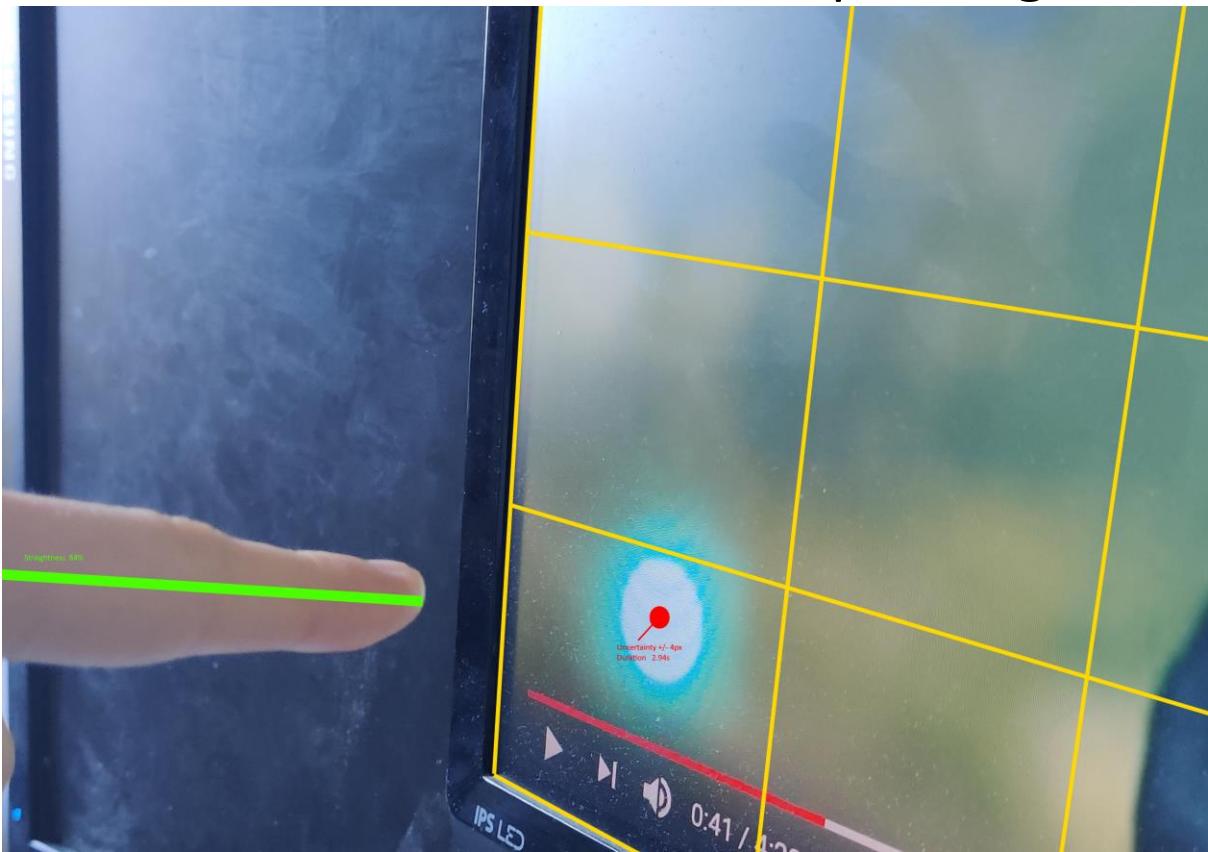


Contactless display interaction

Alex Hobson

Detect the direction of an index finger in relation to a plane (screen) to detect where the user is pointing



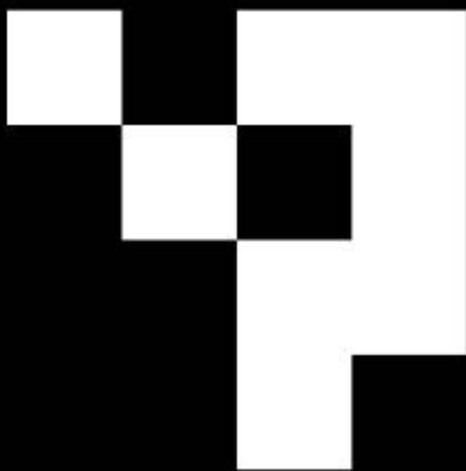


UAV Bird Deterrents

USING COMPUTER VISION TO DETECT
BIRDS IN THE NATURAL WORLD

Alex Scott

Understanding the Drag Flick through motion tracking.



Difficult skills are often hard to perfect without the presence of an expert in the skill set. Mastery requires repetitive action with minor adjustments through visual interpretation.

Using online sources, I would like to track the motion of a difficult skill and trial using fiducial markers to mimic the angle and trajectory required for the skill.



Guitar Chord Recognition

Name: Andy Clifford

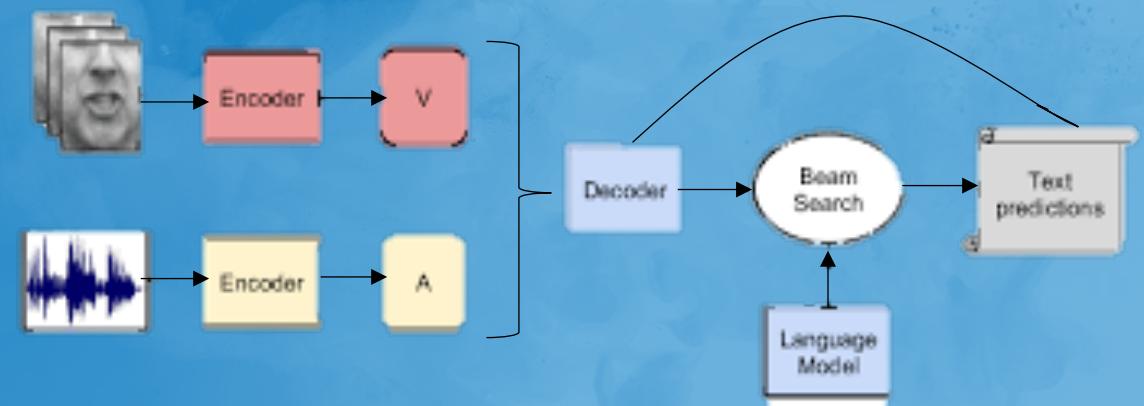
Description: This project will help novice guitarists learn how to play the correct chords by giving feedback as to what chord they are currently playing. It will extend a previous project by making improvements to the current methods used for detection and adding new ones as needed.



Audio-Visual Speech Recognition using Computer Vision

Angelica Dela Cruz

This project aims to recognise words from sounds converted as a spectrograph image. The main goal of this project is to know where the start and end of each word in a sentence is.



AUTOMATIC POKER

Angus Fairbairn

Use computer vision to identify playing card's value and suit.
Use this information to automatically decide winning hand of a round of poker.



HOT SHOT

An application that tracks tennis players mid game and creates a heat map. Could be used for game analysis or generate interesting match stats.





19. Sports Coach

Squash Technique Analysis

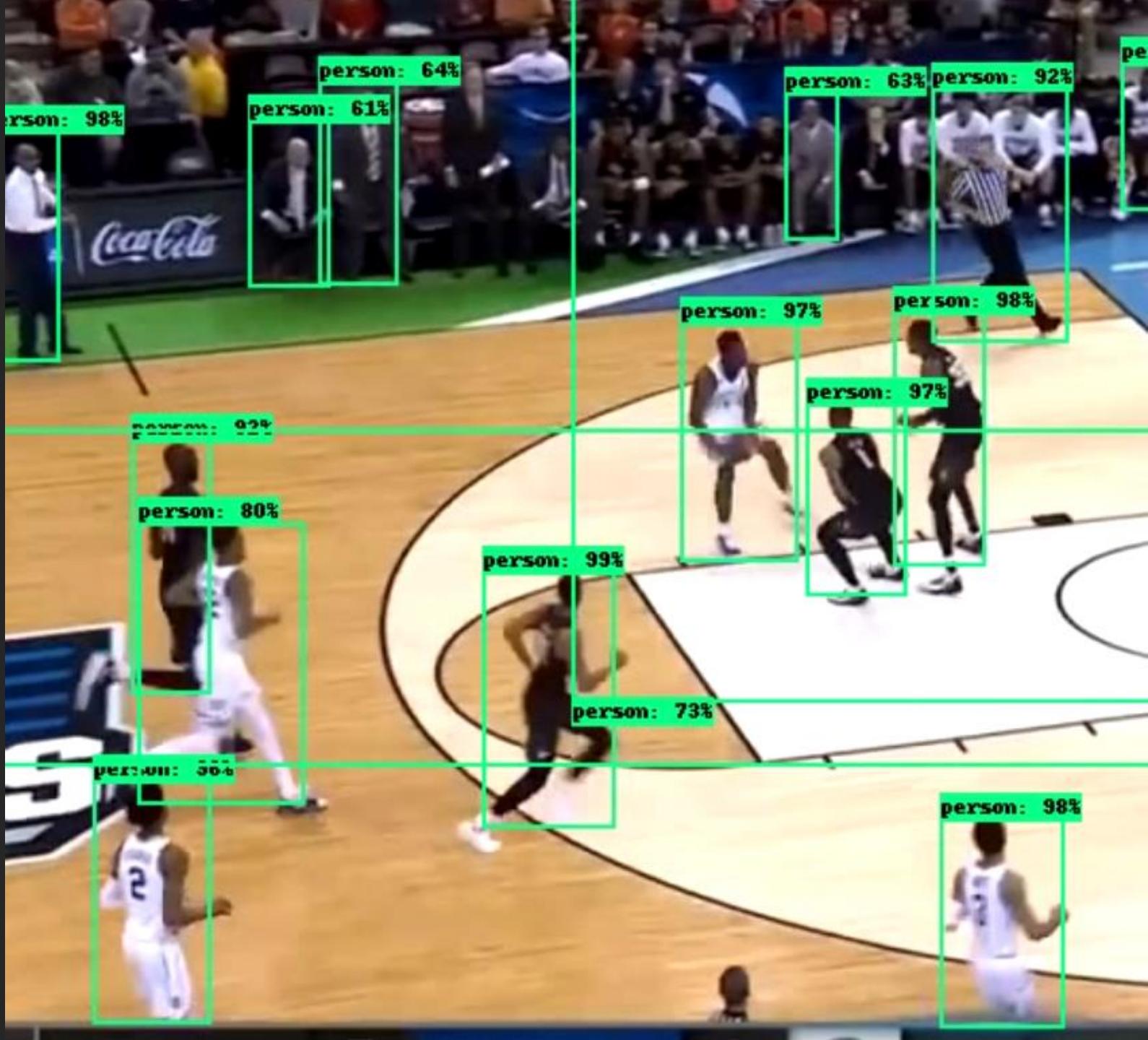
Comparing swing techniques to a professional example in real time by overlaying biomechanical traces.

Ben Todd

PLAYER TRACKER

CAM MASLIN

THE GOAL OF THIS PROJECT IS TO DETECT PLAYERS ON A SPORTS FIELD OR BASKETBALL COURT. THESE PLAYERS WILL THEN BE TRACKED.



