Computer Systems Research Lab Summary Paper

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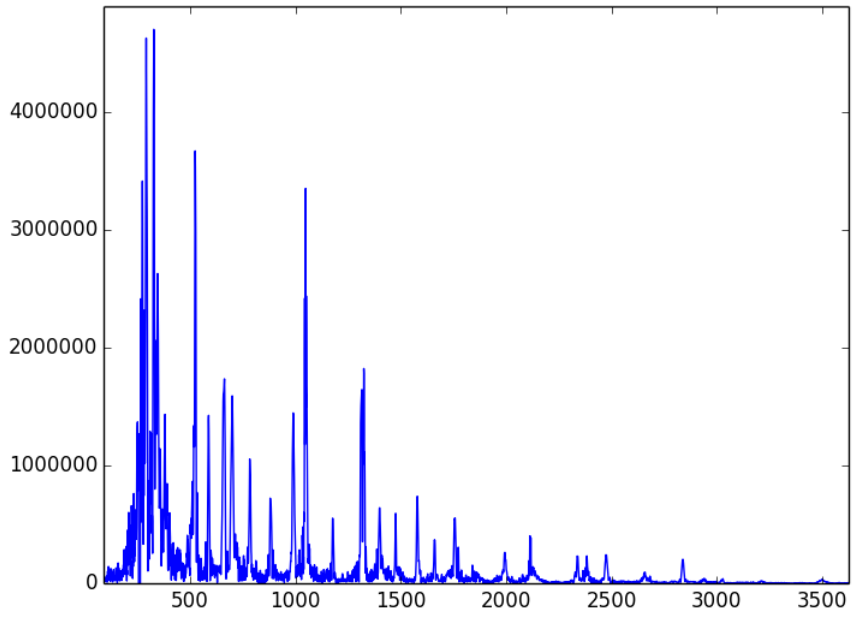
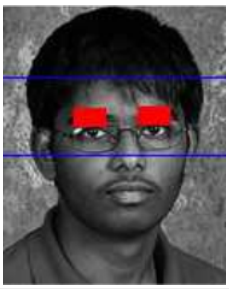
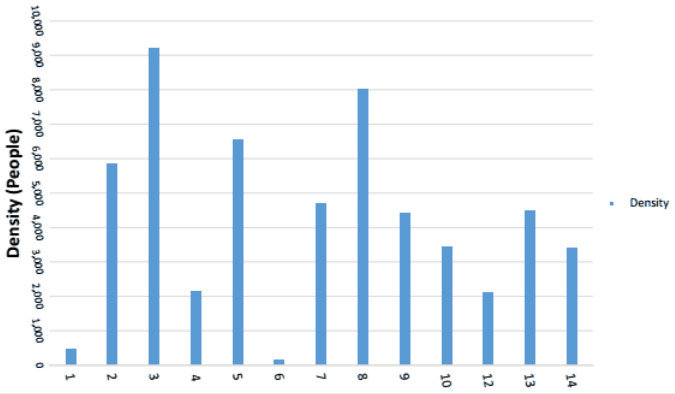
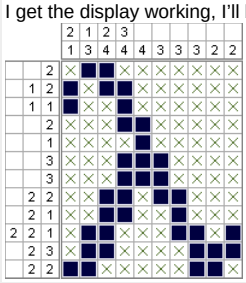
Elise Favia	↑ Iphone Application for Musicians A program to help musicians organize their practice and performance schedules|My project is an iPhone app for musicians to help them mai track of the music they are playing and helps them choose what to practice. The application is programmed in Objective-C, in Xcode, the Ap data and the need to transfer the data, I am using an SQLite database to organize the music. The application will also implem As of toc feature of Xcode called storyboards, which allows objects to be added visually in a drag and drop fashion. I have all transitions programmed and search screens for the database. I am in the process of getting the database up and running and it currently can add data, but not modif difficult because of the number of variables and the different forms of data. For example, searching for composer or title separate is currentl fields of data, else there would have to be multiple search bars. The graphics are also not very sophisticated, mainly because I don't have ar insert images in order to change the graphics.
Alex Barghi	↑ Interactive Traffic Simulation My project is a web application designed to bring a user-friendly interface and a complex set of statistics together to simulate road traffic. Th customize their road network. Users can define road speeds and lanes, and also give feedback to the simulation engine by classifying roads They can also influence how traffic appears and disappears by defining areas of the grid as residential, commercial, or workplace zones. An simulation for a given time period. User-created maps are savable and can be viewed from anywhere with internet access. The purpose of th or even ordinary people to observe the effects of altering the road networks around them and make better decisions when it comes to transp my original proposal, I found that many existing traffic simulators were not cross-platform. This application works on any platform that suppo as code, my project is split into two parts, a frontend written in JavaScript and HTML, and a backend written in Python. The frontend contain displaying data generated by the backend and relaying user input back to the backend to generate new data. The backend contains the stat as classes representing the simulated objects. It also manages what is sent to the frontend and is responsible for storing saved maps in a ta system in the backend and am working on improving the frontend to allow for more user input. My program currently creates and draws roac There is a limited UI which so far is mostly just the animation. However, users can now draw roads and have them added to the network, wh the user is in effect controlling what the network looks like and sending data to the backend. I am now working on allowing the user to specif control over the simulation.
Jocelyn Huang	↑ Sentiment Analysis of Book Reviews My senior tech project is focused on sentiment-analysis of book reviews and is comprised of two parts. My final goal is to create a program t from 1 to 100, how negative or positive the review is; if time allows, I would also like to add to the program such that it can separate each rev diction, griping) The first part of my project consists of gathering sample reviews from Goodreads.com, chosen for its vast repository of straightforward layout. This sample data will be used to weight a dictionary of words that I will use for later reference:for example, 'good' will appears more often in positive reviews. Once this is done, I will work on fine-tuning the text analyzing process and accounting for natural lan 'never read this') will be dealt with and sections of reviews carved out from key words ('the plot was terrible'). At this point in time, I have various pages of Goodreads and have started to compile a database of said reviews with key information (review text, star rating out of five, weighting scheme and have gotten a rudimentary dictionary up that accounts for simple negative statements consisting of two words. I have program that will allow a user to input text.
Jayanth Devanathan	↑ Muscle Imaging for Prosthetic Control The problem I'm addressing in this research project is the accessibility of current upper arm prosthetics. Controlled by EMG, or electromyogr muscles originally intended to move finger tendons may be instead used to exercise the whole hand in the prosthetic, based on the location, method which couples ultrasound muscle video data with machine learning, I hope to alter the control system of prosthetics so that muscles parts, making it easier for amputees to adjust to them. For this analysis, I will develop an algorithm that uses muscle ultrasound video input t moved, given the movement. This will help make a proposed prosthetic more precise. What I'm specifically doing is looking at individual can have a full finger motion as reference, can I identify a fractional movement? I plan to do this method for pinches, but may expand to rota current prosthetics is that they are not very accurate at determining degree of motion, and usually use preset controls to streamline this proc George Mason University, in which I gathered pinching data. I asked subjects to pinch different objects, while I read in their upper arm muscl This data is stored as ultrasound video. I've been able to read in ultrasound video to MATLAB, a programming language I've been usin the file to examine and compare with other files and comparing them for identification. The idea is, I would be able to identify the degree of m movement. For example, if I had a half finger contraction, I would be able to compare it to a full finger contraction, and use the results to fully on the region or muscle that is contracting, I can be much more precise in comparing the two regions. My algorithm so far creates "sigr pixel-by-pixel, but since the ultrasound machine reader shifts slightly with every muscle movement, this wasn't possible. I had some issues v of memory, so it took the Computer Systems computer a lot of time to swap the memory in; I'm currently working on throwing out bits and pie run faster. Right now, if I run the code(which takes 2 minutes to run at this point), I can generate graphs, displaying how "high" each contract frames in each individual video around the region of interest. What I've also looked into makign an aggregate result of what I've collected. Ri compare these graphs to one of the full contraction file, I may be able to get a percentage of movement for that particular file. This would be now, I'm looking into highlighting and movement capture methods to greatly streamline this process, and to make it more accurate. A final re

