Computer Science Society

1st Meeting 2016-2017

```
void Main()
{
  GetEwe();
  Console.WriteLine($"You have been given: {Ewe}");
}

public enum Directions { Up, Down, Left, Right, Forward, Backward, Diagonally };
public Directions? Ewe;

public Directions GetEwe()
{
  Random rand = new Random(DateTime.Now.Millisecond);
  do
  {
    Ewe =
    (
      from direction in Enum.GetValues(typeof(Directions)).OfType<Directions>()
      //let u = Directions.Down
      select direction
    ).ElementAt(rand.Next(0, Enum.GetNames(typeof(Directions)).Length));
  }
  while (Ewe == Directions.Up);
  return Ewe.Value;  Around();
}

private void Around()
{
  Ewe = null;
}
```

Who We Are

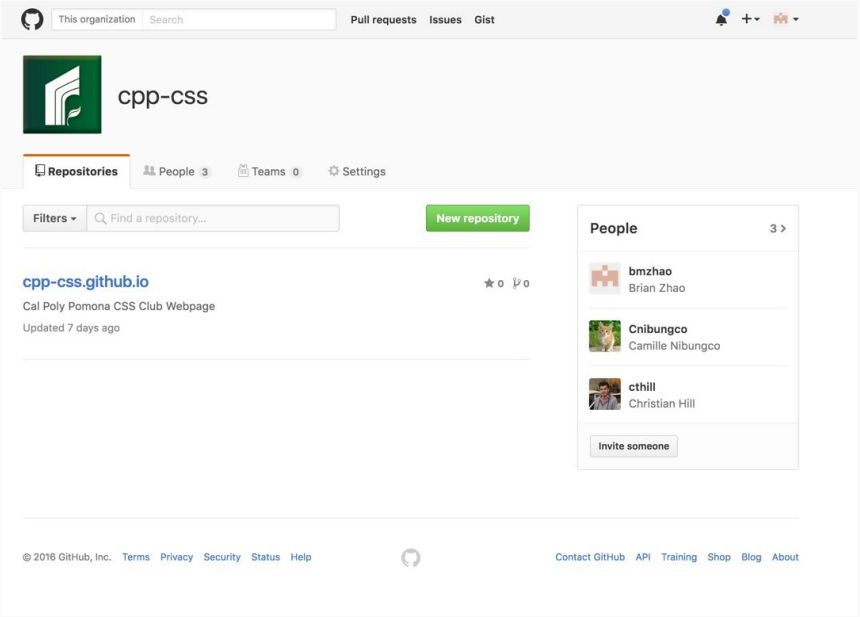
- Presidents:
  - Brian Zhao, Daniel Choi
- Vice Presidents:
  - Anuja Joshi, Carter Slocum
- Treasurer:
  - Nick Brown
- Public Representatives:
  - Victor Darkes, Michael Lee
- Historians:
  - Je'Don Carter (Roc), Tom Lundeberg
- Science Council Rep
  - Roland Lee
- Secretary:
  - Josh Liberto
- Sophomore Rep:
  - Lloyd Zhang

CSS Goals

- Learn Software Engineering topics not covered in class
  - Software Development Lifecycle
  - Version Control
  - Backend/Frontend Web Frameworks
  - Cloud Deployment (eg AWS)
  - Software Architecture Design (eg Microservices)
- Learn How to use real-life Industry Technologies
  - Angular, Bootstrap, Potsgresql, Django/Flask, Docker, Kubernetes, etc.
- Interview Practice Experience
  - Cracking the Coding Interview Meetings
  - Practice Interview Days

How will we cover these topics?

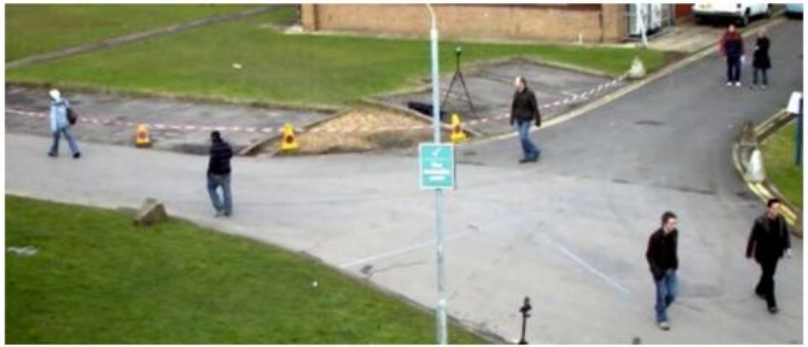
- Learn By Doing
- Year Long Open Source Project Open to all Cal Polyers of all skill levels!
- Like a startup company
  - Goal is to create a demo and impress the investors (Dr. Sang and Parking Manager) to fund the real deal
- https://github.com/cpp-css