Eye in the Sky

Cameron Bodger

Detect combat threats with an overhead drone, warn friendly soldiers of the direction of threat using heads up display in their helmet visor if rifle is pointed at them

View: top down

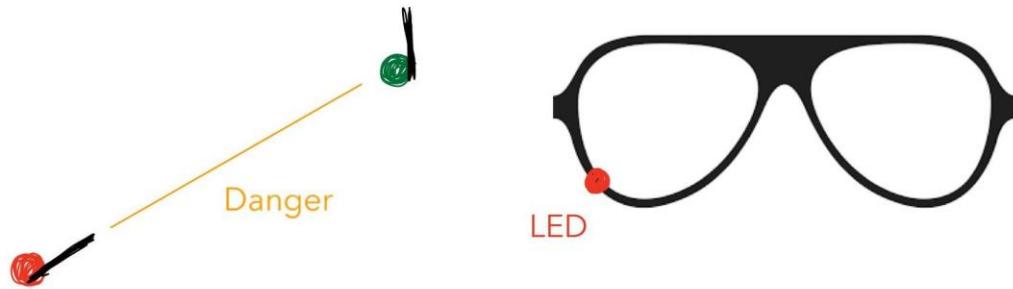
**Good
guy**



**Bad
Guy**

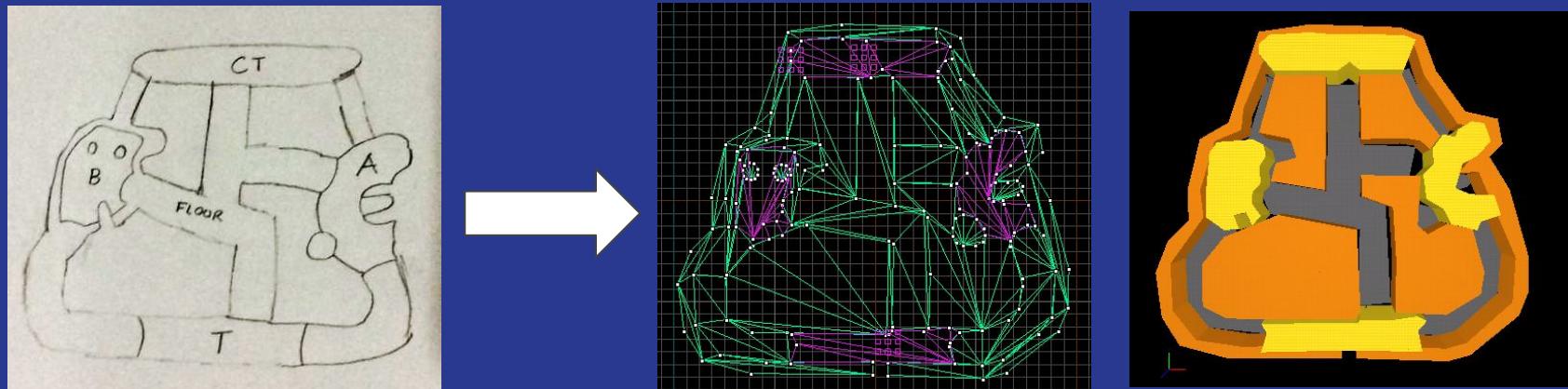


Gun



Automated Conversion of Sketches into Source Game Engine Maps

This project will automate the process of modelling a CS:GO map from a hand drawn layout, for faster prototyping



Cameron Stevenson



POSTURE POLICE

By Cheng-Yi Kok

The modern workspace requires millions of people to sit behind a desk for hours at a time. Posture police aims to monitor user's sitting posture and provide feedback to advocate proper office ergonomics

Automated Apple Counting and Age Estimation in Terraced Orchards

Christopher Holmes

Create a system capable of counting the number of apples on a tree while also estimating each apple's age. This system will vastly improve the accuracy of gross estimates and the speed at which they are made by orchard companies.



Perimeter Breach Detection

Christopher Tichborne

Using computer vision to detect breaches in perimeter security



HEAD ACCELERATION MONITORING FOR CONCUSSION IDENTIFICATION IN CONTACT SPORTS

Using object detection and motion tracking to identify large accelerations of the head. This could be implemented in professional contact sports as systematic concussion identification.



Dynamic Camera Extrinsics and Human Tracking

Connor Macdonald

Solve for camera extrinsics using
stepper motor precision* and track
humans in 3d environment.



* ± 0.05 deg $\approx \pm 1$ cm error at 10m

AUTONOMOUS DETECTION OF FACIAL TICS

Jack van Heugten Breurkes

Facial tics, also known as facial spasms, are a potential indicators of stress as well as other disorders such as Tourette's syndrome. Automatic detection of tics using computer vision will allow people to identify when they are displaying their tics, allowing them to suppress them in public situations such as video conferences and potentially use detection statistics to provide insights on potential triggers.



Detection of Synthesizer Knob and Patch Configurations

Liam Pribis

- Recording the patch locations and state of knobs to produce a given sound is tedious.
- Develop a CV application that recognises the angle of knobs and connection graph of patch points for easy reconstruction of a synthesizer ‘state’.



Settings/Configurations

Item	Value
VCO 1 Shape	Square
VCO 1 Pulse Width	30%
VCO 1 Octave	2
Low Pass Filter Cutoff	25%
Low Pass Filter Resonance	80%
High Pass Filter Cutoff	100%
High Pass Filter Resonance	0%
Portamento Amount	15%
Etc...	

Patch Bay Connection Matrix

Patch	A	B	C	D	...
A					
B					
C					
D					
...					

Identification of plants for navigation and removal using computer vision

Daniel Bowles

An autonomous robot will navigate through crops while identifying weed locations to be sprayed and killed whilst identifying the crops that are to be avoided.



DICE ORIENTATION IDENTIFICATION

[Daniel Davis](#)

The goal is to use low budget equipment to develop a system for identifying the value showing on dice.

The system should extend to multiple dice and different dice types.



Dog Bowl Reader

David Turton

Identifies a dog's food in its bowl and detects how much of the food it has eaten when compared to a starting value.





Driver Distraction Detection

Distracted drivers are one of the leading causes of accidents, the use of computer vision can detect when a driver is not paying attention to the road

Mark Gardyne

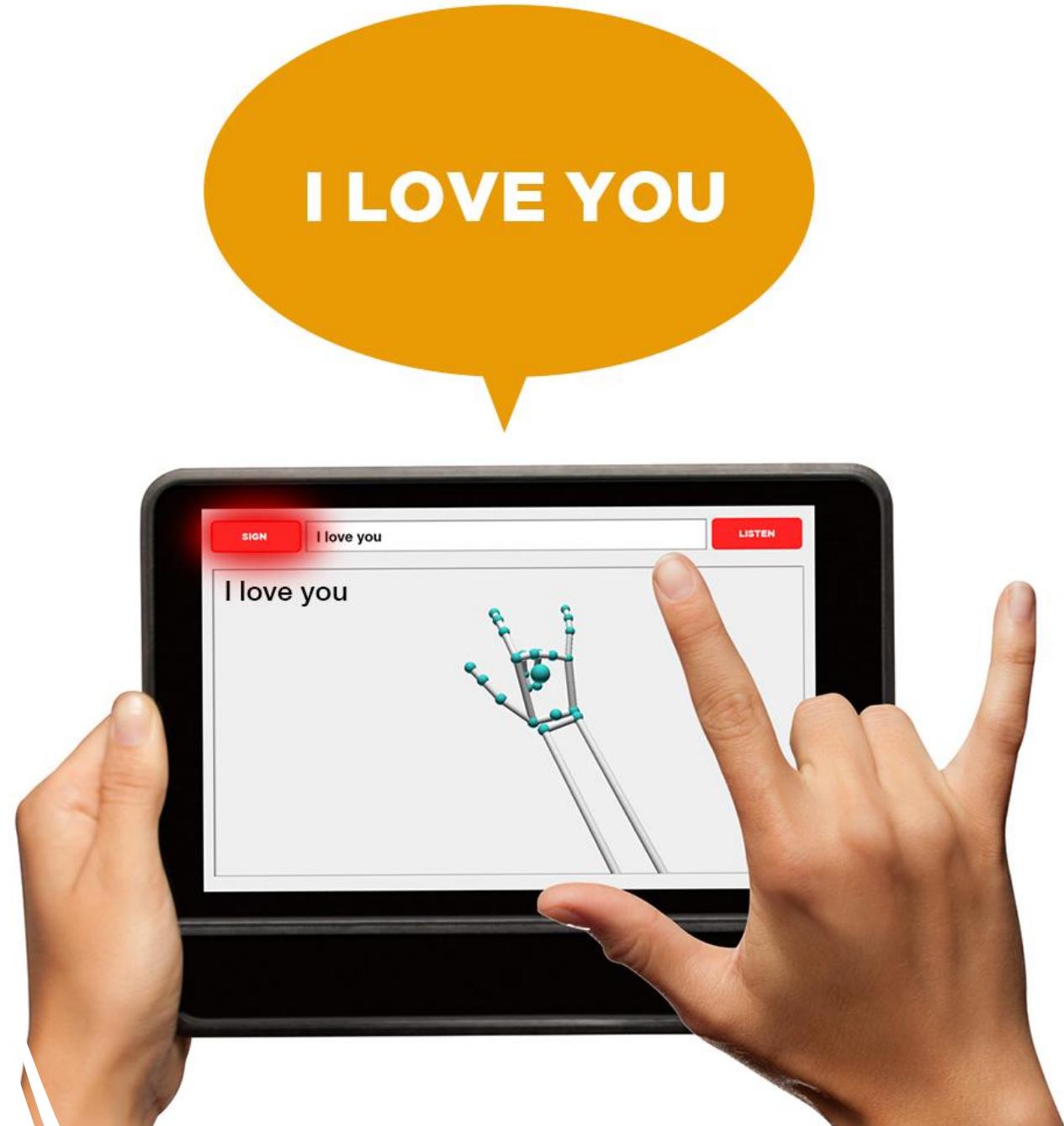


ASL translator

Recognize and translate hand gestures or sign language into text.



Duyen Bui





DRONE PATHFINDING

DYLAN PENLINGTON

A drone will navigate from point A to point B through some unknown obstacles.

Sleeping Motion Detector

- Author: Emol Bui
- Description: Create an application that detect the human motion when sleeping to find out any unusual movements that are dangerous



Engagement and productivity tracking via Gaze detection

- Use gaze detection to determine if student is actively looking at screen or distracted by a phone etc
- Useful for measuring how interesting work is or tracking productivity.
- Could be used in at home digital exams to automatically detect cheaters?
- Combine with object recognition to detect presence of distracting objects?

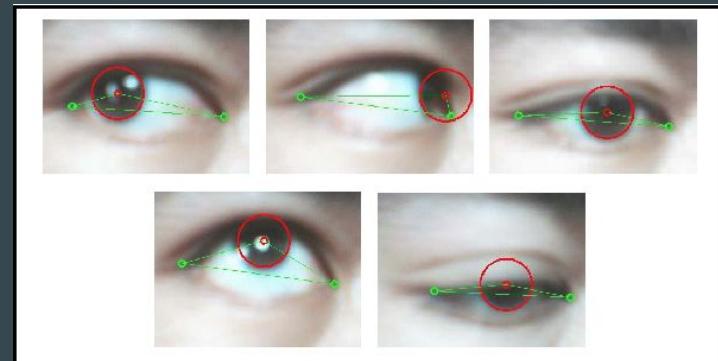
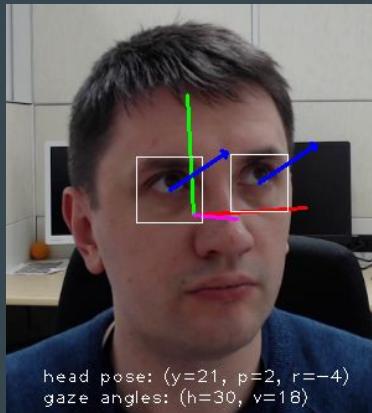


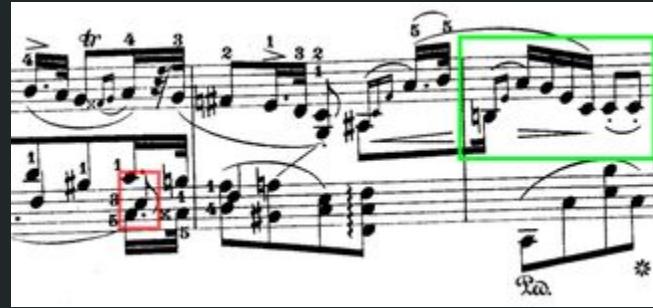
Figure 12. Results of the first experimental