	movement, and an output of what percent of the full movement it represented.
Christine Tsou	↑ Note Scribbler My research project is similar to Soundhound or Shazam, apps that can be found on your phone and can listen to music for a few seconds a and the artist of the song. However, instead of returning a song name or artist, the idea of my project is to return sheet music of the melody t create a program that will listen to a recording of a melody and transcribe it into sheet music. The idea is to be able to submit an audio file ar correct rhythm and notes played in that audio file. To obtain the correct note, the program will analyze the audio file and extract the frequenc can be matched to its corresponding music note. Rhythm will be determined by storing the length of notes in seconds into an array. A library signatures will be used to create a program that will output sheet music. This program would be useful for composers by providing a sir on paper. 
Betty Huang	↑ Automated Book Requesting Currently, keeping up with unreleased books is very difficult. You have to constantly check the library website to see if the book has been pu purchased by the library. An approach to this problem implemented on various web sites is sending email notifications when your library pur filter notifications to be only books you are interested in. Authoralerts.com sends email notifications when a specific author has published a r not your library has purchased the book and provides no way to filter for a specific book. Goodreads.com displays the expected publication d number of books that are scheduled to be released. However, it doesn't send email notifications or link to your library. I want to wri checking whether or not a book has been published and whether or not it has been purchased by your library. I plan to do this with the Fairfa input their library card number, password, and ISBN13 of the book the wish to track. So far I am able to automatically search for ar have set up a web page that allows users to upload a goodreads.com export file (.csv format). My program extracts relevant information abo on the server allocated to the user. When I run the program, the program iterates through the books in each users database, attempting to re library catalog, I update the timestamp and status fields of the book in the database. The status indicates whether or not the search was suc timestamp indicates it happened very recently, the program short-circuits if another user tries to request the same book.
Akshith Doddi	↑ An Algorithm for Eye Detection In Images Akshith Doddi Computer Systems Research Lab 3 December 2013 An Algorithm for Eye Detection In Images that detects eyes in an image of a face with a greater success-rate. Currently eye detection has not met as much success as many other pro the highest success-rate of eye detection algorithms is currently 49.75%. Despite its relative obscurity, eye detection is very important for a v algorithms depend on knowledge of location of the eyes. Facial recognition, itself a problem that being researched intensely, has many appli interactive gaming systems. Thus, advancements in eye detection could have significant ramifications in this wide variety of applications. <b previous eye detection algorithms, will use a metric dependent on both horizontal pixel concentration and distribution, instead of the tradition intended to develop a confidence measure to determine when an algorithm has correctly detected the eyes. Thus, this confidence measure to accept the eye locations determined by the algorithm and when to reject them. Another factors that will be experimented with is the length centered around a single pixel and measures the directional change in the intensity of pixels around that center pixel. For example, the follo 2 -2 0 0 0 2 -1 0 1 -1 0 0 0 1 These sobel masks differ in their length. This project will explore the effect that this difference in length ultimately, eye detection. Currently, significant portions of both the back end and the front end of this project have been completed grayscale, edge detection, vertical and horizontal edge separation, noise reduction, and eye region approximation. Aspects of the back end the concentration and distribution dependent metric and development of the confidence measure to either accept or reject the location of the end that have been completed include the set up of the web page and the basic interface using which the user can give input to the program to upload an image. A hyperlink subsequently directs the user to another page which shows the results of the algorithm. The aspect of the fr implemented is the integration of the central program and the web page sits upon it. Bibliography Parris, Farag, A., . . . Boult, T. E. (2011). Face and eye detection on hard datasets. IEEE. Retrieved from http://ieeexplore.ieee.org/stamp/stam

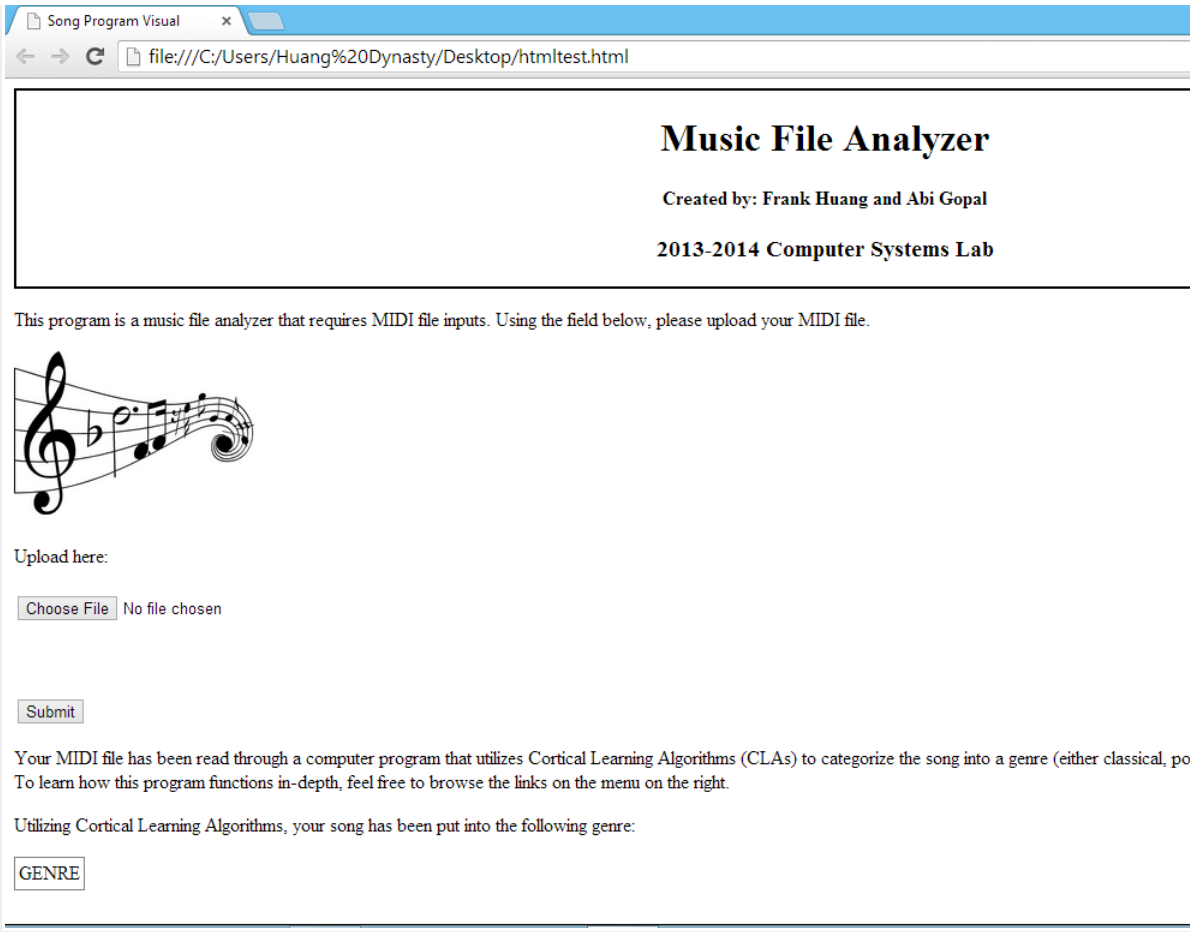
	
Alice Yuen	↑ Speech Recognizing Calculator Speech recognition obviously has the capability to be more convenient than typing or clicking, especially for people with disabilities that mak speech recognition software, such as Siri, are surprisingly accurate, they are not specifically designed to be calculators. As a result, their sui There are some existing speech recognizing calculators that perform operations based on what the user says, but they either have poor perf then, is to create a speech recognizing calculator that operates according to spoken command The calculator will perform more complic adding and dividing, of course. Basically, it will implement the main features of a scientific calculator such as a TI-84, including being able to calculator will be able to recognize speech, the user will not need to an entire expression like he or she would when using a normal calculato special circumstances (eg. no microphone, too much background noise, etc.). This will potentially save time when evaluating expressions ar example&comma Some of the more complex functions the speech recognizing calculator will be able to perform include trigonometric a will have graphing capabilities and be able to store functions, variables, and the calculation history. Users will be able to create accounts for calculation histories, variables, and functions to be stored for future reference. As time allows, however, I will implement more complex func recognition aspect of the calculator and have achieved basic calculator functionality. The speech recognition can return any specified numbe and using the alternative results, I am currently working on making the primary result more accurate. As for the current calculator functionalit operations and group terms with parenthesis, output a result, and display the last couple of calculations in the calculation history. As I contin problem is that all the different ways of saying an expression need to be considered. For example, someone could say "one-fifth" or "one ov so the calculator must be able to recognize them both. This becomes complicated when dozens upon dozens of phrases may have multiple
David Soukup	↑ Bridge Hand Monitor and Recorder Much literature and computing effort has been spent on computers' abilities to play various games at world-class levels; chess is the most co engines exist for other games, such as bridge and go. However, comparatively little attention has been paid to the use of computers to moni of play depend either upon human observation, which is both unreliable and expensive, or crude mechanical systems, which are impractical applied to bridge, by providing a simple method using cameras to track and record the play of a bridge hand. Currently, when brid during major tournaments, an official, known as the operator, sits in a high chair and observes the play of the cards, entering each card in tu major drawbacks, however: it is labor-intensive, as it needs a ratio of one operator to four players, limiting the amount of tables the play can as operators have to enter a large number of plays at irregular intervals and thus tire and make mistakes. A computerized system would solv the latter one too. How would one implement such a system? My project will use four cameras, one behind each player, to regularly observe possible to determine which cards were played when by whom. Because of the nature of playing cards (they are either bright red or black or areas of red or black within white and is thus easier than identification of eyes, faces or other features of an image. The frontend c any distribution of cards using the Python/Tk graphics solution. Also, the program does accept image files and convert them into a code-reac various masks and transformations. However, the image recognition segment, which is by far the largest hurdle to overcome in this project, s state. After this is done, all that will need to be finished will be the logic for playing the cards in the right order, that is, making sure all plays a possible for a group of volunteers to play a hand in front of the cameras and have their sequence of plays noted and logged. 
Betty Huang	↑ Automated Book Requesting Currently, keeping up with unreleased books is very difficult. You have to constantly check the library website to see if the book has been pu purchased by the library. An approach to this problem implemented on various web sites is sending email notifications when your library purc filter notifications to be only books you are interested in. Authoralerts.com sends email notifications when a specific author has published a r not your library has purchased the book and provides no way to filter for a specific book. Goodreads.com displays the expected publication d number of books that are scheduled to be released. However, it doesn't send email notifications or link to your library. I want to wri checking whether or not a book has been published and whether or not it has been purchased by your library. I plan to do this with the Fairfa input their library card number, password, and ISBN13 of the book the wish to track. So far I am able to automatically search for ar have set up a web page that allows users to upload a goodreads.com export file (.csv format). My program extracts relevant information abo on the server allocated to the user. When I run the program, the program iterates through the books in each users database, attempting to re library catalog, I update the timestamp and status fields of the book in the database. The status indicates whether or not the search was suc timestamp indicates it happened very recently, the program short-circuits if another user tries to request the same book.
Michael Kramer	↑ SuperSearch Post-Thanksgiving Report Every search engine has its own way of representing searches. Google represents the OR-Statements with allows the user to input ï¿½&ï¿½ or ï¿½ANDï¿½ to specify an AND-Statement, while Google only allows the latter. It would be nice to have togetherï¿½ My proposal is to compile the representations of search specsï¿½AND-Statements, OR-Statements, NOT-Statements, etc actually be a program that uses other search engines to find the information it needs, and then processes the results further using the searc ï¿½SuperSearchï¿½ is nowhere near my goal. Right now I am working on a basic search engine that will search a text file. For Telelearn, I v