Cal Poly Parking

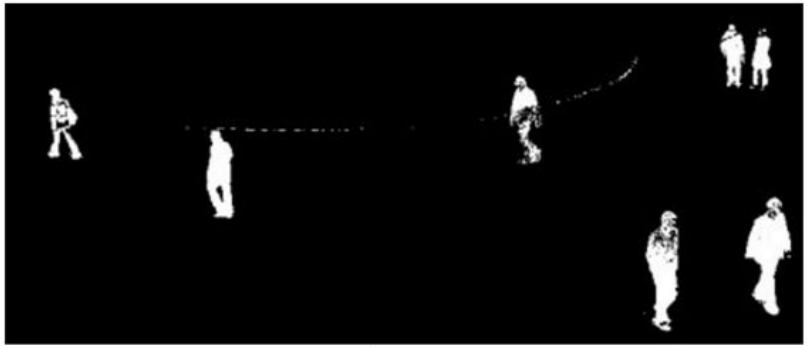
- Parking Webservice, all skill levels welcome!
  - Provide a REST Backend with information on the number of cars per parking lot
    - Camera-Equipped Raspberry Pis mounted at each lot's entrance/exits
    - Computer Vision to keep track of incoming/outgoing car count
      - Image Subtraction
      - Blob Classification
      - Blob Tracking
    - Update state in a synchronized server
  - REST API usable for any frontend
    - Android App
    - Parking Website
  - Long term goals
    - data analytics
    - time series graphs