Izaak Hoorens

Music Score Reader

Optical Music Recognition to
Capture Musical Notation in Documents

Euan Widjaja



Depth information without deep pockets



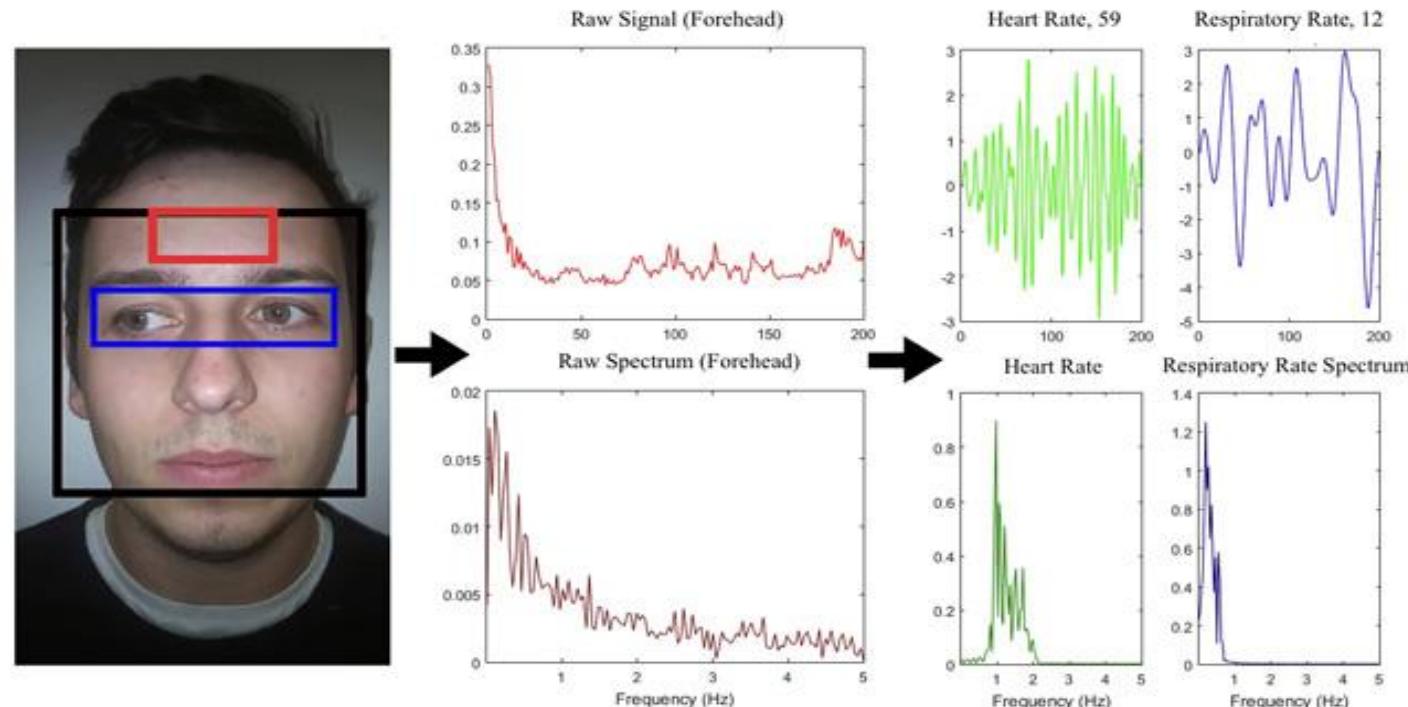
Using cheap webcams to retrieve accurate depth information.

Finn Bright

Webcam MD

Finn McCartney

- Webcam app that monitors vital signs (up to 15) while you work
- Uses this information to determine symptoms of a possible illness.
This will be done by checking a database of illnesses and associated symptoms





Fish Identification System (FISH)

Ryan Carter

A system to identify
different fish
species and
populations

MTB park user classification

Fletcher Walmsley

Overview:

Information such as the number of bikers, walkers, ebikers and horses in the park is incredibly useful to clubs that maintain the tracks

Method:

- Capture images of park users passing by a set point
- Use a differencing algorithm to create frames of the video in which a user is present
- Use the created frames and other reference images to train a deep learning model to identify a biker, walker, and horse
- Attempt to extenct the functionally to identify the difference between a normal bike and an ebike



Standard Bike



Electric Bike

Badminton Smash Technique Analysis and Shuttle Steepness Tracker

Gordon Lay

Side-on view of smash is used to capture data at key points (such as pelvis-thorax separation), as well as steepness of the shuttle trajectory.

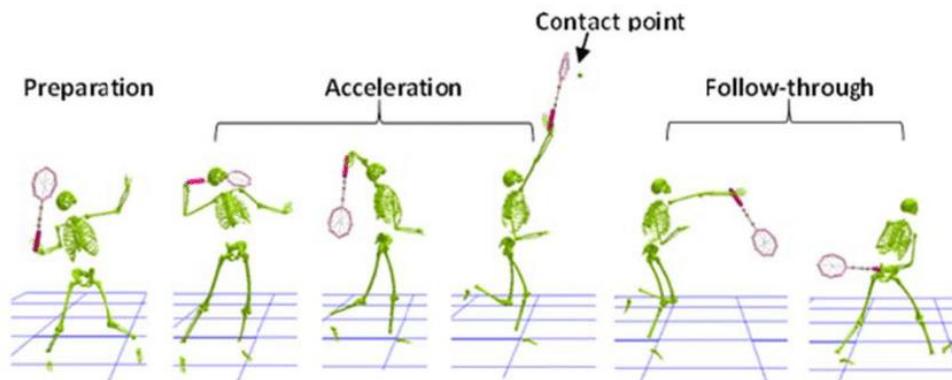
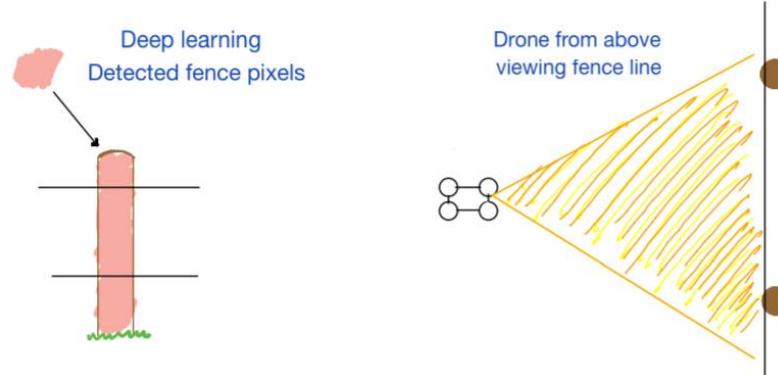
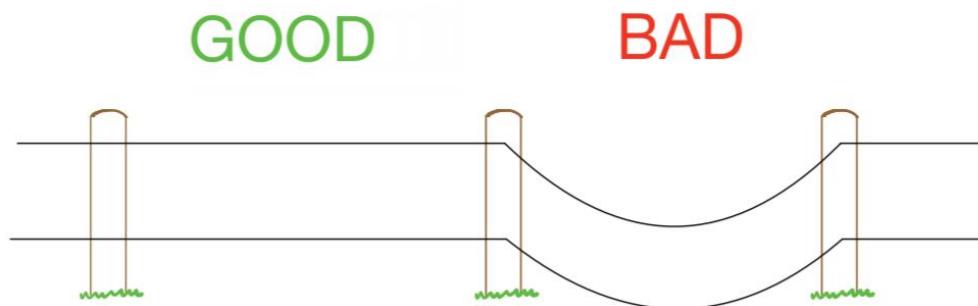


Image from "The Influence of X-Factor (Trunk Rotation) and Experience on the Quality of the Badminton Forehand Smash, 2016)

Detection of Hanging Fences

Grey Harris

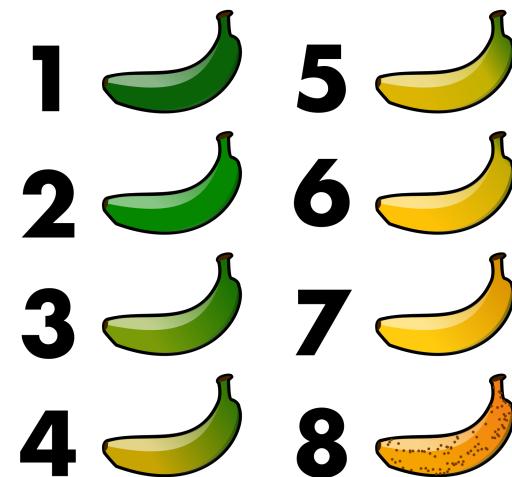
Hanging fences are very dangerous to horses and other large stock animals.
Being able to detect them early with a UAV before an animal hurts itself would be great.



Measure Banana Ripeness

I aim to use a series of computer vision and machine learning techniques to measure the ripeness of bananas from images.

Banana Color Chart



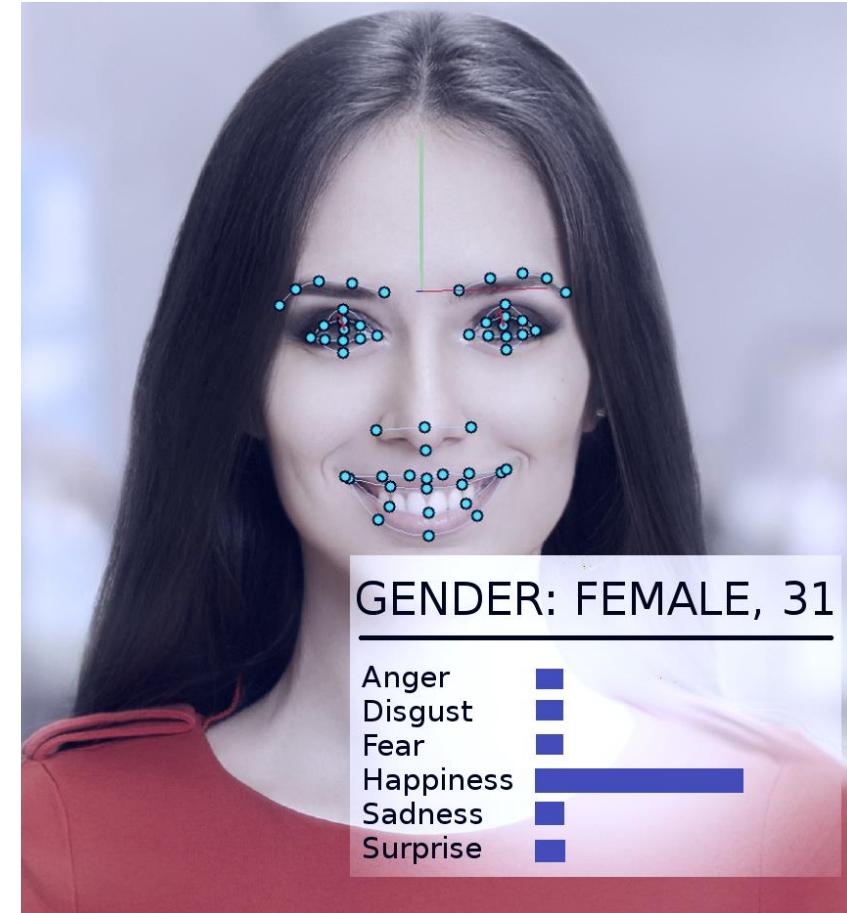
- 1 = Green
- 2 = Green with Trace of Yellow
- 3 = Most Green
- 4 = Green and Yellow
- 5 = Most Yellow
- 6 = Almost Yellow
- 7 = Yellow
- 8 = Yellow with Brown Flecks

Hamesh Ravji

Methods for detecting subtle expression changes

Hamish O'Keeffe

- The goal of this project is to develop a method of detecting subtle changes in a subjects expressions, preferably using a standard web camera.
- Having this ability on a standard web camera would be useful for hobbyists using face tracking, but having it on specialised hardware would still allow for professional face tracking uses