	get the search engine to be able to search single terms before I move onto more complex things. Sadly, the code does not currently work, a while loop, but I do not know what I did wrong. Perhaps I have forgotten a semicolon? Overall, in the past two weeks, I refactored most of m functions I needed. When this basic search engine works, I will set up the search specs I will be using, and check to make sure they wo work for a search engine. I will likely save the ï¿½colon modifiersï¿½ï¿½the search specs separated by a coloniï¿½for a later time, as they a will take, considering I have only just started to learn PHP, the language Supersearch is coded in, but I am determined to keep making progr 
Ashwin Ganapathiraju	↑ Complex World Generation My project is a simulator and generator for a parameterized world. The generator would generate a completely unique world based on inputt simulate the passage of time upon the generation to provide a simulation of the world throughout history. Afterward, it would provide options generator would also be able to save a configuration file for the inputted parameters, which could then be used to regenerate the world, or to some of these games, like Minecraft or Dwarf Fortress, the entire world would be exported, and any data the game required in the save file t appropriately, be it null or some default value from the original generator. This makes sure that the game does not crash or otherwise break The exportation will be done to the save format of the game, and it will be up to the user to use the proper import methods for each game, th the game supported.) The primary purpose of this generator and simulator is to provide a more comprehensive world than that of s natural looking world is usually a plus, and the aim of this generator is to provide one that can be used in all sorts of games. Some of the gai Fortress, and Terraria.
Sidharth Verma	↑ Asteroid Identification through Image Stacking My project is to ease identification of asteroids using image stacking. Image stacking is a method by which two images are essentially place "Photoshopping" an image onto another one, but is a little more complicated than just superimposing one image onto another. My Infrared Survey Explorer telescope, also known as WISE, which was launched by NASA in 2009 and operated until 2011. WISE initially conc reduced to simply finding near-Earth asteroids and comets. Knowledge of the existence and behavior of these objects will help us understan guard the Earth as asteroid collisions become a threat. WISE surveyed the sky in four infrared wavelengths: 3.4, 4.6, 12, and 22 m really four different images. The goal of this project is to stack the four different images from WISE into a single image, weighing them in diff wavelengths constitute a fourth of the new image, is not enough. The project will need to determine a best-fit scenario, that may or may not best results. That would be determined by outside research. Outside research will be a large part in determining whether or not the identifying asteroids will also need to be determined through outside research, as will the process by which the images can be manipulated. order to implement the project optimally. The images are available publicly in a format called the Flexible Image Transport System. Unlike normal image formats (i.e. JPEG), they store much more data than just how to render and view the image; they store data about the was looking for, among many other things. Understanding that data and dealing with FITS files is an obstacle in the project. So far, the proje research" phase. I'm facing a literally astronomical hurdle at this point, trying to understand the structure of FITS files as well as asteroid ide Python. There is a special, free library that can be used to simplify the process of dealing with FITS files. Hopefully, the project will allow astr hurdle presented by the WISE mission.
Andy Sin: Hallway Optimization	↑ Hallway Optimization I have made good headway on my program, a model to simulate and optimize traffic situations. Essentially, although most parts remain unfi simulation of traffic from period to period (or some arbitrary time period, depending on what the program models) is fleshed out. The progran situation and convert it into meaningful data. It also takes a schedule input – the workers using the map and their intended destinations. Both use the project for themselves, which naturally is the point of this project, a traffic simulation that is adaptable to a wide variety of real-life situ coordination problems around the globe. I have considered a streamlined process for a user to create their own maps and schedules, becau is very unforgiving of mistakes. However, any sort of user-friendly input will have to wait until the actual program is complete. The progr sorted into a grid-like system streamline by units called hallways. These hallways can be used to represent actual hallways, or roads, or any areas (and open expanses), Boxes are used to represent miniature grid coordinates, to allow for more flexibility in calculation the optimal pa project was going to use solely grid-based calculations (Boxes). However, due to runtime concerns, I decided that this was not practical for r well. So far, the program can successfully navigate from hallway to hallway, by use of a heavily modified A* search algorithm. Time con enough to have an A* search that worked for Boxes as well by today's date, but it is what I am working on right now. This is the immediate g complete, mostly in terms of accessibility to the general public. As an example, I have attached two diagrams below. The first illustrates the describes how many people would theoretically pass through each hallway in TJHSST a single day. There are three important things to note implemented yet, the junior lounge is inaccessible. This obviously would not happen in real life, but it provides an interesting aspect of how t off (perhaps due to construction). The second is that this chart describes the first floor only, as time constraints prevented me from adding th randomly generated – again, because I could not account for rooms on the second floor, or in a non-hallway area (such as the trailers) at thi work is far from complete. However, I hope that this report will serve as an illustration of what I have achieved so far.



David Zhao	↑ Android Application that Generates Nonograms from a Picture Background: From Wikipedia: “Nonograms, also known as Hanjie or Griddlers, are picture logic puzzles in which cells in a grid must be colo the grid to reveal a hidden picture. …“ These numbers on the side are in the form of “8 2 2,” meaning that in that row or column there are thr least one space). The picture demonstrates a solved Nonogram(note that the Xs are the equivalent to the flags in minesweeper, and are unr Goal: The goal of this senior project is to develop an android application that allows users to take pictures and create a Nonogram from Nonograms can also be in color, with the major difference being that the numbers on the side are colored to refer to the specific color neede the following tasks: 1) Take a picture or access one from storage. 2) Break it down into a specific size. 3) Break down the mu (max 5) 4) Solve the puzzle to determine if it’s too hard to solve. (Time permitting) 5) Create a GUI to interact with the puzzle. most of the first three points. I have set up a framework in order to accommodate all the actions I want the application to accomplish. At this camera, but am still working on letting the user access photos from the phone storage. I’ve also been successful in compressing the size of change) by sampling pixels in the original image. Currently I’m working on breaking down the colors into a smaller sample by using integer r division, I am able to map a range of pixel-color values into one color, effectively forcing the picture to consist of certain, predetermined colo the altered image onto the screen. I want to be able to see the color manipulations I performed on the image as well as set up the base for tl I get the display working, I’ll be working on other GUI based aspects (e.g. selecting puzzles from a list). 
Owen Hoffman	↑ Latin Certamen Practice Suite My project is focused on the game of Certamen, which is a Latin-based Quiz-Bowl-style game. In Certamen (Latin for struggle or competitio language, culture, history, literature, and mythology. In order to answer, players must “buzz in” via a handheld button device. As soon as a pl stops reading the question until an answer is given. If the answer is incorrect, the moderator continues the question for other teams. Th optimally buzz in quickly while still hearing enough of the question to find the correct answer. It takes a lot of practice to be able to understan There are many issues, however, that currently make practicing difficult. Firstly, in order to practice, several players must be together in the s moderator. Recently players have gotten around this by practicing over video chat programs such as Skype, but someone still has to sit out buzzer system in their hand by slapping a table to simulate a buzz. This is ineffective because the moderator can’t tell who buzzed by the so question base, so it is difficult to find questions to practice with. There are scattered sources with a few rounds of Certamen questions, but o solution to these problems is an online Certamen hub, where students can purchase a custom USB buzzer, play online with their friends, us submit their own questions. The major steps in creating this practice suite are: creating a cheap handheld buzzer, writing code to synthesize interface to connect users and allow them to answer questions as they are read, assembling a bank of questions, and making a website whe sessions. The current prototype of the buzzer is made using the circuit boards from used computer mice. They are cheap, easy to mak the proper drivers to interact with a computer. I soldered a push button onto the middle click button, so that buzzing in simulates a middle cli least disruptive mouse button; it usually doesn’t do anything. The text-to-speech is being handled by a program called MBROLA (pronc to assembling diphone databases, databases that contain sound bytes of two-letter syllables in different accents. MBROLA reads in phoneti of pitch values for each letter and the quantity (length) of each letter. It then synthesizes the phonetic files into audio files. The tricky part is d appropriate for each sound. There are several sources on Latin prosody that clarify the rules of quantity. Pitch is much more difficult and can random-based system, which sounds recognizable, but I’m looking for a good source to improve on this.
Philip Yu	↑ Image-Editor Philip Yu Computer Systems Period 6 Computer Systems Image-Editing Project My Senior Compute that is able to edit images. Currently, there are a multitude of drawing-related applications. Almost all of these major photo-editing applicatio eye removal, rotation, resizing, flipping, cropping, lighting adjustment, color management, undoing, basic drawing tools and shapes, touch-u pictures), gray scale conversion, image extraction, shadow adjustment, layering, and auto image straightening. My project will be slightly diff mentioned because I will attempt to code many of the features mentioned above in an online application – in other words, my project will be list of features my project will include: - Basic editing features (rotation, resizing, flipping, cropping, shading adjustment, brightness - Basic drawing tools (drawing basic shapes and lines on pictures, filling color, and adding text) - Splitter/Combiner - Auto Selection (object extraction with flexible cropping) - Edge refinement (again, using edge detection) - Pic

