ECE 196 - 5/19/24

Digital Sign Language Interpreter

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Problem Definition

The problem we've chosen is the **lack of effective communication methods** for deaf/mute individuals to easily interact with those who are **unfamiliar with sign language** without the aid of an interpreter, which creates distance between these communities.

The New York Times

Sign Language Interpreter Warned of 'Pizza' and 'Bear Monster' at Irma Briefing

Share full article

A screenshot from a Sept. 8 news conference in which Manatee County, Fla., officials announced a mandatory evacuation.
Manatee County

LOCAL

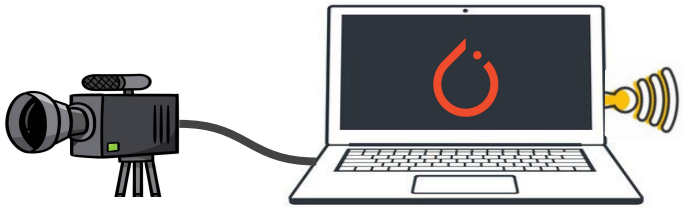
Angels Camp council member Amanda Folendorf, first deaf U.S. mayor, conducts city business

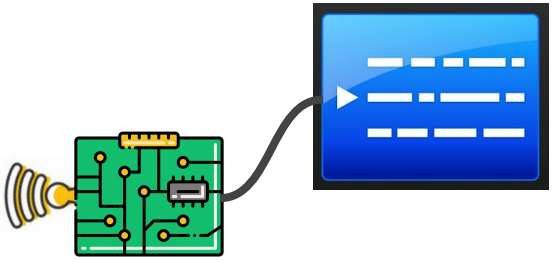
BY MCCLATCHY FEBRUARY 7, 2018, 1:40 PM

Amanda Folendorf, the youngest member of the Angels Camp City Council, has become the first deaf female mayor in American history.

Proposed Idea

Our proposed solution is a live closed captioning system for ASL, utilizing machine learning.





Tested Hypothesis

- Compile a list of alphabetical letters
- Vary in hand sizes, lightings, and backgrounds
- Check the system’s accuracy and response time
  - See if it can identify different letters
  - How long it takes to translate each letter
- Display correct results on OLED screen

Milestones

Utilize machine learning to distinguish between different signed letters

Improve display to be lightweight and compact, allowing it to be wearable

Get dataset such as photos and videos of ASL letters

Prototype a system for transmitting, receiving and displaying live data

Improve machine learning to include symbolic words

What we have Achieved so Far

Able to communicate with OLED with arduino I^2C data cable using libraries from ECE 16

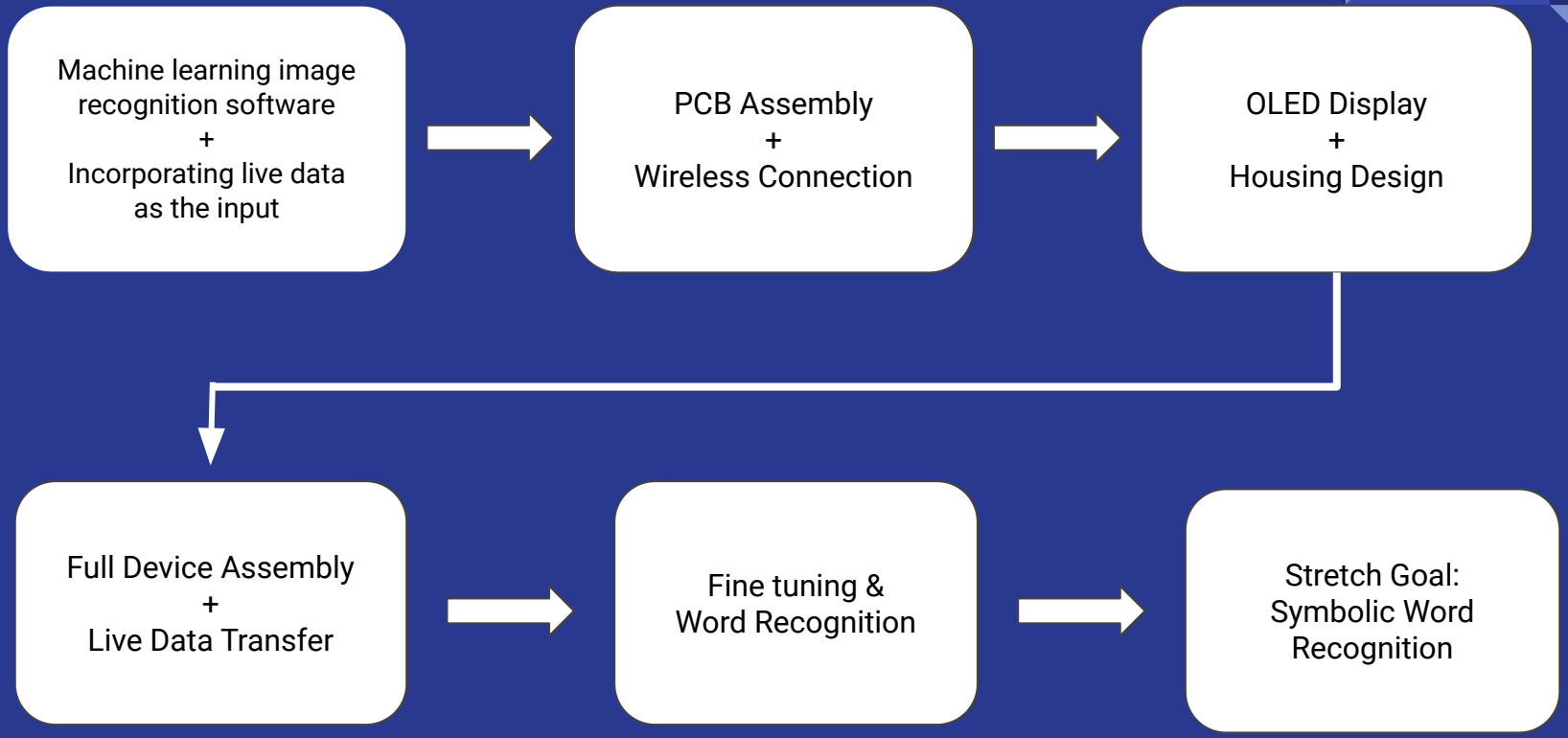
Found 28 classification dataset on Kaggle (26 letters, nothing, space)
- Cited in References

Created method to allow webcam to capture imagery
- Previously had issues with GoPro and CV2 library not working

Determined a machine learning model to classify letters
- EfficientNet
- Cited in References

Redesigned PCB to fix issues with usb connector

Upcoming Milestones



References

- ECE 16 libraries
  - Several useful python and arduino libraries we used came from ECE 16
- 28 image classification dataset on Kaggle
  - Dataset Link
- Pre Trained EfficientNet for testing
  - Github Link
- EfficientNet for training and implementation
  - Github Link

Questions

- Have you ever had a situation where a system like this would have been helpful?
- What are common misconceptions we should keep in mind?
- Do you think our milestones are feasible?
- Anything to improve our proposed idea?
- Any other questions? :D