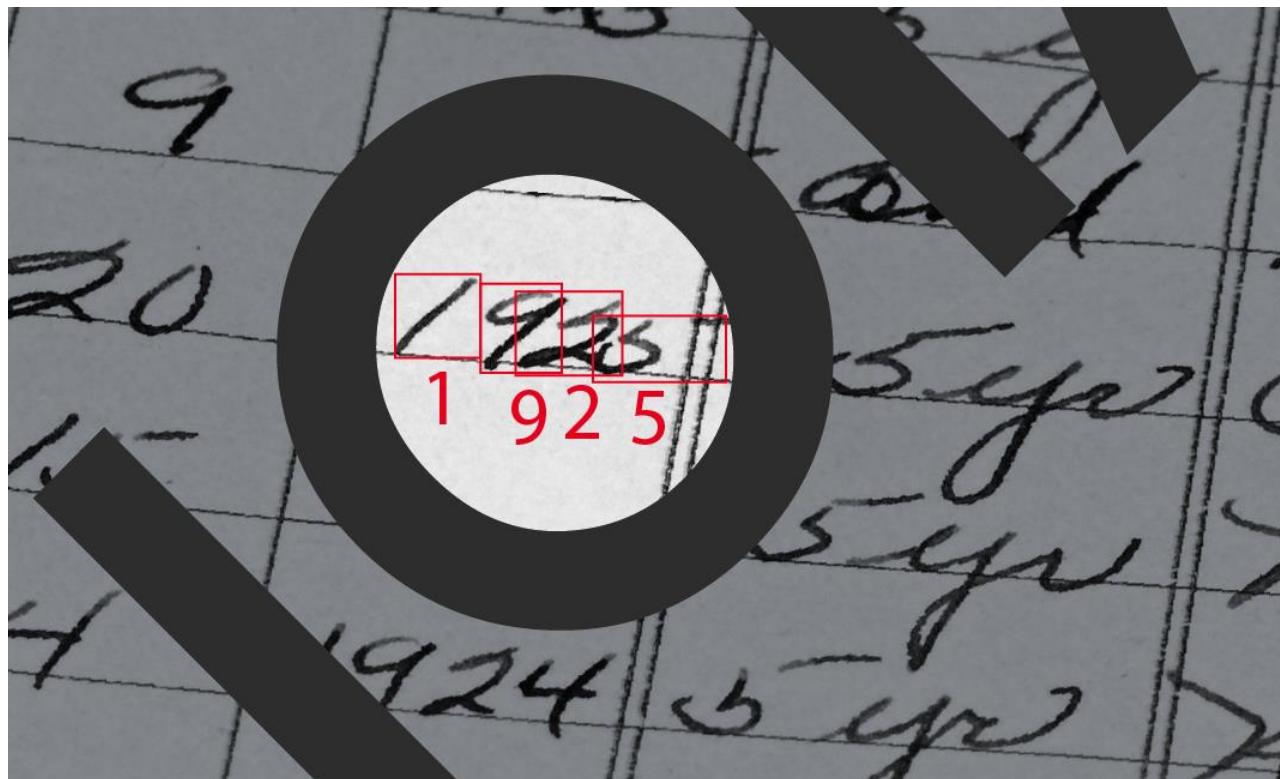


Abyssus, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons
Image does not show subtle expression changes

Handwriting Recognition

Zhehong Zhu

Recognize the handwriting notes and project on top of the pictures



COVID-19 Police

Hank Wu

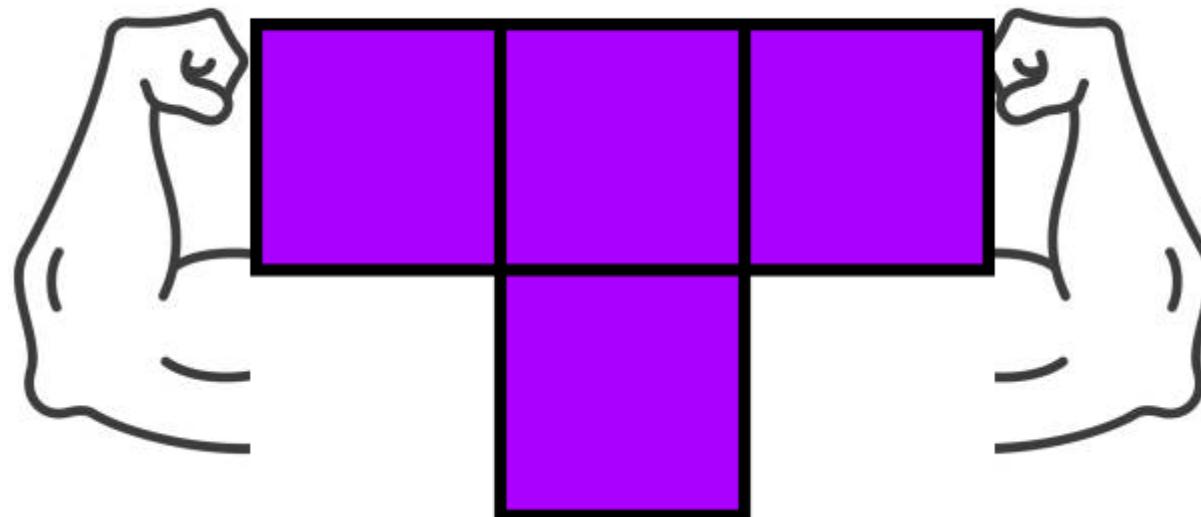
COVID-19 Police is a computer vision software keeping track of the crowd density, social distancing, and masks' presence. If the software detected any violation of the rules, it should give warnings to the people.



Using Poses to Control a Game of Tetris

Henry Hickman

This project aims to control a game of classic Tetris (NES) using 5 different body poses, one for each required action.



Card Counting using Machine Learning

Application of machine learning techniques (Label Studio) to recognize and count playing cards.

Key stages:

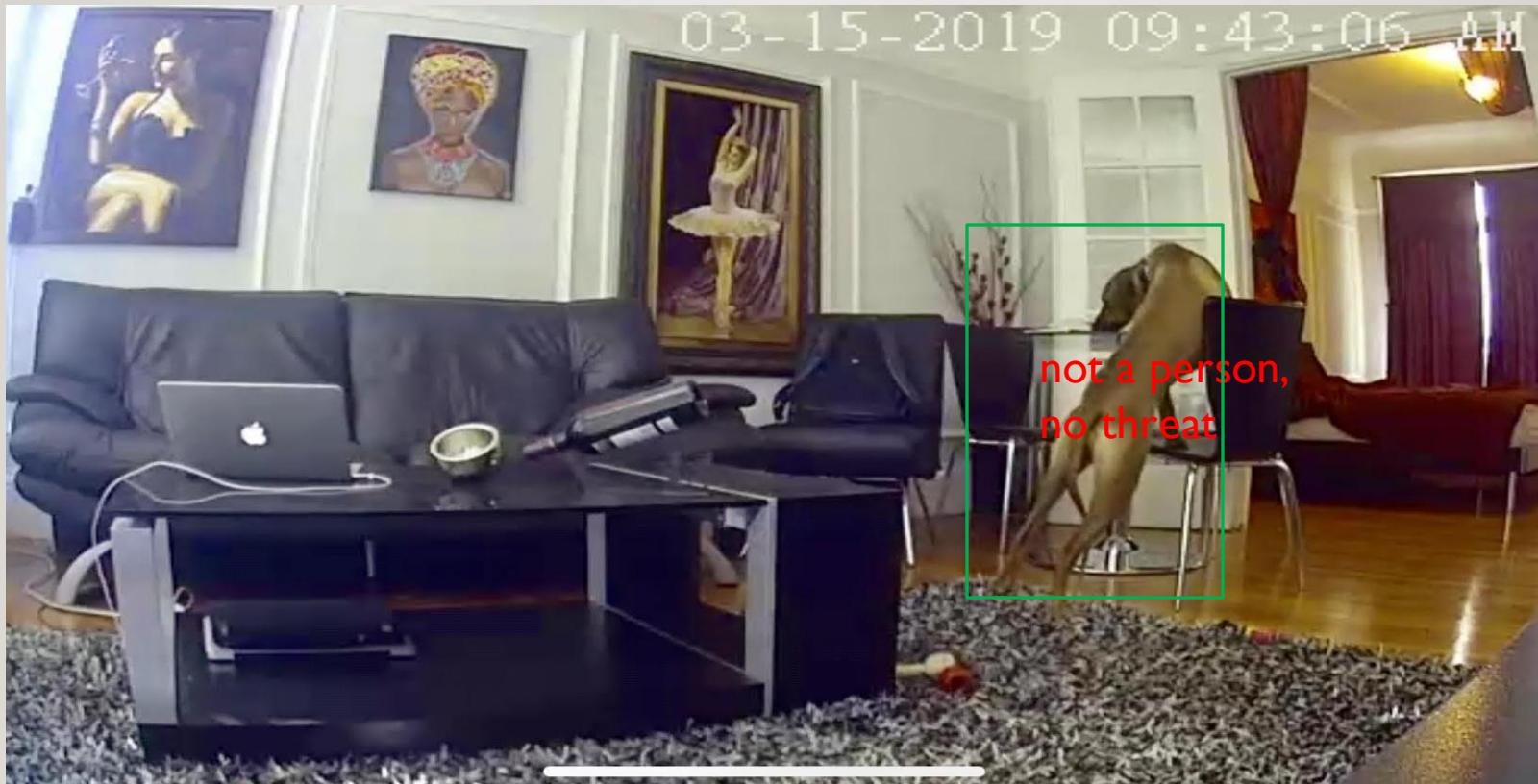
1. Detection of numbers and suit patterns.
2. Interpretation of patterns to identify cards.
3. Practical application to card counting or common games (e.g. poker)



22. PET / HUMAN CATEGORIZATION

IVAN VAN NIEKERK

GOAL: CREATE A SECURITY SYSTEM THAT CAN DETECT WHETHER THE DETECTED OBJECT SHOULD BE SETTING OF THE ALARM.



Computer Science Field Guide

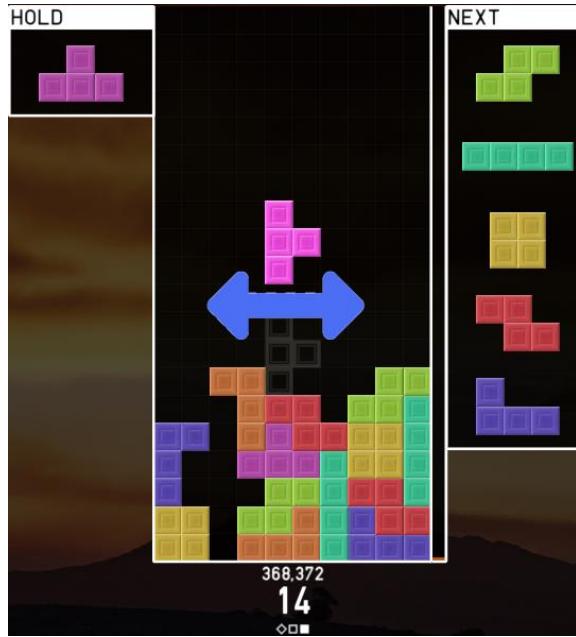
Teaching Computer Vision to High School Students

Jackie Qiu



Revamping the Computer Vision chapter of the CSFG. Possibilities include ensuring the chapter runs in any browser or tablet, and integrating interactivities using the webcam to make it more engaging.

Tetris Using Hand Gestures



Play tetris by using a series of hand gestures to control the movement of the blocks.

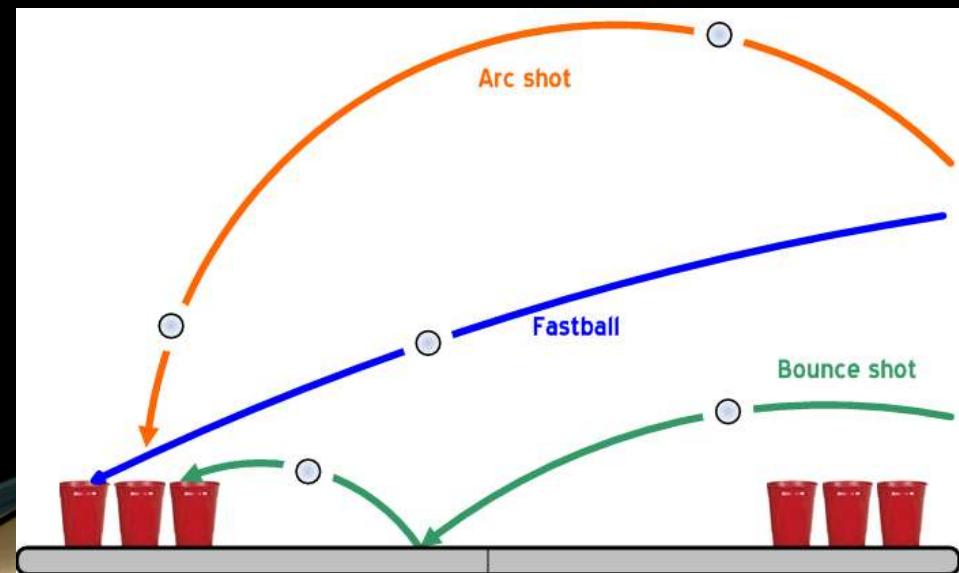
ANALYSING AND PREDICTING SHOT TRAJECTORIES IN BEER PONG GAMES

Jamie Houghton

The classic drinking game gets Nerdified.