	Sepia, Black and White, Negative, Pencil Drawing (Sketch), Pastel, etc.) -Intelligent Scaling - Automatic Photo Correctio (or other images) and be able to implement the above features. This part of my project will be coded in Python and Javascript. When an ima that will convert images into a two-dimensional array of pixels (which represents the picture frame), each with its own RGB value. To edit the changed accordingly. For example, to make a picture darker, the pixels would be scaled towards black (0,0,0). As for the website (which wil clear, user-friendly interface. It will have a comment section or forum, for users to post their thoughts and critiques of the application, organiz to store images in digital albums), and downloading capabilities.
Matt Levonian	↑ Automated Chess Game Recorder Chess games often have their moves recorded and published using a standard notation. Human encoders go through and write down move would be interesting to automate the process, however, using live video streams of the board. After the computer processes and records a n a website. Using image processing techniques, I aim to pick a chessboard out of an image. By scanning once or twice a second a will become apparent. Based on either an assumed or explicit initial setup, these deltas can be converted into traditional chess move notatio though; all pieces show up as circular. Piece identification would not be needed if the game started from a standard configuration, or if the in a very difficult problem to differentiate a dog from a cat, differentiating pieces would probably be of equivalent difficulty. Part of the pieces on white squares, white pieces on black squares, black pieces on white squares, and black pieces on black squares are all different. combination, and different efforts and techniques may be required for each. After solving the problem for a basic case â€“ top dow algorithm to work for oblique camera angles and strange lighting. One of the biggest problems is pieces covering up parts of the board or ca with the computer vision library OpenCV to find the edges of blocks of similar color, from which I can isolate the portion of the image that is t frames and identify the moves that were made. Finally, I will create an API so the game moves can be accessed via the Internet.
Ola Zytek	↑ Plant Recognition For my senior research project, I am working on a program that can recognize an image of a flower or leaf and determine what species of pl completed, someone will be able to take pictures of plants they find and are unable to identify, and input them into my program and receive a species. There are a few similar program existing today, such as Leafsnap by Smithsonian, however they tend to be inaccurate, and can onl my program different from existing plant-recognition programs by allowing the user to input images of multiple parts of the plant, such as a p take data from both parts of the plant together to determine the most likely candidate. I began the year by working on color recognition program by finding the color of the image given first, and then skipping over all images in the database of a very different color for later comp the user's flower is yellow, it will ignore all flowers that are not yellow or near-yellow in later comparisons. For color recognition, I am using a purpose of clustering algorithms is to create an image out of the original image that only contains a few colors. For example, when used on a two clusters, the algorithm will make the entire flower one shade of red and the entire background one shade of green. The K-Means algorith default mean-color it is most similar to. This is accomplished using the distance formula to compare RGB values. It then iterates through the membership, and then moves the pixels between means as necessary so they are a part of the correct group. Finally, the process is repeate (meaning the pixels involved are as close in color are possible). Once my clustering algorithm is completed, my program decides which up the background. It then makes all pixels of the background color(s) transparent, so they will not be considered in future tests. I have not y background colors. Finally, my program creates a list of the color of every pixel in the image. From these values, it determines the aver image. These colors are compared to the average and mode colors of every image in the database to determine which species it most likely users can upload their images. My program in its current state can be found at http://www.tjhsst.edu/~2014azytek/
Frank Huang	↑ Song Learning Using Cortical Learning Algorithms The goal of my project is to create a program that takes a MIDI music file input and use a constructed cortical learning network (which uses a cortex) to categorize the music into certain genres. The framework for my program is actually heavily based off of an image recognition prog (formerly called Numenta). Originally, I had happened upon a relatively old build of NuPIC, which utilized Hierarchal Temporal Memory (HTM network that did not require heuristic inputs, rather, they were created so that a program would "learn" specific inputs and through pattern re However, after consulting with the founder of Grok Solutions, Jeff Hawkins, he pointed me towards the more recent build of NuPIC which util music learning program has been divided into two main phases: research and framework building. The first phase was gathering information quantified music data and read it into a CLA network. I found a thesis paper written by Nathan Schey, a graduate of Ohio State University, w categorizer through an example program in the NuPIC source code called Bitworm. Bitworm created a very simple HTM network that took bi by reading in MIDI files and using a distance algorithm to establish patterns in beat timings. After consulting with the original author of the Bi HTM network was both outdated as well as far more difficult to understand in terms of documentation. Subutai linked me to a hackathon Gro program that utilized the CLA network to do song prediction, as the CLA algorithms excel in pattern recognition and anomalies. This program separated values) so that the computer could read them easily. Very similarly to Schey's program, it was selective about which beats to keep Schey's program, the source code was provided so that I could have a sense for how such a network could be created. The next phase time was spent getting NuPIC set up on Ubuntu, since it requires a lot of dependencies and there was a lack of good technical support from the song prediction program, so the input reading aspect of my program is identical. However, I still need to modify the program to use patte prediction. Here is an example of how the program will be implemented on a webpage to allow people to submit their own MIDI files for



Luke Kuprenas

↑ High Resolution Virtual Tour Maker and Viewer

My project is a program to create and take a virtual tour of an area. As input, the program will use many thousand images in order to create area. This alone would be very useful for giving a virtual tour of an area, but there is so much more to the project. After the panoramic pictur other media to three potential other pieces of the program. The first is a part that will display a slow motion video. In order to add this type of on the panoramic picture where the video was taken and then select the video file. My current plan is to attempt to use VLC media player in videos will be used to show interesting things that look really cool in slow motion such as a bird taking off or someone flipping their hair. This than a useful for giving a tour. The kind of thing a college shows you when you go visit to grab your attention.

The second piece wi project. This will either be input from a video file or input from a series of pictures. Currently I am leaning towards using a video input but I ar (or if it will even be created in my project or if you will need to input a time lapse video). It depends on how much time I have when I get to th introduction or conclusion to a virtual tour in order to show just how different an area is at different times of the day. As an example, for my s metro station near the Capitol from the beginning of rush hour to the end of rush hour. This shows the wave of rush hour traffic coming out o

The third set of secondary media for my project will be 3D models of buildings. This will be a good way for a person to explore an a of the whole building. The hardest part about this is getting any sort of pictures to use for the top of buildings. The flagship building that I am quite hard to take pictures of, I have quite a few stories about that). In order to create this 3D model I will use the toolkit SFMToolkit.
On media is input, the program can then be switched to view mode. In view mode the user will start out with seeing the whole panoramic picture superimposed on the picture. Each of these colors will represent a different kind of secondary media and clicking within a box will take you t you the video and then take you back to the panoramic picture. In the case of the 3D model it will take you to a viewer for the 3D model that are ready, it will take you back to the panoramic.

