**Speaker: Jonathan Rosta**

**Topic: CAPTCHA cracking**

Cracking the CAPTCHA happened kind of by accident, the google map team was trying to identify the street addresses in google map’s street view. They had different options they could have used in order to try and read the street numbers, they could have gone with Amazons mechanical truk or they could have used a digital piecework process that costs just pennies per image. However, the team chose to use a deep convolutional neural network that operated directly on the image pixels to find the street numbers. After training their program on the publically available street address house numbers they achieved 96% accuracy in recognizing street numbers. They decided to train it on millions of CAPTCHA images and after doing so they got 99.8% accuracy on reading CAPTCHAs. Some might think this will be bad for CAPTCHA in general, but in reality it can be used to improve CAPTCHAs and make them better overall.

**Speaker: Nasmah Alnaimi**

**Topic: Detecting Human Body Language in Video**

The group doing the research is called GreenDot and they are investigating motion capture, pattern recognition, detecting and analyzing human movement in videos. Their focus for this project was on analyzing the body language of national and international public figures. From their analysis they built a large database with that data. Using that data and data they got from analyzing videos of Mariano Rivera they then built a 3D model of Rivera. Some of the area in which this research could apply is: as a lie detector, as a detector to see if someone is under duress, in the inter-culture field as a means to assist in communications and also it could be used with google glass to help people that can’t see, good or at all, in detecting if the person they are talking to are bored etc.

**Speaker: Adam Eortferd**

**Topic: Partical Accelerator**

This topic is on how modeling the Relativistic Heavy Ion Collider (which is used to study how the universe came to be) could be used to help build two new tracks. There are currently two “racetracks” where heavy ions are accelerated in opposite directions for testing. These two tracks only intersect at detectors that are located around the track. By modeling the current tracks and then simulating new tracks based off the model they found that instead of needing six more tracks they only need two and they also believe they have found the optimal configuration for the new tracks to work in conjunction with the old tracks.

**Speaker: Riley Englin**

**Topic: 3D Printing of Body Parts**

This research was quite interesting and has many practical applications that it could be used for. That being said, the 3D printing of body parts is accomplished by first harvesting cells (or ink) from the person they are going to print an organ for. Then after letting the ‘ink’ multiple for some time it is then input into a 3D printer in which the printer then prints out the organ. So far the company Organovo has successfully printed models of human kidneys, bone, cartilage, muscle, blood vessels and lung tissue. Some things that will need to be overcome for this to really take off are things like getting approval from the FDA and any ethical issues that might come up from harvesting human cells to make organs. However, it is predicted that this could be ready to use within the next five years.

**Speaker: Sarah Bass**

**Topic: Monitoring and Predicting Wind and Solar Power**

One of the great things about renewable energy is that there is an endless supply of it and there are no emissions from it. One of the down sides is that it is not cost efficient to store wind or solar energy so it needs to essential be use immediately. Tracking solar power is fairly simple as every day we get solar energy, wind on the other hand is not so easy to predicate. One downside of wind energy is that you never know when the wind will stop so you have to run backup generators just in case the wind stops. The NCAR has developed weather models that predicate the weather with greater accuracy than any other before it. This new weather model has increased available energy from renewable sources by 30% and saved around 6 million dollars in just 2010.

**Speaker: Tom Schultz**

**Topic: AI Learning for Facial Recognition**

They started with training the AI on stills of cat videos off YouTube, about 10 million YouTube stills. For the AI they are using a deep learning AI type, deep layer has hidden layers where each layer is treated like its own neural network. After getting the AI to recognize cats they then went on to faces from Facebook. Using images that have been cropped the AI had an accuracy of 97.25% were as a human has an accuracy of 97.50%. Deep learning is not modeled after the human brain, is instead a mathematical model. Deep learning is more of a Monte Carlo as it is feed un-labeled data to learn and then after learning that way for a while the AI is tweaked to look for certain attributes.

**Speaker: Jeremy Reineman**

**Topic: SpaceX Reusable Rockets**

SpaceX is a company that makes reusable rockets for launching cargo up to the space station. They are also, so far, the only ones to have recovered a booster rocket for the first time. Their rockets have four landing legs and the rocket is over 20 stories tall. The idea behind the recoverable rockets is to reduce the cost of space transportation, so that more missions can occur. SpaceX is the first private company to launch, orbit and recover a rocket that delivers cargo to the space station. Regular rockets cost about the same as buying a new jet for each mission, but the recoverable rockets can reduce that down to about 1% as you only need to buy fuel.