This project has two sub-goals:

- Track both the player's hand and ball trajectory for both successful and unsuccessful shots
- Predict shot trajectory prior to ball release

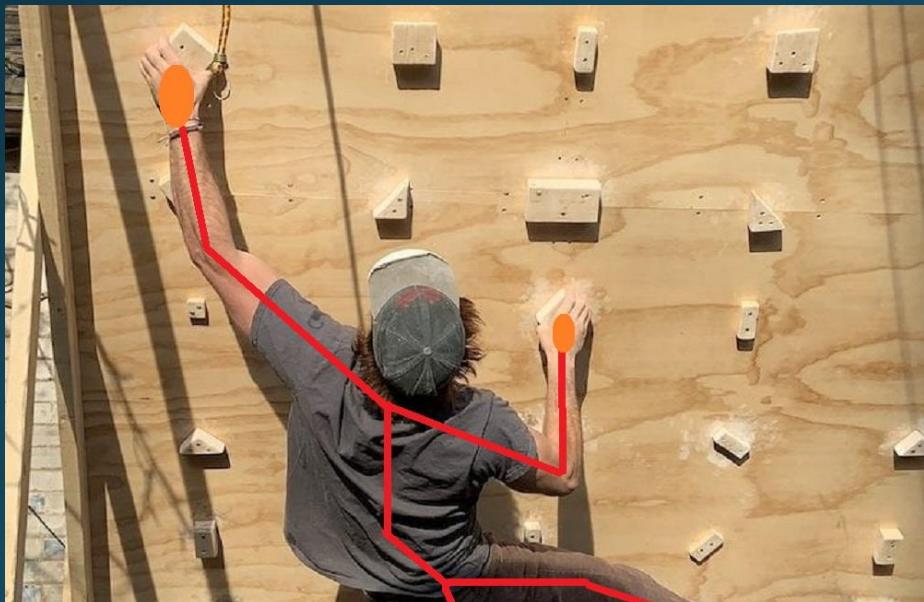


Climber movement tracking and prediction

Jessica Page

- The goal of this project is to track a rock climbers' movements on a vertical wall with the goal of overlaying a prediction of the next move in the sequence

A rather rough example of what this may look like:





Facial Detection of Wearing Mask

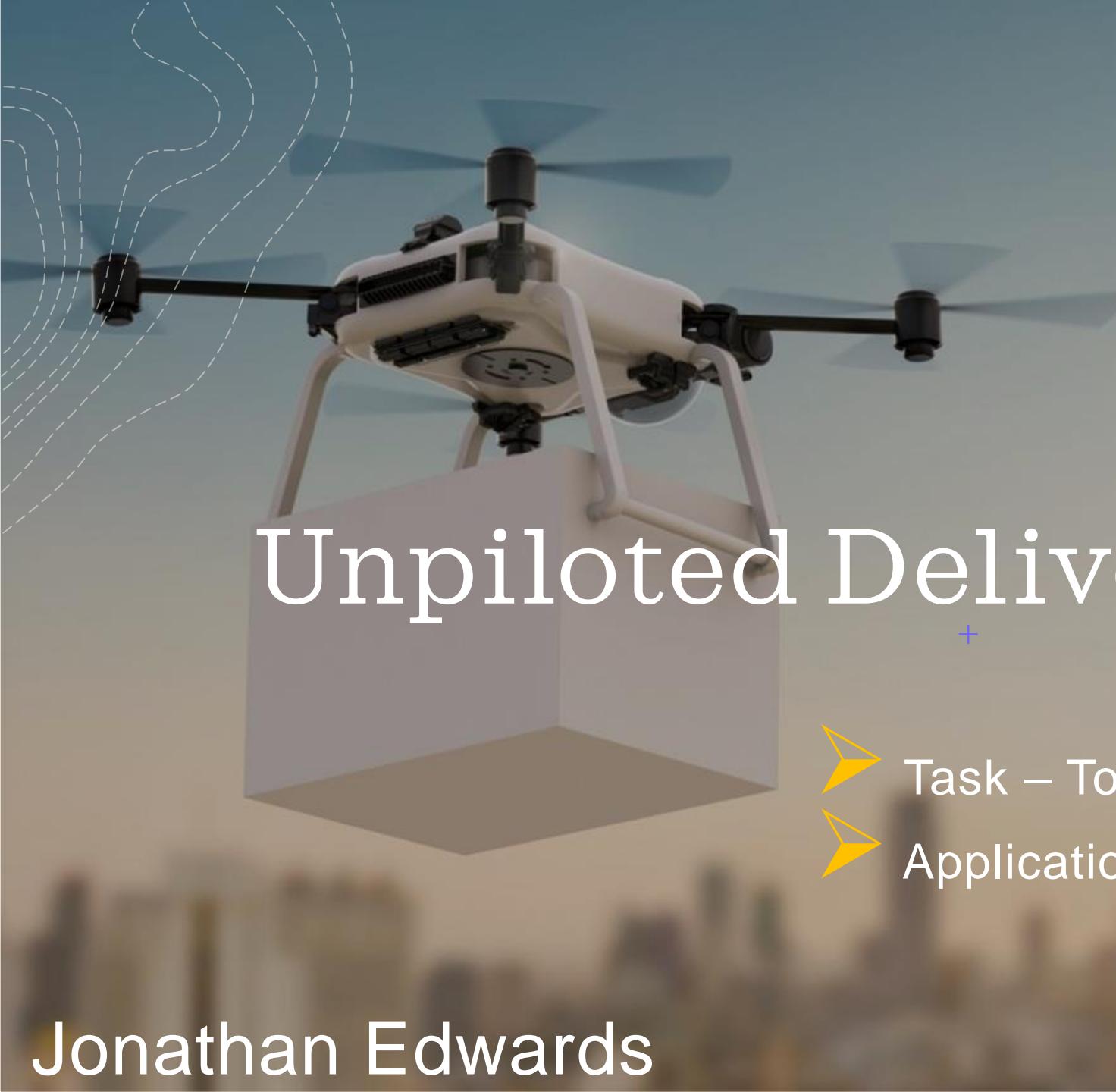
Jiaxing Peng 72519605

This facial detection can remind bus driver when passenger is not wearing the mask.

Dance Teaching Tool with Body Movement Tracking

An application to teach the user choreographies while also giving feedback regarding positions and angles





Unpiloted Delivery Drone

+



- Task – To deliver a parcel from point A to B
- Application – Quicker Delivery Service

Jonathan Edwards

Mask detection using a camera

Joshua Roberts



Software which is able to detect the presence of a face covering will be useful especially in a COVID-19 environment. For example, it could be used in conjunction with a security camera to prevent building access to people who are not wearing a face covering.

RECOGNITION OF 3D PRINT FAILURE

Julia Harrison

When 3D printing, there is the possibility for the print to go wrong, such as when an overhang collapses. This project aims to enable the automatic cancellation of a 3D print in the event the printed model deviates (with some tolerance) from the digital model.

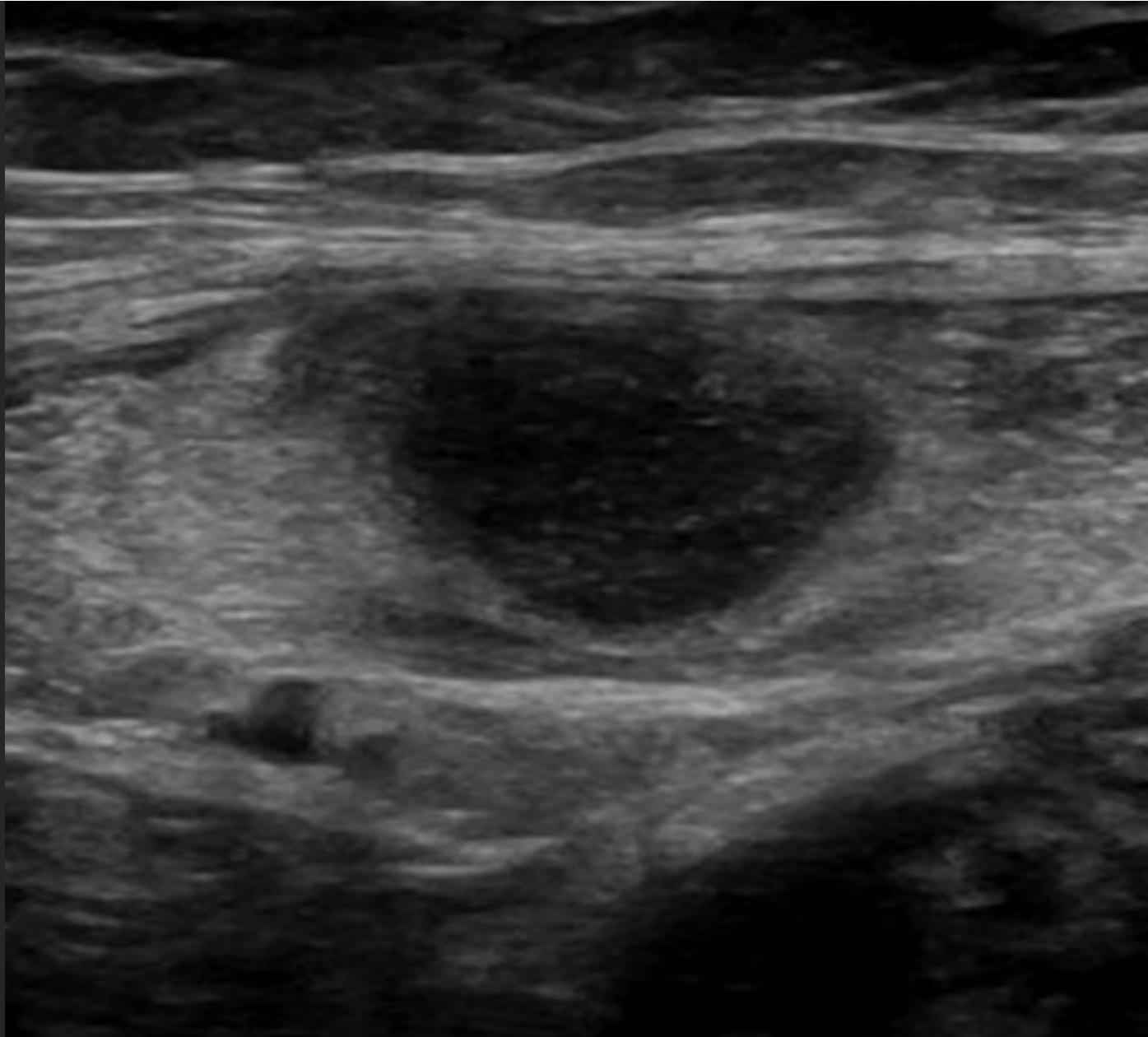


Image from: <https://www.pledgeme.co.nz/projects/5758-plastic-waste-3d-printer-filament-machine>

DETECTION OF MUSCLE MOVEMENT.

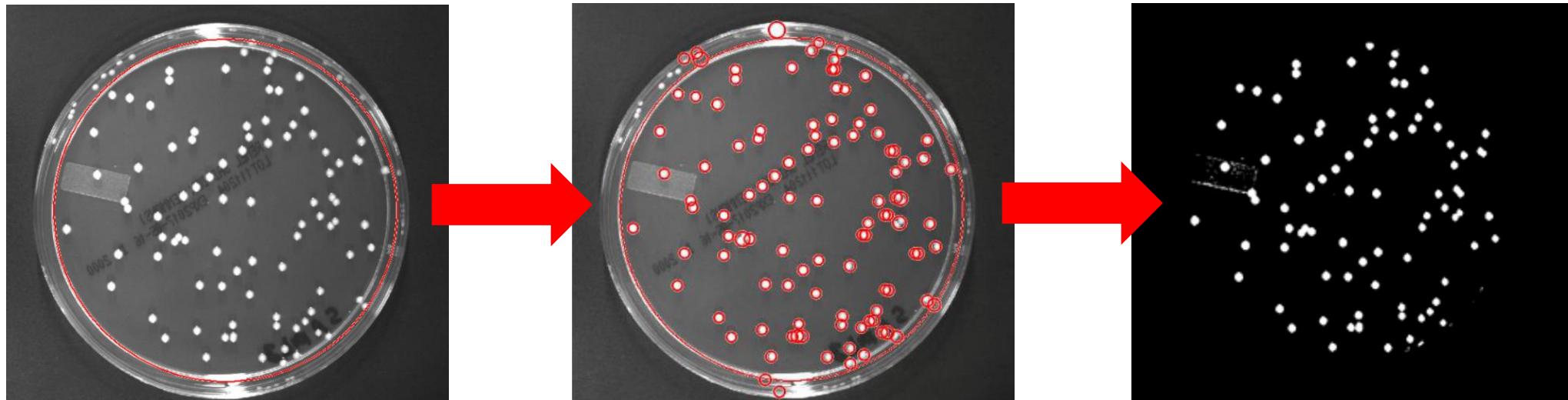
USING ULTRASOUND IMAGING TO
CALCULATE THE MUSCLE TENSION OR
COMPRESSION DISPLACEMENT.