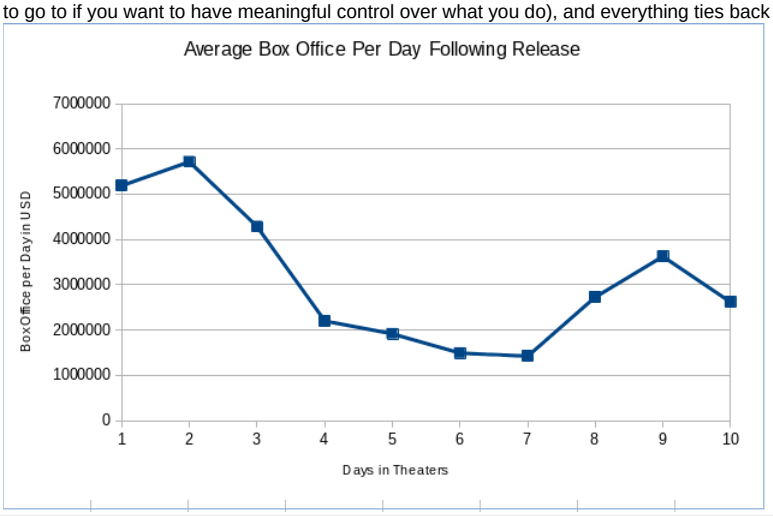
Currently I have had a lot of problem just finding a program that will take thousan picture. Many programs claim to be able to, but so far, none of them have been able to. I am on the last program to try before I am forced to at a time. This will be a much less efficient way to make it and could take several hours and lots of memory. I am also working on making the hard to make this interface though when the first part of the project is completely non-functional with what it is supposed to be doing. I have works and how I would work the interface with VLC. As I am not that far along in those pieces of the project though, I have not fleshed out al

Alex Aulabaugh

↑ News Events and Movie Trends Analysis

It is intuitive that events in our daily lives have an impact on our mood and day to day interests, and that our mental state of being influences entertainment, among other things. What may be counterintuitive and difficult to determine until a considerable amount of time has past, if at state of society as a whole. The goal of my Senior research project is to focus in on a basic choice most of us make extremely frequently -- v between that choice and national news events. To gain any degree of accuracy, many data points are required to conduct this project. The s demand for flexibility in modeling makes my project fit in the Computer Systems Research Lab.

The first phase of my project that I sufficient amounts of diverse data on the movie industry over a period of time and its formatting into a framework for modeling. As I consider required a few basic categories of information. The first is box office: how many people saw specific movies and how successful were they? each movie, what were their budgets, what was the plot, what day did they release, how long were they in theaters, etc? The third is news e In order to collect these data, I turned to the internet. I found relevant web pages, used a web scraping framework to scan through them and went through mountains of text with other programs to pan out the useful and widespread among all the sources pieces of information. The p computer science classes at TJ, but it does draw on what we learn here and is extremely exciting to work through and figure out. Fun as it is for all of my labor so far. After taking the Artificial Intelligence class, I know that there are many different approaches I can take, but having it exhilarating and daunting simultaneously. It is actually highly representative of the entire Computer Systems Lab, there is an unprecedented to go to if you want to have meaningful control over what you do), and everything ties back nicely to material in previous computer science c

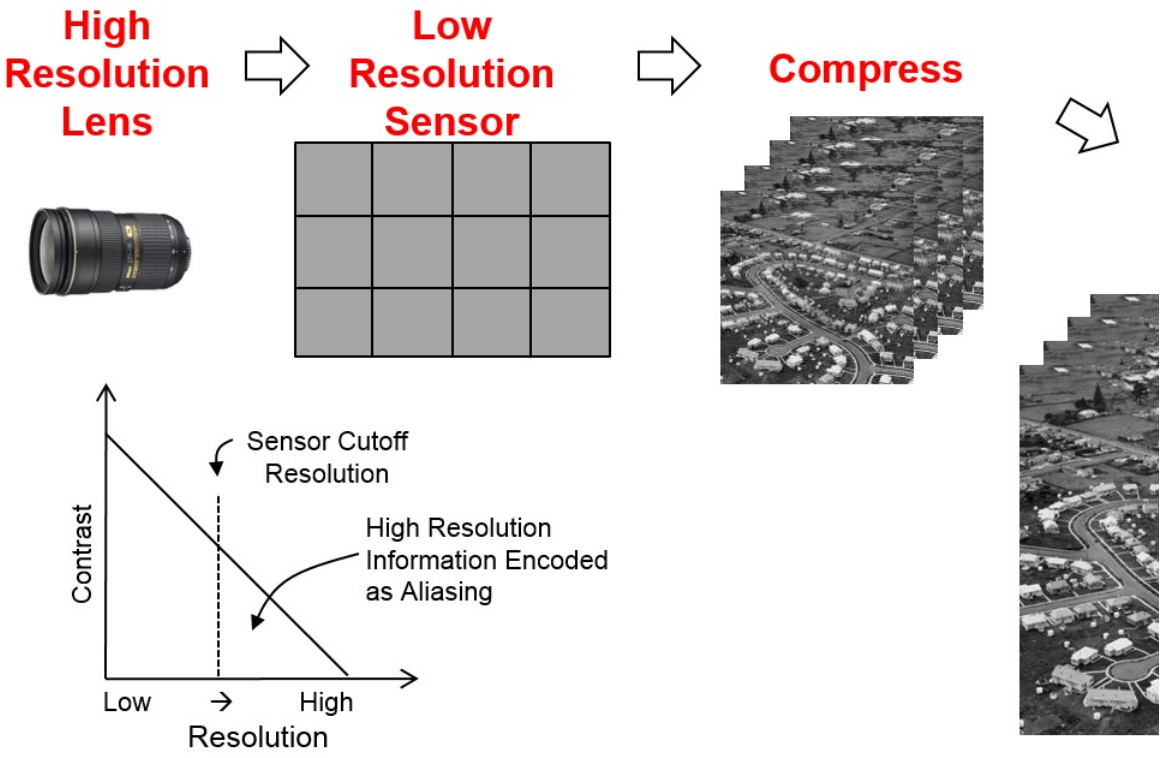


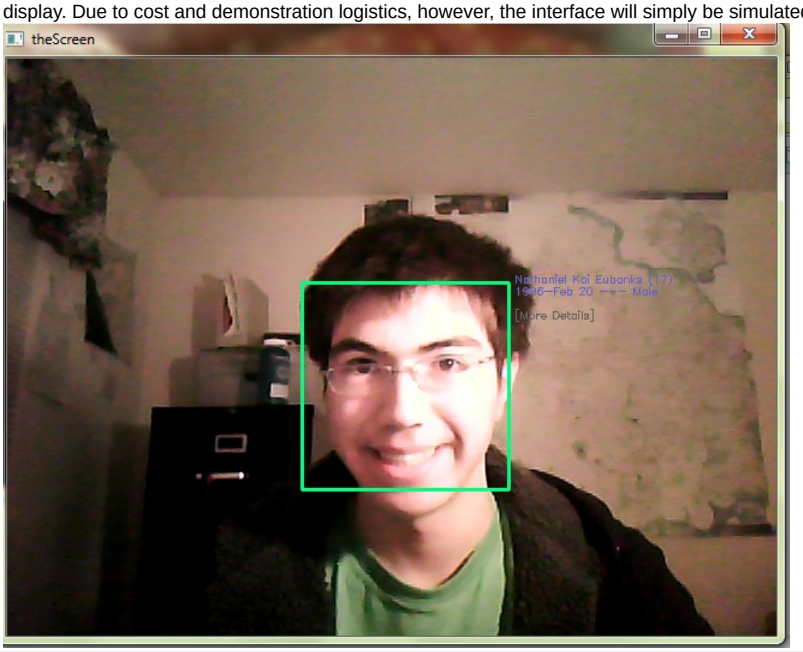
Jason Huang

↑ Microsimulation of Traffic on I-66

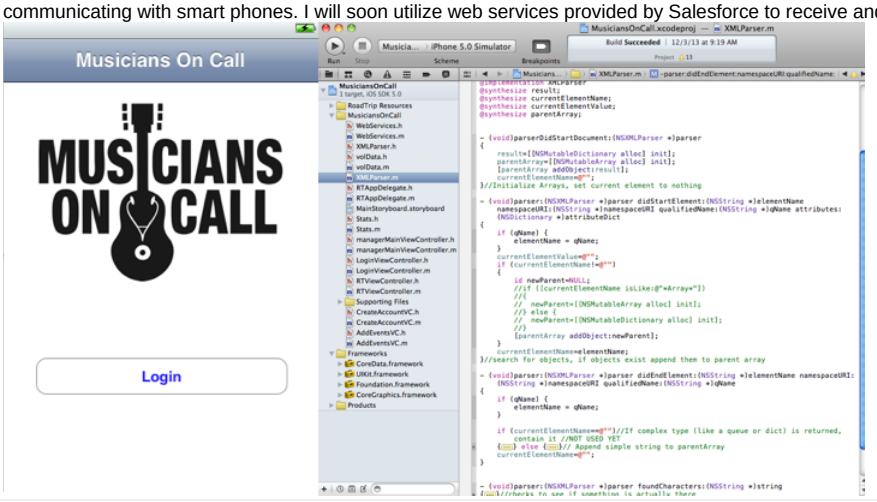
The purpose of my research project is to develop a program that will effectively map out and simulate the traffic flow along I-66. Then by adding an Extra HOV+2 lane running parallel to I-66 could decrease congestion by over 50%. The reasoning behind this assertion is based certain threshold. If I could simulate a reduc
Specifically, I plan to isolate the 14 mile stretch of I-66 that goes through Fairfax County. I c of the most highly congested roads in our area, but it als
Through my background research of this subject, I've discovered a downloada with many features such as ramp entrances and uphill sections. Although it simulates traffic at a smaller scale, I hope to improve on this des highway like I-66. In this updated model I plan to incorporate traffic congestion related features that are utilized
There is a plethora of inf Transportation (VDOT) providing insight on volume of cars traveling on the roads all over Virginia. Some of these statistics include: annual a cars and buses and k factor (a statistic that accounts for peak hour traffic); these statistic will be vital to program a realistic model of traffic <b has been devoted to figuring out how to code and run from .java files to an applet and then to a local web browser. After getting the sys. lab realized that it was too complicated to modify. Therefore, I began from scratch working with java and java graphics to make my basic simulat