**Speaker: Matt Hemplesman**

**Topic: The Maddingly Model, A Simulation of all Life on Earth**

This topic was about modeling life on earth. It does not model each specific organism, but rather is a general eco-system model, it simulates earths biosphere. Some of the reasons this project was started are: getting answers to eco-questions, to help with policy making decisions and to help predict climate changes, pandemics, food security and human pressures. The model abstracts specific organisms into cohorts like omnivore, herbivore and carnivore. The model can also work on different scales to see the overall or behaviors of a specific group of cohorts. There are some problems they have run into such as, getting how many of an animal type there is, and ecosystem properties.

**Speaker: Reid Fortier**

**Topic: Modeling Global Climate Change**

The argument of climate changes has been going on for some time now and with about 7 billion people in the world today there are many reasons the climate could be changing. There are three major projects that are working on tracking the climate changes, GISS GCM by NASA, Global Programs and CIMP5. NASA is focusing on cloud cover and how the oceans interact with clouds. However, Reid focuses on CIMP5. CIMP5 has a website you can go to, to get weather data for a given time frame. CIMP5 clams they can model the Earth up to 1000 years back and 1300 years into the future. CIMP5 is currently working on adding ‘ENT’ to their model which will allow them to add in dynamic vegetation and how that affects the weather.

**Speaker: Peter Griffin**

**Topic: 4D Printing**

Unlike 3D printing 4D printing is not so much about making some new as taking something already printed from a 3D printer and making it change itself. Syratasys has been working on a new material that when submerged in water changes the properties of the material making it respond in ways that if printed right allows one shape to become another with no interference from any machine or person. They are currently working on finding other mediums, such as, a specific light spectrum or energy type they can bombard it with, which than that can be used to make the 3D printed shape remake themselves into 4D.

**Speaker: Fawaz**

**Topic: Magnetism Simulation Software to Model US Presidential Elections**

Some researcher over in Europe wanted to simulate the Presidential Elections to see if it could be predicted one who would win the election. The Model was designed to simulate the voting patterns in the US and they tried to use factors of influence to make that prediction. I guess they were unsuccessful in building the model or in finding measureable factors of influence, but they said it was a pipe dream. So they took a new approach and instead they are trying to model human behaviors to see how the opinions of others affect how they vote. The new model wouldn’t focus on who wins, but on the margin by which they will win.

**Speaker: McKenzie Murphy**

**Topic: Aereo**

Apparently Aereo has been in the news back east for some time now. Aereo is a company that is intercepting TV broadcast signals and storing them. For a price, customers can then basically DVR shows on the cloud through Aereo. This is where Aereo is having issues, because the TV broadcast companies are saying that Aereo is doing a one to many business model, which goes against copyright laws. Whereas Aereo is saying they are a many to many business model because of how they capture the broadcast. Aereo uses many little antennas they claim this makes it many to many. Right now it is being debated in court and many businesses are watching to see what the outcome will be.

**Speaker: Jesse Scholer**

**Topic: Computers Teaching Each Other**

For some reason somebody thought it would be a good idea to have computers teach each other. So far they have had a computer teach another computer to play Pac-man. The teaching computer passes along the parameters and instructions needed by the learning computer. After passing that along the teaching computer then tries to advise the learning computer. One of the challenges of a teaching computer is that there needs to be a balance between helpful and annoying because the learning computer is easily confused and then shuts down. Some of the benefits of computers teaching computers are: your old robot teaching your new one it’s duties so you don’t have to every time you get a new one, for testing programs and ultimately for teaching humans.

**Speaker: Jason Helms**

**Topic: FPGAs for Server Defense**

It was first made very clear that FPGA is not the same as ASIC (Application specific Integrated Circuit), ASICs are developed on FPGAs though. FPGAs have a long and intense development process and for this purpose they are using the H architecture to find the bottle neck in the data flow. After development the gates aren’t all manually set, the FPGAs are sent out to server farms which will find 600+ different gate configurations that can be set. The FPGAs does the mass IP packet processing between the internet fabric and companies such as Amazon and Comcast. FPAGs basically work like this, after sending a syn+ack if they don’t get an ack back they don’t process the request and they dump it.

**Speaker: Ahmed Al Aswad**

**Topic: A System Detects Global Trends in Social Networks Two Months in Advance**

This project was developed by the University of Carlos II De Madrid with the cooperation of NICTA of Australia, University of Yale and the University of California-San Diego. What they do is monitor twitter for social movement, consumer reactions and for possible epidemic outbreaks. If I understand this correctly, they do this not by watching the most popular people on twitter, but their followers. By doing this they can see trends that are coming. They observed the “friendship paradox” which is basically people think they have more friends than their friends, but they don’t. 98% of twitter users apparently are subject to the “friendship paradox”.