KALEB MCGILLIVRAY-SEATON



Automated Bacterial Colony Counting and Classification

Kayle Ransby



Count the number of bacterial colonies present on an agar plate.
Suggest the species of a given bacteria based on its color.

Interactive Sign Language Lessons Using Image Recognition

Very few applications exist to teach sign language as the programs have difficulty visually seeing which hand movements the user is making

To fill this gap in the market, a program will be designed which will ask the user to translate a written sentence into sign language.

Image recognition will then be used to check the user is translating the sentence correctly.

Laurence McKnight



CLIMBING POSE DETECTION

Liam MacDonald

Using a neural network to track and classify
different movements while climbing



Dice side detection

Comparison between CNN and pip counting algorithm approaches

Lorenzo Fasano



Skateboard Tracker

Capture the orientation of a skateboard through tricks and recreate a 3d model of the skateboard.



Louis Colville

Beer-Pressure, no Pong intended

Lucas Imrie

Sick of losing track of the score in your game? Sick of your mate putting his elbows over the table when he shoots?

This movement tracking algorithm will solve these problems as it tracks the path of the ball and players elbow position relative to the table, ensuring a fair game with rightful bragging rights.

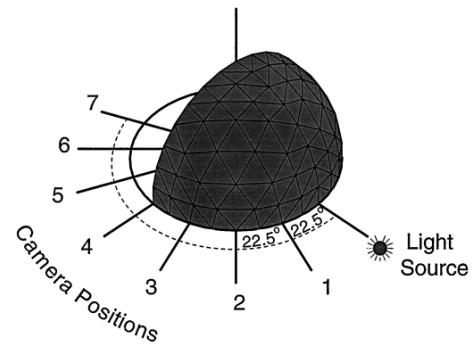
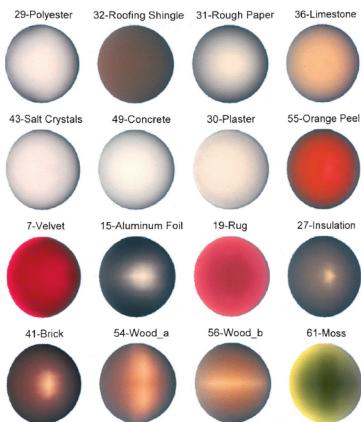


Capturing surface properties for image-based rendering

Lucas Payne

In “Reflectance and texture of real world surfaces”, by Kristin J. Dana et al, a database of texture BTFs (bi-directional texture functions) is created for common materials, formed from a large number of images of a small patch taken at all geometrically meaningful combinations of lighting and viewing directions. I would like to form a workflow for capturing such data-sets and visualizing the results in a renderer.

(see <https://www.cs.columbia.edu/CAVE/software/curet/>. Pictures from the ref'd paper.)



Portrait Drawing Construction

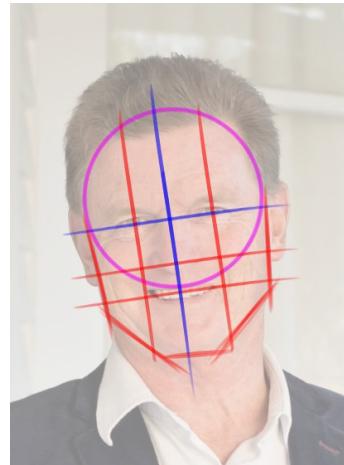
Given a reference portrait photo, generate and overlay the **basic construction lines** that can be used as a guide to drawing a person's portrait.

Step 1

Get the reference image



Step 2 Draw the **construction lines**



Step 3

Finish
the drawing*

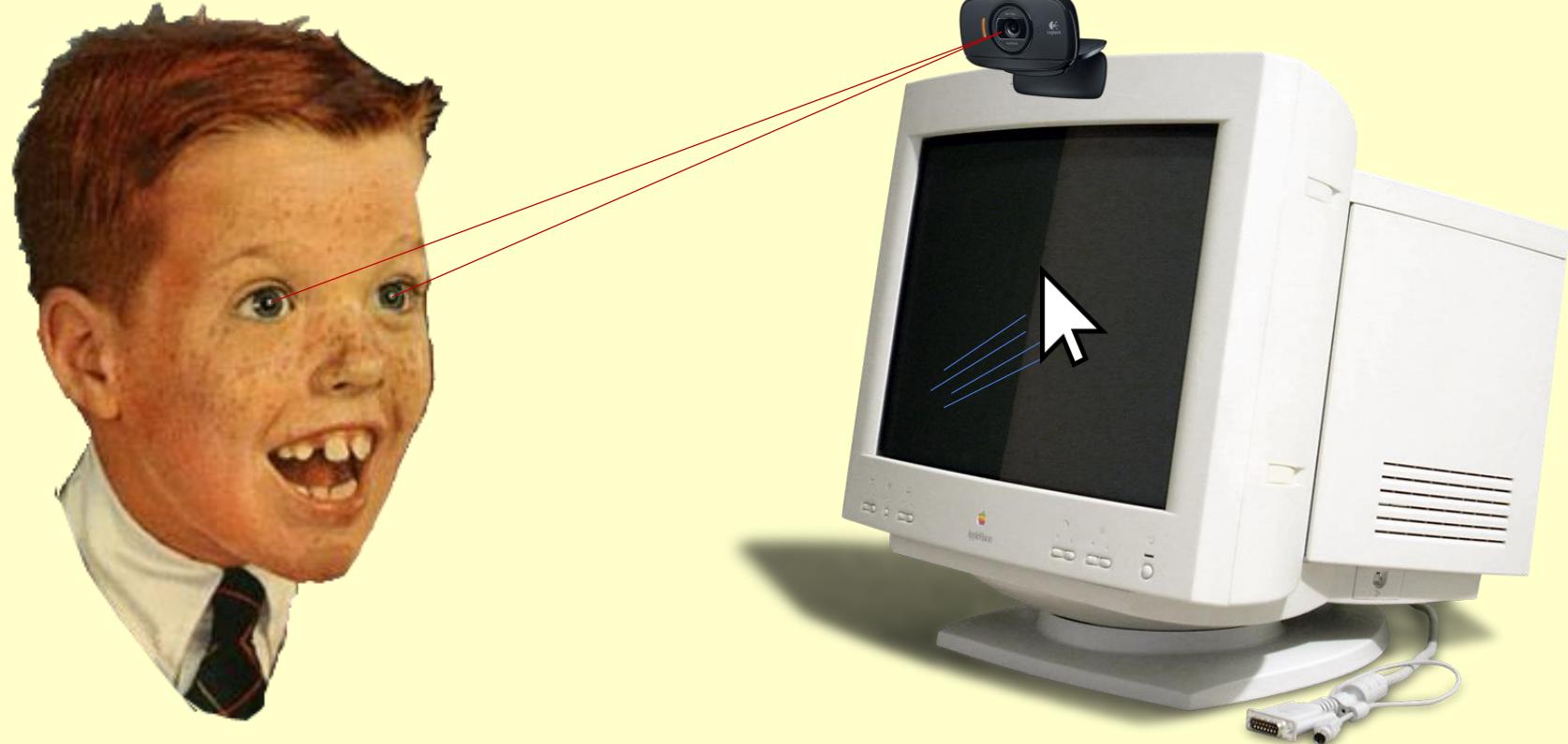


MARCUS LEE
17213804

Eye tracking mouse

TIRED OF MOVING YOUR HANDS? JUST LOOK AT
WHERE YOU WANT TO CLICK!

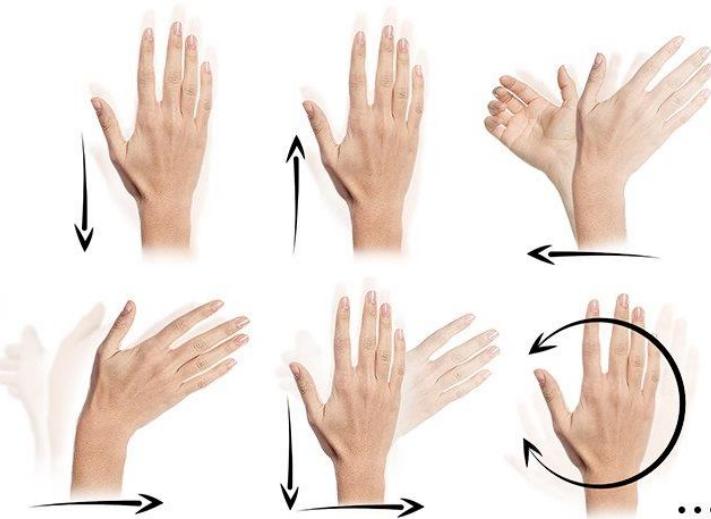
"LOOK
MA, NO
HANDS!"



VERTICAL LANDING

Martin Cruz

COMPUTER VISION THRUST VECTOR CONTROL
IMPLEMENTATION FOR PROPULSIVE VERTICAL
LANDING.



Gesture Recognition & Control

Matthew Bertschinger – 28849205

Develop a gesture recognition program that can convert human gesture to a computer action, to be implemented in a smart mirror, or similar interface. The goal is that some control can be added to a normal screen without requiring external hardware (e.g., a mouse or keyboard), or needing it to be an expensive touch screen.





SCORING DARTS

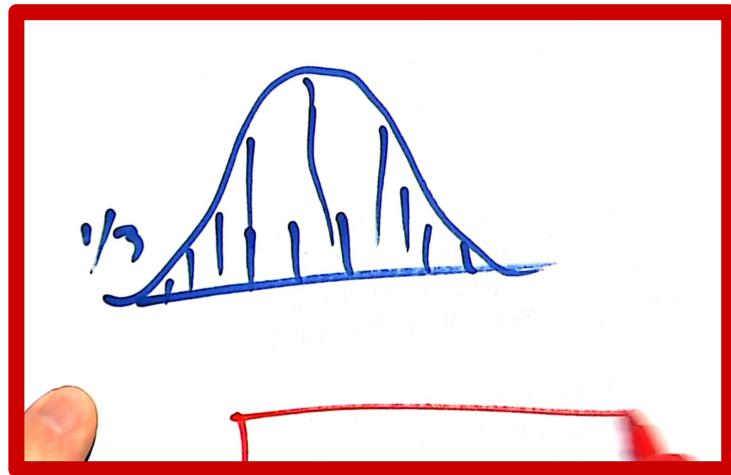
MATT KELLY

- USING COMPUTER VISION TO ACCURATELY AND RELIABLY RECORD THE SCORE OF A DART PLAYER, UPDATING THROUGHOUT THE GAME.

Document camera hand identification



—



Give the lecturer a warning when they start writing on the screen.

— Max Young

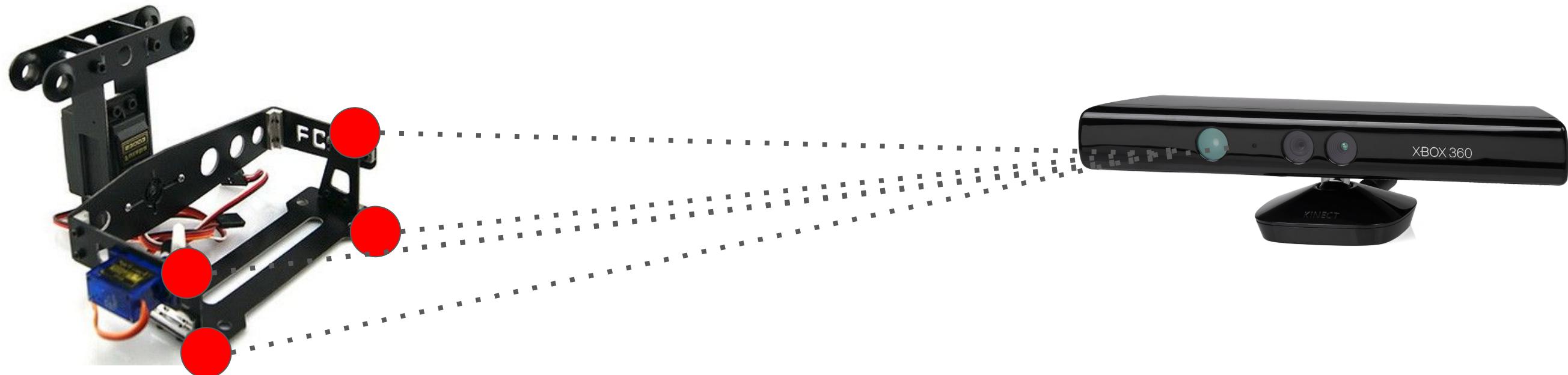
A wide-angle photograph of a coastal scene. In the foreground, several small waves break towards the shore. A person is standing in the water near the shore. In the middle ground, a surfer is riding a wave on a white surfboard. Another person is visible in the water further out. The background shows a hilly coastline under a clear sky.