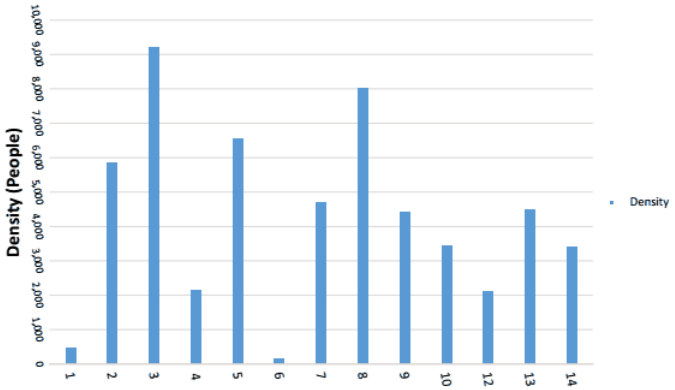
	graphics and JOption display tools from Intro to Computer Science and AP Computer Science, I was able to display a basic grey strip throug strip. The display constantly updates and redraws the over the previous background which simulates the moving car. There's also an action moving. The speed can be adjusted by how a speed or dx value that changes the x coordinate when drawing the car. My research project s time need to complete a full length research project.
Jimmy Wei	↑ Robotic Balancing Platform The purpose of my project is to create a robot that would be able to balance an object while walking over obstacles. The robot will be able to top of its body so that it will be able to balance an object. At the conclusion of this project, I want the robot to be able to walk across a room to maneuver through uneven slopes and scattered objects. As the legs encounter obstacles in its path, the legs will respond by moving by adjusting itself so that it will stay flat. So matter how tilted or off balance the robot will be, I want the platform parallel to the ground at all ti calculate algorithms to determine where it should move next. I will be using an Arduino to control my robot. Currently, I am working on c building the robot, I made several possible designs using SolidWorks 2013 and AutoCAD. I have begun to cut out pieces of my robot with th be made out of a sheet of metal. I also want to add an orientation and motion sensing device to my design so that the robot will be able to kn
Daniel Fontenot	↑ Mashup Crowdsourcing What is a Mashup? A mashup is a musical piece composed by mixing and intertwining two or more songs. The songs can mixed in diff mashup which is the vocals of one song placed over the instrumentals of another song. The pace, pitch, and other musical characteristics of have to be edited in order to create harmony and synchronization in the mashup. Other styles of mashups include Version vs. Version, Abstr Bootlegs, and cut-ups.1 On top of different types of mash ups, there are also different genres that get mashed up. Rock, pop, electronic and music. But I have come across mashups that utilize other genres, like one of Eminem with ragtime music, and another with Otis Redding ov (because order does matter) are endless! My Project I am creating my own mashup website to investigate how a website grows, o not host the songs (because of data storage and possible legal issues); instead the website would serve as a link hub (primarily YouTube an running I will advertise the website on forums requesting that people submit mashups to help build the database and give the website a shot and productivity of the site. I will also enter a “beautification and growth” phase which will consist of trying to grow the user base while also m fun as possible. Features: Method to submit mashup links with certain tags, rating, and comments (any user could comment, rate, mashups based on rating and tags (tags would highlight the songs included and the style of the mashup) Page categories to browse dif included. User accounts to save/favorite mashup links and organize them in their profile to find later or share with friends. News up function to give comments towards website Easy to navigate format that minimizes going back and forth and opening new tab. Roo may come up with
Nikhil Gupta	↑ Interactive Data Visualization A web application that will be used to compare different types of data- in this case, Census data. It is programmed in Python and JavaScript, interactivity. The application will feature a map of the United States, with the ability to overlay different shadings of density for different data t purpose of this application is to allow for quick comparisons between a variety of Census data types. If this project is successful, it could be the Census Bureau.
Rena Liu	↑ Mapping Surface Currents to Model the Path of Algae Colo America consumes one fourth of the world’s oil supply and according to analysts, the fossil fuel supply will run out, at the latest, in 2500. As of energy production must be created and implemented on a large scale. A new field in alternative energy is the study of macroalgae, or sea thousand tons of seaweed for acetone production, but after the war ended the production was stopped. This area of research has not been very complex and until a few years ago harvesting the sugars was too expensive. However, within the past couple years scientists have bioe complex sugars into useful products. Due to these bioengineering breakthroughs, researchers believe the possibility of ethanol yield from m The main proposal for mass production of seaweed involves farms. However, these farms produce an unpleasant odor and also attract pred the seaweed. In order to combat this issue, barriers would have to be placed to keep the predators away which dramatically increases the c ocean-grown farms, involves using free floating macroalgae in the production of biofuel. In this alternative, seaweed is placed as immature its course throughout the ocean, and then is harvested at a different site. The purpose of my project would be to create a computer model to various bodies of water.
Tushar Govil	↑ Handwritten Mathematical Analysis Today, there are many tools available to mathematicians to compute expressions ranging from simple arithmetic to multivariable calculus. O knowledge engine and can not only compute mathematical expressions, but can also serve as a powerful tool for computational physics thro Wolfram Alpha’s immense power and potential, there is one aspect in which it lacks flexibility: handwritten input. Although Wolfram Alpha all tedious to input things into the engine. Long equations require a significantly large amount of parentheses which allocate a lot of room for er Alpha to accept handwritten input, hence reducing the margin for error and making troubleshooting much easier for the inputter in the case t what I hope to implement as my Senior Tech Lab project for Computer Systems. I conceived this idea because I use Wolfram Alpha extensiv input queries successfully. Implementing a handwritten input interface for Wolfram Alpha would not only be a step into the future of computa practicality omnipotently. Complex equations, should they be written neatly, would be instantly simplified, resulting in a slightly increased con reduced work performed by the user in terms of input. I have successfully implemented a working model of my idea during my year in Tech L Wolfram asking them to undertake my idea and use my project as a basis to implement a more efficient and user-friendly version.
Robert Young	↑ Engineering Xylanase This project introduces a novel computational method for efficiently engineering proteins for improved stability. Protein engineering is a field benefit from the use of proteins with increased stability or activity. Current protein engineering methods are generally performed in a wet lab to produce and test mutants. In this study, Streptomyces lividans endo-1-beta-4-xylanase, an enzyme used in papermaking and biofuel prod potential mutants for improved thermostability and minimal change in activity. This study aimed both (1) to predict a number of xylanase mut future production and use in industry; and (2) to design an algorithm which could comprehensively identify multiple-point protein mutants wh The basis of the method used in this study was a novel system of clustering amino acid mutations and subsequently combining these cluste Delaunay tessellation of the protein, so that amino acid residues which were nearest neighbors could be combined into a cluster. Mutations simple linear manner. Once a large number of clusters within the protein were identified, a second portion of the algorithm combined these c largest predicted improvement in stability, as predicted by a score generated from the tessellation. The algorithm displayed significant of the tessellation score. However, SwissPDBViewer indicates likely low thermal stability of “optimal” mutants, likely indicating imprecisions i presented algorithm displays significant applicability to the protein stability optimization problem specifically, as well as the general class of p

