/product/microchip/atatmel-ice-basic/microchip-atmel-ice-programming-kit-for-sam-and/1306123 https://www.newark.com/microchip/atatmel-ice-basic/debugger-programmer-arm-avr-mcu/dp/45X9866 https://www.digikey.com/en/products/detail/microchip-technology/ATATMEL-ICE-BASIC/4753381 https://www.avnet.com/shop/us/products/microchip/atatmel-ice-basic-3074457345644782430/	should restock soon (2022-03-31) should restock soon (2022-04-04) shipping might take *too* long
ATATMEL-ICE (non-basic) **Alternative to above part**	https://www.digikey.com/en/products/detail/microchip-technology/ATATMEL-ICE/4753379 https://www.microchip.com/en-us/development-tool/ATATMEL-ICE	more expensive, has extra features that we don't need
T350A104K035AT	https://www.avnet.com/shop/us/products/kemet/t350a104k035at-3074457345643651400/ https://www.newark.com/kemet/t350a104k035at/tantalum-capacitor-0-1uf-35v-26/dp/57K9266?CMP=AFC-ECIA https://www.alliedelec.com/product/kemet/t350a104k035at/70095315/ https://www.tti.com/content/ttiinc/en/apps/part-detail.html?mfrShortname=&partsNumber=T350A104K035AT	
Alternatives to above part	https://www.digikey.com/en/products/detail/kemet/T350A104K035AT7301/3726263 https://www.digikey.com/en/products/detail/kemet/T356A104K035AT/818462 https://www.digikey.com/en/products/detail/kyocera-avx/TAP104K035SRW/1470992 https://www.digikey.com/en/products/detail/kyocera-avx/TAP104K035SCS/563934	

https://canvas.eee.uci.edu/courses/45047/files/18336632

Soldering Parts

- Lab doesn't have a soldering iron;

- I'll lend mine to TA's so they have one during labs;

- All <u>required</u> soldering is just for the LCD screen, so you might not really need it;

- If you do want it though, any soldering iron should be fine.

  This was the set suggested during remote-instruction:

  - https://www.digikey.com/en/products/detail/sparkfun-electronics/TOL-14456/7902306
  - https://www.digikey.com/en/products/detail/chip-quik-inc/NCSW-031-0-5OZ/13531391

Supported Development Environment

- Microchip Studio
  - https://www.microchip.com/en-us/tools-resources/develop/microchip-studio
  - Makes it easy to change fuse settings
- ➤ Windows only!

- If you **really** want to try a different environment, you can look into this:
  - https://platformio.org
    - https://caiobatista.com/uploads/courses/uci/s22/cs145/platformio.ini
    - https://docs.platformio.org/en/latest/plus/debug-tools/atmel-ice.html
    - https://docs.platformio.org/en/latest/boards/atmelavr/ATmega32.html

  - https://www.microchip.com/en-us/tools-resources/develop/mplab-x-ide
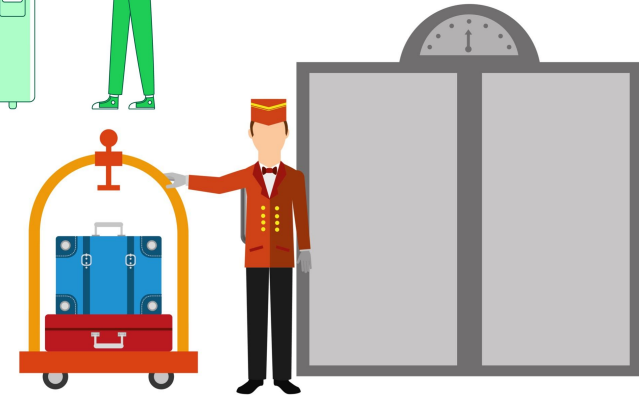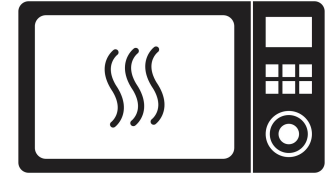   - ➤ doesn't work on m1 macs!

- ➤ Please note that your TAs/Instructor might not know how to use/setup/fix these other tools!

Embedded Systems

- An embedded system is a computer embedded in something other than a computer.

- An embedded system is a computer system – a combination of a computer processor, computer memory, and input/output peripheral devices – that has a dedicated function within a larger mechanical or electronic system.

See you next time :)

Q & A