Micaela Cooper

Surfcam Analysis

CALCULATING WAVE PERIOD AND SWELL
HEIGHT FROM LIVE SURFCAM FOOTAGE.

Gimbal Stabiliser using Xbox Kinect



Stabilise a handheld gimbal using tracking points and/or fiducial markers. Use the camera distance data to help.



Face mask detection

Mitchell Freeman

Automated detection of whether someone is wearing a face mask to allow/deny entry into facilities.

Skill recognition from continuous movement



Straight right punch.

Using continuous movement from fighting identify and segment individual skills.

Oisin Roberts.

Utilising a UAV to map ocean pollution

Oliver Dale

The aim of this project is to detect floating pollution along coastlines and in local rivers. By recording the GPS coordinates, the pollution can be mapped and modelled virtually.



Volume Estimation of Arbitrary Bottle Shapes

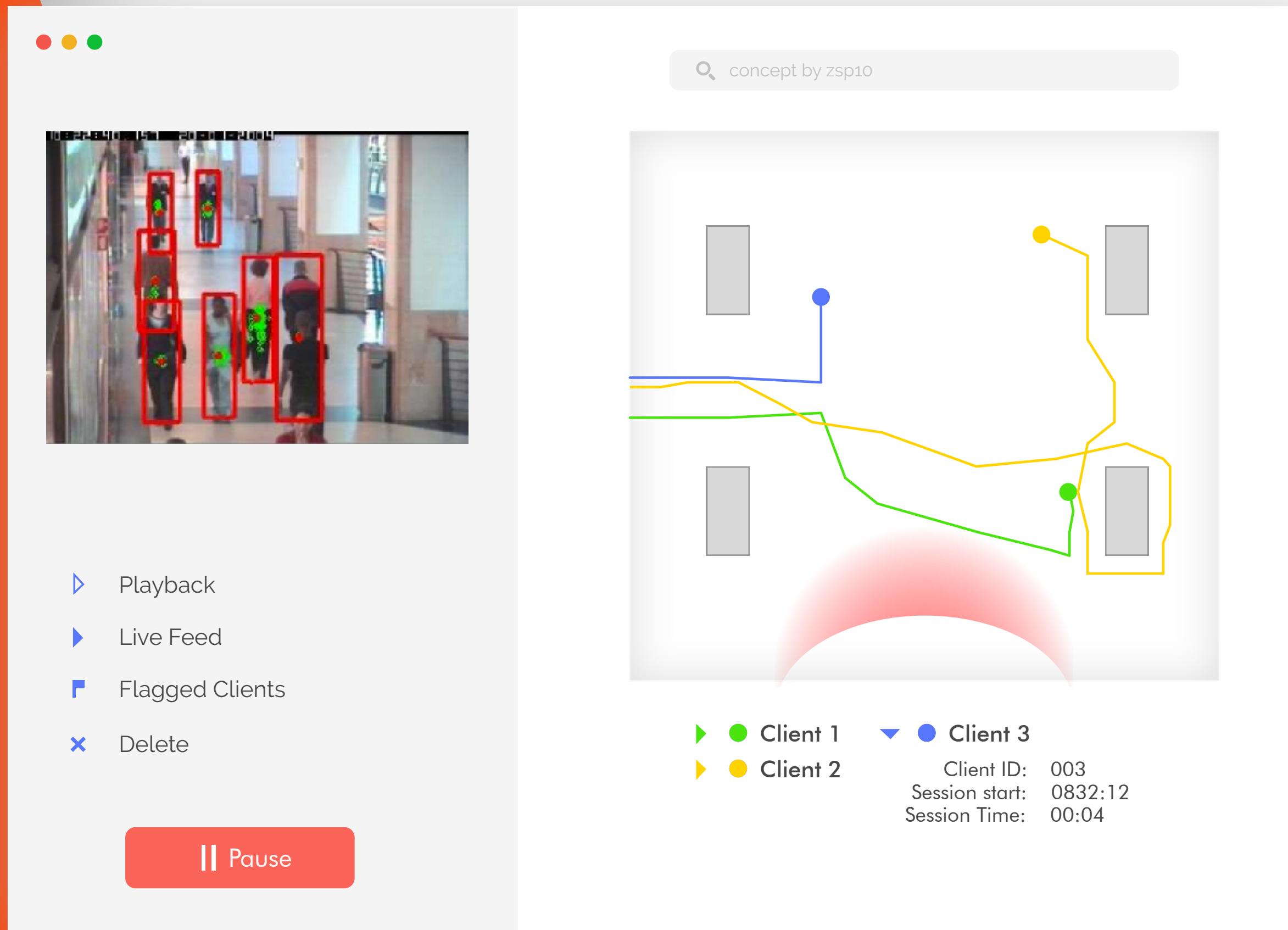
Oscar Holmes

Estimating the external volume and shape of glass bottles using 2-3 photographs.



Indoor Patron Path Tracking

Interpolation of HOG Centroid Mapping

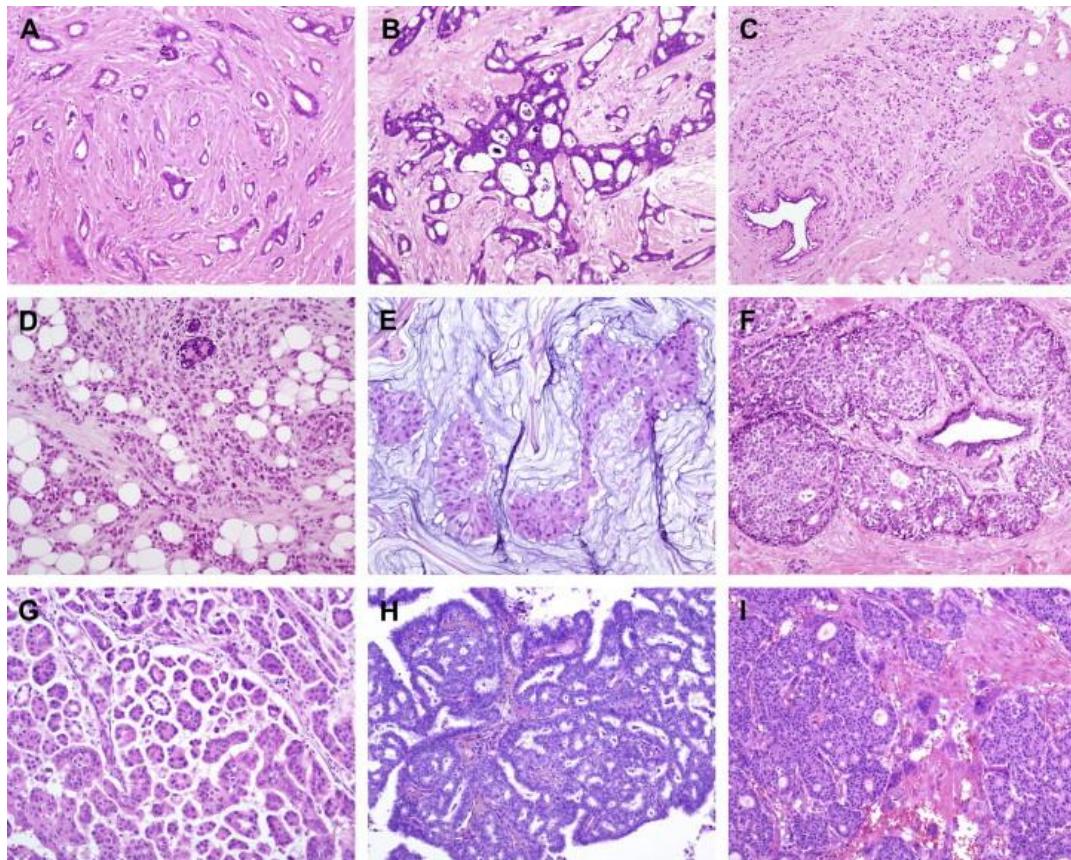


Interpolation of identified patrons onto an associated floorspace. Session-based surveillance for retail and incident-response based applications

- ① **Human Detection**
Train stock HOG & Linear SVM for client identification in unobstructed room then implement Non-Max Suppression
- ② **Session Tracking**
Implement Re-ID and correlation tracking to maintain sessions with disruptions (obscured body, moves out of frame)
- ③ **Room Localisation**
Calibrate the feed to an associated floorpan and interpolate client centroids onto this in a GUI

Breast Cancer Detection

- Using Convolutional Neural Networks for diagnosis of breast cancer on histopathological images.