Everi Osofsky	↑ Personalizing Computer Authentication This application uses vocal recognition technology to log into a computer. The project is relevant to modern technology due to the current po devices. For example, the iPhone's Siri from 2010 takes audio input from the user's speech, " . . . parses the sound, interprets the request, a [5]. Furthermore, in 2012 an article was written about a USB drive that "claims to provide the world's first voicecode security." The Voicelok V recognizes a password spoken in the voice of the person to whom it belongs. However, further research in this idea appears necessary, as t reliable this software is or whether your enterprising, voice-impersonating work colleagues will be able to get to your files" [3]. Even more rec an online article, " . . . is apparently also able to differentiate between users based on their voices" [6]. Vocal recognition of a spoken phrase project is an example of how vocal recognition can be used to authenticate a user.
Steven Bunting	↑ Video Compresion with a Tailored Optical Response Video Compression with a Tailored Optical Response (ViCTOR), is a project which I started over the summer at MITRE. The project solves a Unmanned Aerial Systems (UAS)cannot send high quality video at fast frame rates due to bandwidth issues. If the bandwidth cannot be fixe this system, the camera taking pictures has a high resolution lens, but a low resolution sensor. This means that the image quality is slightly l resolution data is encoded as aliasing in the image. When the UAS takes this picture, it can then be sent to the command center, where it ca Super-resolution is a process where multiple frames of the video are strung together, the differences are found between them, and aspect of the project was determining an optimal method of compression that retains the aliasing so that the aliasing can be traced in the im finishing that research. 
Akhil Gangu	↑ Development of an Automated Facial Detection System Computer science research in facial detection has attracted much attention, and the work in this area is getting improved by not only comput world due to its many potential applications in computer vision communication and automated access control systems. There are numerous in an image, background color, lighting, and even facial expression when developing an automated facial detection system, making it a non- develop an automated system to detect approximate, but fairly accurate, facial regions using a novel method that would avoid the time-cons calculating distances between distinguished facial features, while increasing the overall facial detection accuracy. The method involves ident skin pixel and creating a binary skin map of the image, using a procedure partially implemented by undergraduate computer science student
Nathan Williams	↑ Modernizing Membership Management One community pool, Rolling Valley Swim and Tennis Club (RVSTC), experimented with a new login system during the Summer of 2013. Fo hand in binders that have littered the front desk; this is the traditional manner of operation and is common among other community pools in t simplicity, causing no confusion among patrons. Nor was maintenance an issue, beyond updates of the paper membership files. In an effort Board opted for an electronic check-in system this year. The preliminary solution indeed had its strengths over the former, includin computerizing the membership records was a great move, but the misfortune of the situation manifested in the fact that the membership dat Essentially, this only saved paper, and therefore the new electronic system still suffered the same inefficiency in database management. <br available source code and a multitude of features was clear and the senior project was a a perfect opportunity to resolve this issue.
Ryan Jian	↑ Monte Carlo Tree Search Heuristics in Computer Go After the success of artificial intelligence in chess, developing a competitive computer program for the game of Go is considered to be the ne Go is significantly more difficult than chess due to a vastly larger state space and the lack of effective positional rules to create an accurate e

	Computer Go remained below even the level of amateur players. However, the use of a new technique in the mid 2000s, called Monte Carlo programs to reach much higher levels, approaching that of professional players. Unfortunately, MCTS is still too slow, and also tactically wea MCTS to address these two issues and test their effectiveness by implementing them using preexisting open source Computer Go libraries.
Jonathan Colen	↑ A Voice Recognition-Based Desktop Manager This program will allow a user to speak to the computer, and have their utterances executed. For example, a user will say "Open Google Ch using their Chrome browser. This project will use the existing Sphinx4 Speech Recognition framework. This is a state of the art open so Models to match input features to their most probable phone sequence. For this project, a grammar will have to be defined, and a post-proce parse the spoken input, and execute the spoken command. An advantage of this system is adaptability. The Sphinx4 framework allows accuracy for a given voice or speaking style. Audio will be collected to improve acoustic models and recognition accuracy through a settings any time. Currently, the program recognizes a user's voice, and can open some basic programs. The next steps will be to include more will allow the user to create their own voice commands, as well as upload audio to be used in adapting the system to their voice.
Mira Holford	↑ Passive Non-Invasive Breathing and Heart Monitor The system will comprise a capaciflector, a circuit board, and a personal computer. A capaciflector is a modified capacitor whose value chan When connected to an RC circuit, the frequency of oscillation of the circuit will vary with the changing capacitance. The capaciflector is as th sheets on a bed. When a person lies down, breathing produces changes in capacitance reflected in the changing frequency of oscillation. U circuit board, and manipulate the data to isolate breathing activity and heart rate. Finally, I will establish thresholds for visible activity, and eff on threshold breaks.
Ricardo Tucker	↑ FIRST Robotics Competition Programming The overall objective of the TJ FIRST Robotics team is to build and design a robot in a set timeframe (on average, about 6 weeks) to perfor compete in the FIRST Robotics Competition. As a member of the Programming Subsystem for our FRC team, my goal is to program the rob control. This means I design the control scheme, the machine vision and subsequently the visual tracking, and the general motor functions f
Nathaniel Kai Eubanks	↑ Augmented Reality Project The Augmented Reality Project aims to prevent social blunders through proper identification of strangers and people whom you should know this allow humans to better communicate with strangers, but it will also have information stored in a person's profile; for example, the area n contain birthdate, gender, and favorite breakfast cereal. The additional information would lead to interesting conversation and friendships. <b accomplish this through a set of virtual reality goggles. The goggles would take visual input roughly equivalent to that of the wearer's visual f display. Due to cost and demonstration logistics, however, the interface will simply be simulated. Attached is an image of a frame of user vie 
Cameron Ewell	↑ Practical Quantum Programming The core of my project is Quantum Computing Language (QCL), a unique programming language for a simulated quantum computer. QCL i many ways: it has an interactive shell and can import the contents of .qcl files or execute them outright. With QCL, I plan to foray i particularly security and encryption. To put it simply, a sufficiently-large real quantum computer could nigh-effortlessly break any and all form probably expect, this possibility has garnered the field of quantum computing much attention, from the media and government organizations quantum computers stems from a process called Shor's algorithm: a quantum algorithm for factoring integers. Using modular arithmetic, qua than any normal computer. A big enough quantum computer could factor numbers as big as the pseudo-primes used for modern data encry This is very simplified, as every method works differently, but quantum computing poses a threat to all of them. Getting Shor's algo You can easily find a description of the algorithm on Wikipedia, alongside a proof that it works, but there is no concrete implementation avail lets me transform the theoretical Shor's algorithm into real code that can be executed with an integer as a parameter and gives the proper o no means a standalone entity. It depends on a proper, thorough implementation of modular arithmetic, which also isn't available on the Inter variables has to be performed using unitary operators, which in essence are huge matrix multiplications with hundreds of complex-valued co down to are the true focus of my project: How is a quantum computer really programmed? What constitutes the long bridge between manipu

	cracking encryption?
Brian Welch	↑ Using Scale Free Networks to Find the Best Coaches Using the concept of scale free networks and their properties from the book Linked by Albert-Laszlo Barabasi, this project applies them to N studies using data analysis to analyze the best college football coaches in the NCAA, and the many connections between head coaches and schools makes networks a natural component of this problem. Spanning 30 years of coaching history, this study hopes to find the hidden co exciting field of scale free networks.
Asa Kaplan	↑ Using Touch Stimuli for the Visually Impaired My program will take a depth map input from a Kinect camera and process it to a pressure map as a form of output. In the event that m device, including the output working functionally, the computation of the input being usable, and the human mind being able to comprehend able to aid an individual who is visually impaired to successfully navigate an environment. It is difficult to say exactly how good the brain will to determine how the feedback will be as compared to actually having sight, but the applications extend to anyone in an environment that is help with night vision with different cameras.
Amy Kim	↑ Reasoning Behind Financial Decisions Individuals make financial decisions on a daily basis. Thus, my project focuses on the reasoning behind these financial decisions. Why do pe extent do previous experiences influence their decisions? Thus, my project is a web application, written in JavaScript, that involves a study c economic concepts, my project incorporates methods of experimental economics and then analyzes the results. With the data I've gathered, make the choices they do and ultimately, help them to make more sound financial decisions. Through extensive research and preparation th the various influences society exercises on human nature as well—the way other individuals, networks, and culture affects our financial deci
James Forcier	↑ GlobalVNC GlobalVNC is an in-browser VNC client that is simultaneously simple on the backend and highly configurable (both on the backend and front a computer remotely, similar to Remote Desktop. While participating in a hackathon last year, my team searched for an in-browser VNC clien our needs sufficiently. This project hopes to fill that gap – a client that is easy to set up on the backend, yet is configurable enough to be vers using the Websockets API in the web page, and writing a custom daemon to listen on the back end. The daemon will act as a transport betw intend to use Canvas to render the VNC connection. As no VNC libraries exist for Python, in order to proceed with my project in Python I will
Muthu Chidambaram	↑ Opinion Engine The goal is to create an application to pool together social data and generate social opinions on topics based on machine learning classifiers So far, I have finished the base classifiers for my project and am working on increasing accuracy.
Daniel Sainati	↑ Keyboard Proximity and Context Sensitive Spell Checking This software will use common spell checking algorithms like the Levenshtein distance and word proximity to determine the closest words to will sort these based on various factors ranging from keyboard proximity to sentence context to suggest the most likely word for the user. If ti component, wherein leaving the program active will allow it to learn from which words the user prioritizes for a given misspelled word and co
Kate Hao	↑ Music Transcription Progarm Working with my partner, we are working on a program that will ultimately produce neat, professional-looking sheet music. The user of the pr melody and the program will output the corresponding sheet music. After extracting pitch and note durations from the audio file, the program compute the rhythm. This program will hopefully be useful for musicians and composers who would like an quick and easy way to jot down r
Aditya Chaudhry	↑ Optimizing Simple Moving Average Corssovers In Stock Price There are many factors that affect stock price. Company performance, economic health, and extraneous incidents all drive changes in share stock will move in order to be able to buy or sell appropriately in advance. Whereas natural disasters or political changes cannot be adequat mathematical indicators that can be. The most basic such indicator is the Simple Moving Average (SMA). Using SMAs, the investor can pred My project will seek to develop a tool that will find the optimum SMA lengths that will grant investors the ability to quickly predict stock r SMA is one of the basic tools of financial analysis. The x-day SMA is the average price of a stock over the previous x days. So for example, $11, $12, $10, $11], its current five-day SMA would be $10.80. Tomorrow, however, the five-day SMA will change, because the most recent if Stock A closes at $12 today, tomorrow stock A's previous five closes will be [$11, $12, $10, $11, $12], and its five-day SMA will be $11.20. can be plotted on a price vs. time chart. In theory, crossover rules should work for any short term and any long term SMA, whether it be fifty-day SMA crossing over a two hundred-day SMA. However, crossovers don't always make accurate predictions, especially when shorter above a two hundred-day SMA, one can be fairly certain that this crossover bodes well for the stock. However, if a two-day SMA crosses ov result of market fluctuations and may have no significance for future pricing. Thus, crossovers based on longer time periods will more consis of course, is that one may lose an opportunity if he waits for a long term crossover. Waiting for a fifty-over-two hundred crossover to occur w made if he had bought the stock earlier. The expected outcome of the project is a piece of software that will find a particular SMA cross movements in stock price with a high level of confidence.
James Day	↑ Java to C++ Transcompiler My goal is to write software to translate Java source code into C++. This will allow software developers to write their code in Java (which is c roughly 40% better performance). There have been numerous attempts, both proprietary and open source, at translating the sourc attempts have had some success. There is a open source project called java2c-transcompiler which is somewhat effective at translating Jav Java's syntax, arithmetic, data types, and most of its key words (abstract, assert, boolean, break ect). It is incapable of translating Java's obj exceptions, arrays, String concatenations ect) or the Java standard library. The java2c-transcompilier also does not create the necessary fur proprietary source-to-source compilers, such as the DMS Software Reengineering Toolkit, have attempted to translate between several lang those encountered by the java2c-transcompiler project. I will complete my project by by breaking the problem down into three maj The front end will first verify that all of the Java source's syntax is legal. Then it will remove arbitrary spaces that the user included from the J break into small pieces. Finally the front end will break the source into small pieces (key words, variable names ect) called tokens. The mids