Below image shows the 200th frame of a video



image

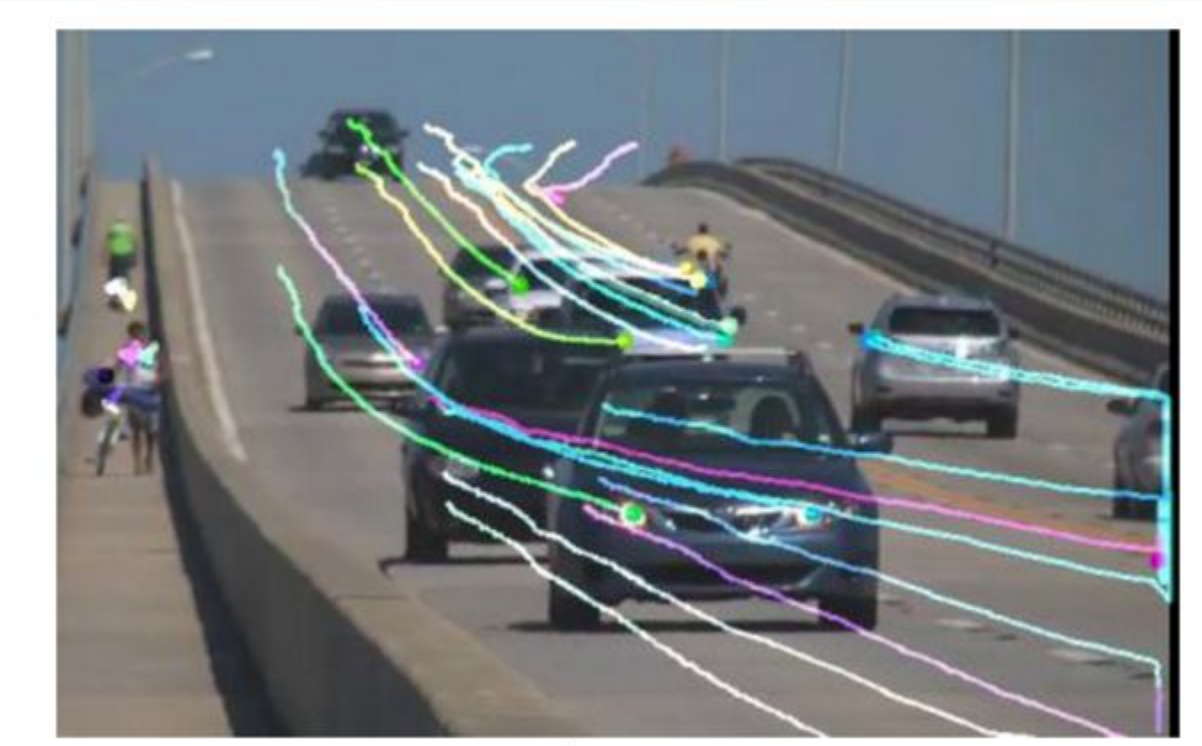
Result of BackgroundSubtractorMOG



image

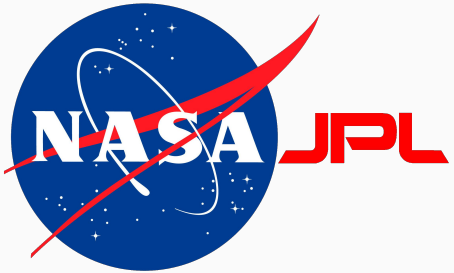
Image Subtraction with OpenCV: http://docs.opencv.org/3.1.0/db/d5c/tutorial_py_bg_subtraction.html

https://github.com/andrewssobral/simple_vehicle_counting



Optical Flow with OpenCV:
http://docs.opencv.org/trunk/d7/d8b/tutorial_py_lucas_kanade.html

CSS Speakers



Ultimate Goals

- To be competitive in the CS job market
  - Job Experience Catch 22 - CSS helps fill the initial gap!
  - Side Projects for resume - link to CSS repositories, be a contributor!
  - Confidence for Technical Interview - be prepared to answer data structures/algorithms questions
  - Make it to Google/Facebook/Amazon/Microsoft!
- Networking
- To make new friends in Cal Poly Pomona CS

Announcements

- Technical Tuesdays
  - Software Engineering Project Talks / Cracking the Coding Interview Prep
    - Linux Talk Next Tuesday Oct 4 with Christian Hill
      - What interface does the OS present? (Virtual Memory, Filesystem, Processes)
      - What is GNU/Linux? (Kernel vs Userspace)
      - Linux Commands, Shell Redirection, Piping
      - Advanced Topics (Systemd and Daemons)
    - Git and Github Thursday October 6 with Zach Kysar
      - Why use Git?
      - Git add, commit, push, merge, rebase, blame, bisect…
      - Handling Merge Conflicts

Announcements

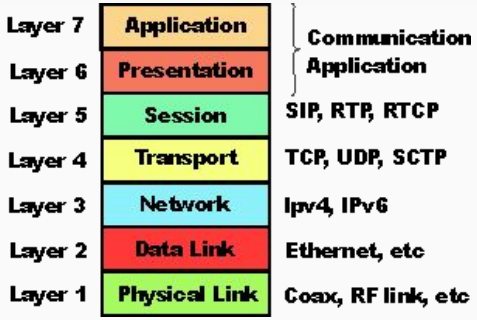
- Equipment Rentals
  - Oculus Rift, Gear VR, Smartwatches
  - Will post catalogue of equipment on Github
  - Please apply to rent out equipment, w/name, project, and rental period

- Potential Video Recordings of Meetings

Announcements

- Club Membership
  - Membership Fee of $30
  - Free Club T-Shirt
  - Free Graduation Attire
    - Cords, Stoles, etc.
  - ACM Membership
  - CSS Equipment Priority Access
  - And More…

What happens when you type google.com into your browser and press enter?



- What is the internet?
  - “network of networks”
    - means of communication between different computers
  - layered model
    - ethernet/wifi - mac addresses (inside a network)
    - ip - “globally unique address for a computer”
    - tcp/udp - multiplex multiple networking processes on a computer using ports
      - tcp offers guaranteed inorder delivery + other guarantees
    - application layer - http, https, ftp, etc
      - easier to use interface for application to communicate over the network
  - each layer provides extra guarantees/abstractions using the layers below it

What happens when you type google.com into your browser and press enter?