	translate them to their C++ equivalent. The back end will arrange the translated tokens into lines and append them to a output file in a mann
Adithya Venkatesan	↑ Finger Tracking for Virtual Typing The goal for this project was to utilize motion tracking hardware to detect fine changes in movement in order to accomplish the feat of typing taps in the air and receive feedback from the computer as to what virtual key he or she pressed. In addition, the user should be able to make interaction with the computer. I am calculating finger position using the Leap Motion and transforming it into my virtual keyboard pl finger is relative to the virtual keyboard. Using this, I am calculating where the finger is being pressed into the air over the virtual keyboard a a box of interaction, the finger movements that are strong enough are perceived as interactions with the computer. Strength in this case, is n that the finger travels. In addition, I created my own methods of tracking finger presses and hand motions as the given methods are sometim
Victoria Xia	↑ Offline Handwriting Recognition The problem of offline handwriting recognition, getting a computer to convert an image of handwritten text into editable text, has already bee automated form processing) and the postal (to facilitate automated letter sorting). For my project, though, I'm only interested in being able to for easier editing, electronic storage in one page, and control-F. My plan is to start with character recognition, then move to word recognition of notes. So far I'm still at the character recognition stage. I've been working with neural networks for this purpose, but so far I hav
John Aulabaugh	↑ Musicians On Call App When a musician preforms for a patient, or a group of patients, MOC and a guide from the hospital are required by law to record information the musician and patients. Currently there is no organized system for recording this information. The goal of my project is to design a functio this year. My app is aimed at simplifying the way MOC collects data, and encompassing the scheduling process that volunteers go through. appointments, give musicians more opportunities to preform, and process data for MOC. My project currently consists of an IPhone applicati communicating with smart phones. I will soon utilize web services provided by Salesforce to receive and interact with data from MOC. 
Jesse Judish	↑ Using Machine Vision and Robotics to Solve a Physical Puzzle My project goal is to autonomously solve the puzzle "Thinkfun Tilt". My project consists of three stage. The first consists of using the Python convert it into data. The second consists of taking the data of the setup of the board and outputting a string of answers to solve the board. Fi will then control robotic motors to solve the puzzle. My goal is for a person be able to play with the puzzle - if they can't solve the puzzle they program solve it.
Hari Sridhar	↑ Modelling Power Failure Detection and Rerouting in Smart Gri The goal of my project is the create a graph of the proposed smart grid (an electric grid that uses computer systems) to model power failur e nodes of the graph (i.e., houses or other buildings). As of now, I have done some background research into the topic and am currently worki models such as Watts & Storgatz) of a small-world network to develop the structure of the electricity network. Although I have code that dev random and not small-world networks; furthermore, small-world networks beget more work. As such, I plan on transforming my code to work and then proceed to developing the algorithms for power failure detection and rerouting in nodes.
Tyler Shepherd	↑ Web Application of Sugarscape Modeling In Sugarscape agents move around a grid searching for the nearest largest amount of sugar in their vision. This creates an emergent behav they create some overall trend. This can be used to study numerous effects, mostly economic, game theory and societal trends as detailed i Societies." Once the base model has been completed various additions can be made to create simulations, such as disease, tribes, and ma application version of the modeling system that researchers could then use without having to create their own Sugarscape.
Biqiao Yin	↑ Chemical Reaction Modeling The objective of this project is to accurately predict the outcome of a chemical reaction based on its reactants, catalysts and environment. Tl computational chemistry already, but they are usually focused on a specific type of reactions. I want to create a more generic program. the basic types of reactions, and expand the program to work backwards – generating methods to produce desired outcome.
Andy Sin	↑ Hallway Optimization I have made good headway on my program, a model to simulate and optimize traffic situations. Essentially, although most parts remain unfir

	simulation of traffic from period to period (or some arbitrary time period, depending on what the program models) is fleshed out. The progran situation and convert it into meaningful data. It also takes a schedule input – the workers using the map and their intended destinations. Both use the project for themselves, which naturally is the point of this project, a traffic simulation that is adaptable to a wide variety of real-life situ coordination problems around the globe. I have considered a streamlined process for a user to create their own maps and schedules, becau is very unforgiving of mistakes. However, any sort of user-friendly input will have to wait until the actual program is complete. The progra into a grid-like system streamline by units called hallways. These hallways can be used to represent actual hallways, or roads, or anything o open expanses), Boxes are used to represent miniature grid coordinates, to allow for more flexibility in calculation the optimal path, and navi going to use solely grid-based calculations (Boxes). However, due to runtime concerns, I decided that this was not practical for many cases far, the program can successfully navigate from hallway to hallway, by use of a heavily modified A* search algorithm. Time constraints did nc an A* search that worked for Boxes as well by today's date, but it is what I am working on right now. This is the immediate goal, but I have pl mostly in terms of accessibility to the general public. As an example, I have attached two diagrams below. The first illustrates the progress I many people would theoretically pass through each hallway in TJHSST a single day. There are three important things to note – one, becaus junior lounge is inaccessible. This obviously would not happen in real life, but it provides an interesting aspect of how traffic would readjust s construction). The second is that this chart describes the first floor only, as time constraints prevented me from adding the second floor as w again, because I could not account for rooms on the second floor, or in a non-hallway area (such as the trailers) at this time. As can be complete. However, I hope that this report will serve as an illustration of what I have achieved so far. 
Arno Chang	↑ Iris Locating and Side Scrolling The purpose of this endeavor was to create a software to track the movements of a user's irises with the use of a camera or a webcam, and changes in iris location. This undertaking was inspired by the fact that scrolling on a computer without a mouse with a scroll wheel can be ra focus of the screen just by looking at it would be significantly more efficient. This project has been attempted before, most notably recently w which combines tilt angle with tracking eye location to scroll down pages, but this feature is exclusively used for smartphones, and thus cann friendly. For computer usage, there have been attempts to build a webcam based eye tracker with software such as Opengazer which has h known to support scrolling through screens, as this project will. Opengazer also seems to be more focused on the entire face and facial featı project could be argued to be an improvement of already made technology, but in the end I hoped to make it my own. Outside of scrolling up practical applications of this project include but are not limited to: games, virtual reality simulations, conserving energy if one isn't looking tov there are more than one pair of eyes detected by the webcam, perhaps the screen could be made to go dark. This project could also be exp Google Chrome of Firefox perhaps.
Nathan Dass	↑ Modeling Data Sets with 3D Audio Monitoring or analyzing real world scenarios on small screens or big panorama displays with either actual or stored data can be engaging ar data being presented on the screen. When we are analyzing or monitoring the data, we continuously look for information about the place an also known as spatial sound, can help create a sense of reality in virtual environments by incorporating another dimension to the data being functions and reverberation, we can pinpoint a sound to a location in 3D space relative to our position at the time. As a result, this can help t research project, the Milky Way Galaxy Data Set was used to create an effective way of portraying the galaxy with the use of 3D audio. This ultimately allowing the user to look at 1,236 astronomical bodies and almost naturally turn to the bodies that stand out from the other bodies instance. This research was done with broad idea of using this concept in command centers, space missions, air traffic control centers, heal where an operator is monitoring a real-time scenario and can make the optimal decision based on the situation.

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