- How to identify which computer you want to talk to?
- Parse URL
  - **scheme**:[**//**[**user:password@**]**host**[**:port**]][**/**]**path**[?**query**][#**fragment**]
  - http://google.com
  - scheme or protocol what type of application layer protocol you want to use to connect
    - http, https, ftp, file, hdfs
  - hostname = globally unique human-readable name for a computer
    - “google.com”, “bing.com”, “www.cpp.edu”
    - can be purchased from sites like namecheap.com, godaddy.com, etc
    - hostnames eventually map to an IP address like 216.58.216.46

What happens when you type google.com into your browser and press enter?

- How does hostname to ip address mapping occur?
- First do a lookup in the OS' *hosts* file
  - at /etc/hosts on POSIX systems
  - if mapping doesn't exist, query DNS servers (Domain Name System)
- DNS servers will contain mapping tables in their cache, or will recursively query other DNS servers for the mapping, and return the result
  - so you try to find google.com:
    - first query local DNS server (usually your router)
    - it doesn't know where it is
    - query root . DNS server

What happens when you type google.com into your browser and press enter?

- DNS servers will contain mapping tables in their cache, or will recursively query other DNS servers for the mapping, and return the result
  - so you try to find google.com:
    - first query local DNS server (usually your router)
    - it doesn't know where it is
    - query root "." DNS server
    - query ".com" DNS server
    - query "google.com" DNS server
    - "google.com" DNS server will return an IP address that is sent back to your DNS server, which then caches the result

https://howdns.works/ep1/

What happens when you type google.com into your browser and press enter?

- Send an HTTP GET Request to that server's IP address looking for resource "/"
  - HTTP is built on TCP, defaults to port 80
  - Basically raw plaintext sent over TCP following a specification

```
brianzhao@Brians-MacBook-Pro-5:~$ curl -vvv www.cpp.edu | more
* Rebuilt URL to: www.cpp.edu/
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0*   Trying 134.71.177.148...
* Connected to www.cpp.edu (134.71.177.148) port 80 (#0)
> GET / HTTP/1.1
> Host: www.cpp.edu
> User-Agent: curl/7.43.0
> Accept: */*
>
< HTTP/1.1 200 OK
< Date: Thu, 29 Sep 2016 18:45:49 GMT
< Server: Apache
< Accept-Ranges: bytes
< Content-Type: text/html
< X-Cache: MISS from www.cpp.edu
< X-Cache-Lookup: MISS from www.cpp.edu:80
< Transfer-Encoding: chunked
< Via: 1.1 www.cpp.edu (squid/3.5.19)
< Connection: keep-alive
<
{ [10954 bytes data]
 <!DOCTYPE html> <html lang="en">
     <head>
    <title>Cal Poly Pomona</title>
     <meta charset="utf-8" >
```

Closing Remarks

- Come to the meetings
  - Thursdays at U-Hour Room 8-345
- Go to events
  - Social and educational events (ACM, Hackathons, CSS Picnic)
- Become a Member
  - Donate $30 to receive awesome benefits

```
void Main()
{
  GetEwe();
  Console.WriteLine($"You have been given: {Ewe}");
}

public enum Directions { Up, Down, Left, Right, Forward, Backward, Diagonally };
public Directions? Ewe;

public Directions GetEwe()
{
  Random rand = new Random(DateTime.Now.Millisecond);
  do
  {
    Ewe =
    (
      from direction in Enum.GetValues(typeof(Directions)).OfType<Directions>()
      //let u = Directions.Down
      select direction
    ).ElementAt(rand.Next(0, Enum.GetNames(typeof(Directions)).Length));
  }
  while (Ewe == Directions.Up);
  return Ewe.Value;  Around();
}

private void Around()
{
  Ewe = null;
}
```

https://fau.digital.flvc.org/islandora/object/fau%3A4196/datastream/OBJ/view/Automatic_parking_lot_occupancy_computation_using_motion_tracking.pdf

http://docs.opencv.org/3.1.0/db/d5c/tutorial_py_bg_subtraction.html

https://www.learnopencv.com/blob-detection-using-opencv-python-c/

https://github.com/andrewssobral/simple_vehicle_counting

http://docs.opencv.org/trunk/d7/d8b/tutorial_py_lucas_kanade.html

https://github.com/alex/what-happens-when