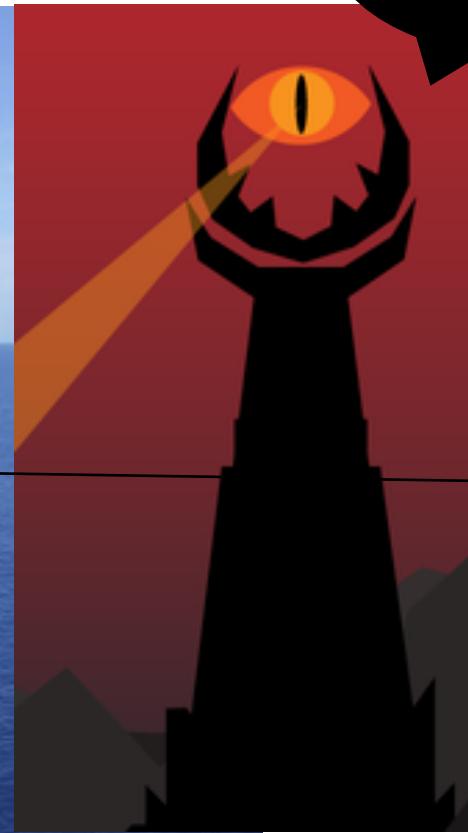


Raymond Liu

Eye of Sauron-Soteria

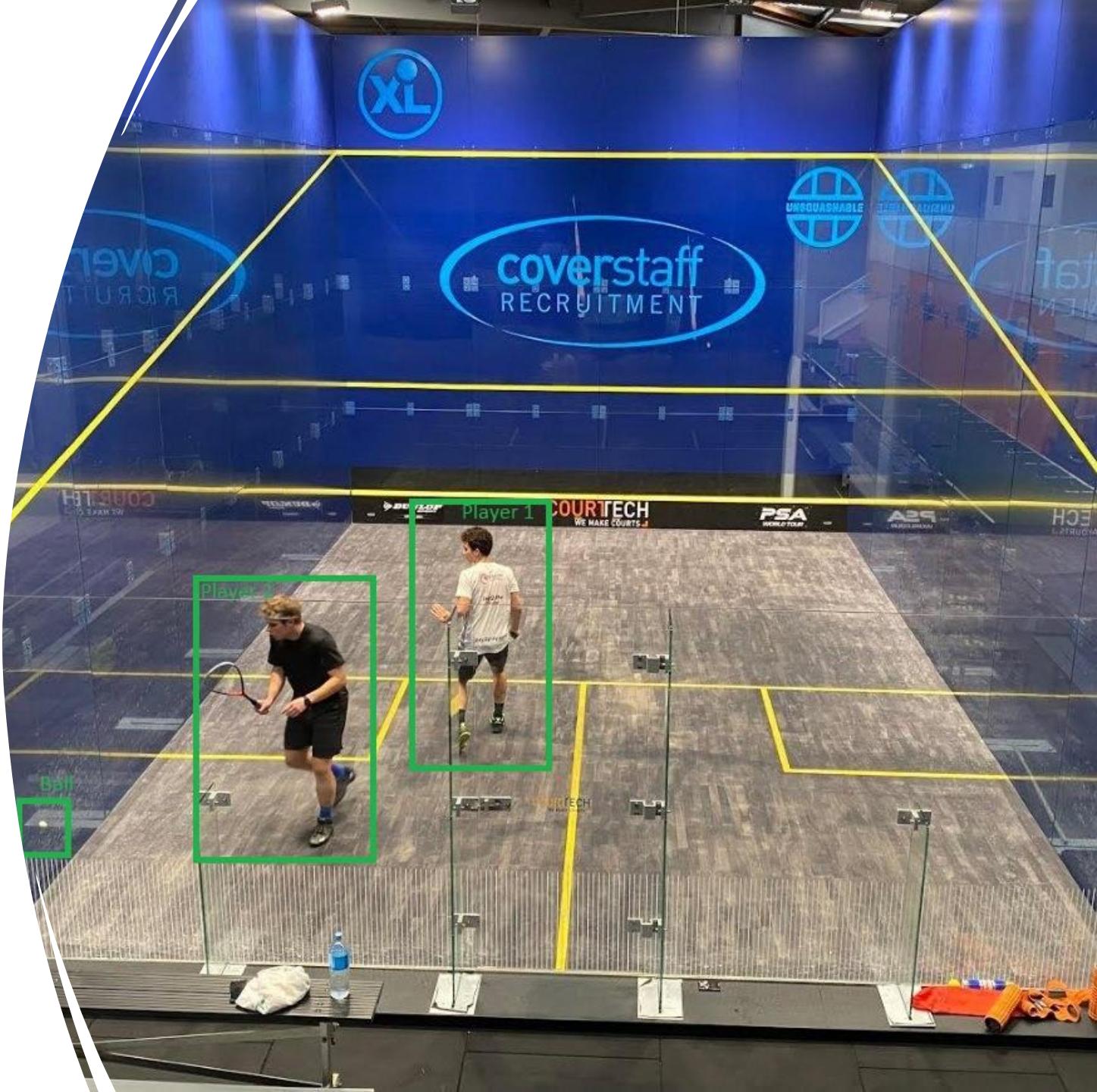
(Greek Goddess of safety and salvation)

Assists in search and rescue operations at sea.



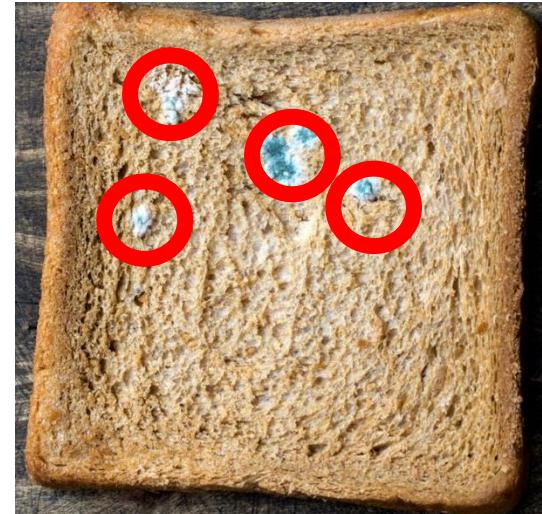
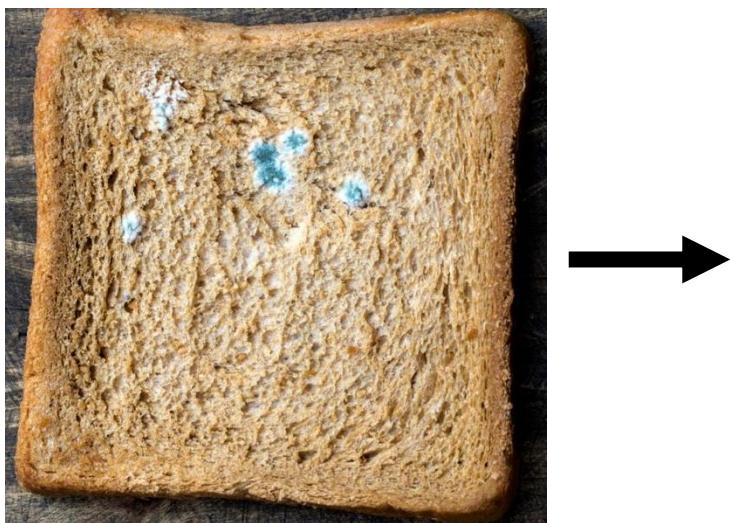
Tracking a squash ball and squash players for analytics – Rhys Jennings

- Using computer vision, I plan to track squash players and a squash ball through a match / rally. This will allow us to produce analytics about the players' game, such as movement around the court and common places on the front wall the players hit.



Bread Mold Detector

Richard Vong



Mold Detected: 87%

Aim is to use computer vision to detect if bread has grown mold

Tracking Mouth Movement for Virtual Reality

Ridge Nairn

Analysing real-time video to track mouth movements, which could then be mapped to a virtual avatar to improve verbal and non-verbal communication



Limb Tracking to Determine Force Distribution in Rock Climbing Applications

The relative position of a climber's limbs and centre of mass need to be found to track the force applied to each hold. This project aims to track the limbs of a climber and identify climbing holds.



Golf Swing Analysis Using Pose Estimation

Ryan Beaumont

Using pose estimation to compare
the golf swing of an amateur golfer
to a professional.



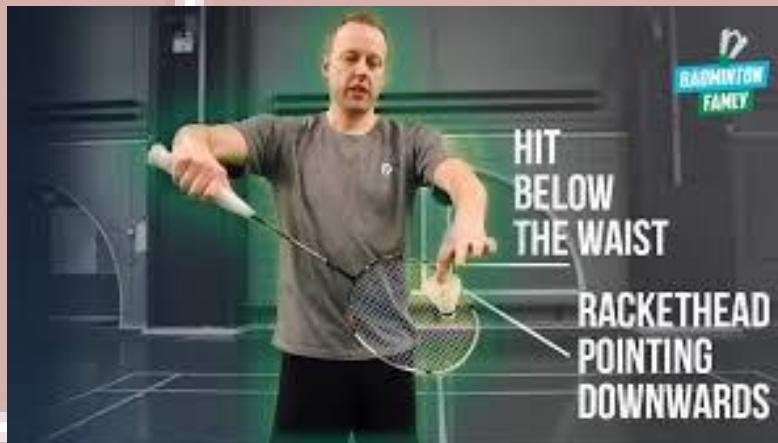
Pool shot tracking

An interactive real time display showing the predicted path of the white ball using the relative position of the cue to the white ball.



Photo sourced from <https://www.youtube.com/watch?v=zSht0bvtSw8>

Automating Service Fault Calls in Badminton



This project will aim to use computer vision to determine service faults in badminton.

Sam Loan

Seed Identification

Sam Marshall

This aim of this project is to correctly identify different seeds from commonly grown arable crops.



Barley

Rice

Buckwheat

Corn

Rye

Spelt

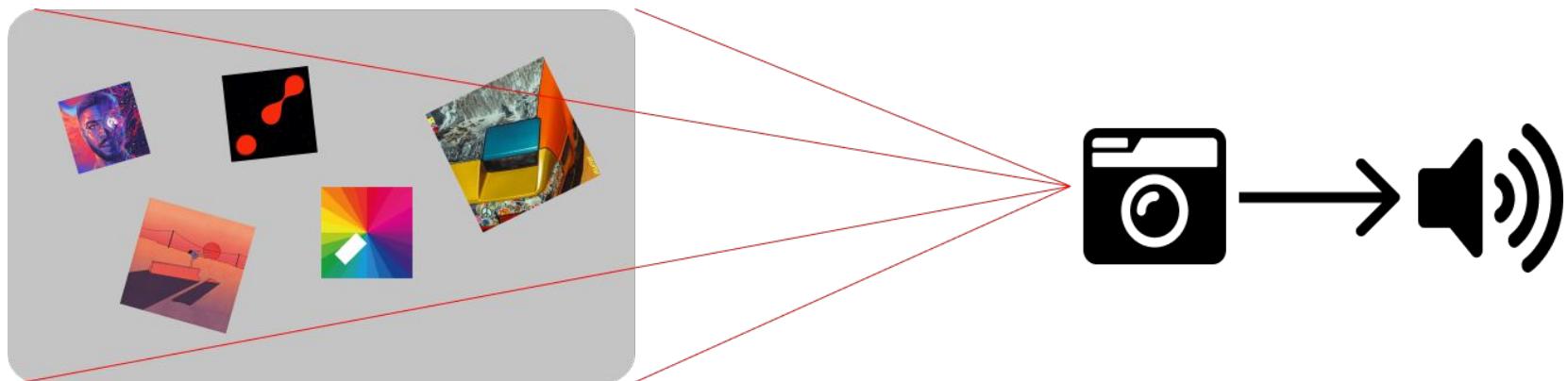
Oats

Wheat

Scanning and Playing Music from Cover Art

The aim is to be able to scan an image of an album cover, whether that's from a picture, cd, vinyl, or on another devices screen, and automatically play the album.

Extended goal is to make it so if you have multiple albums in view, it will shuffle play from all of them.



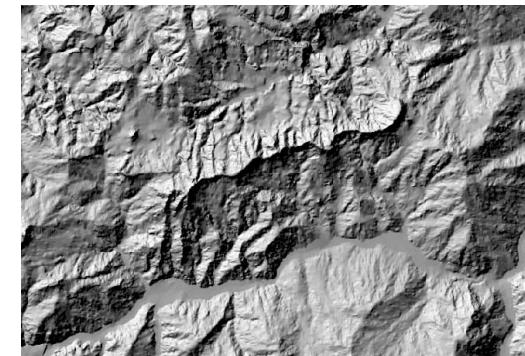
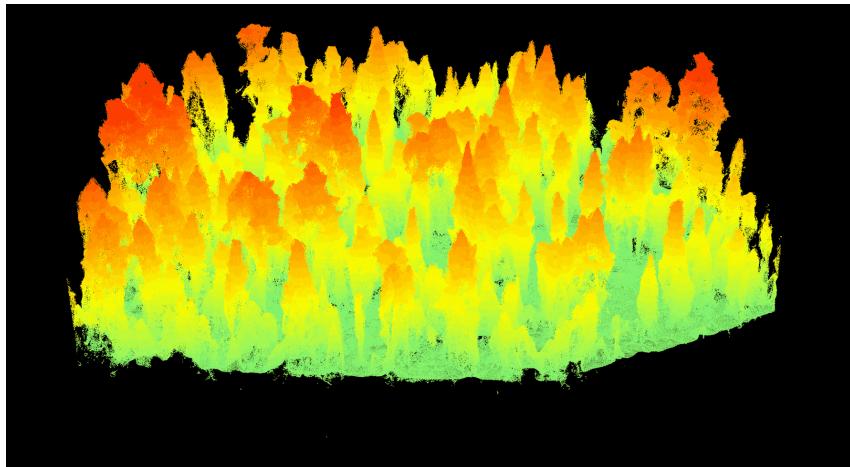
Newly Logged Forest Height Measurement from Drone



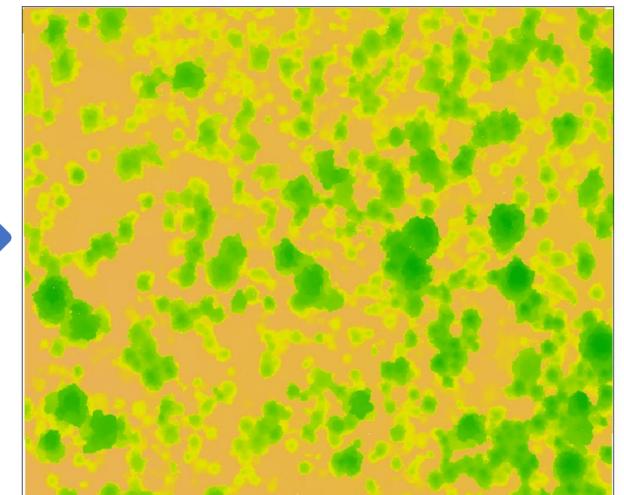
*Drone collected images
from different angle*

Sharon XIA

The photogrammetry algorithm or optical floating point or other applications produce a 3D cloud of points, similar to LiDAR data



Digital Elevation Model For Terrain



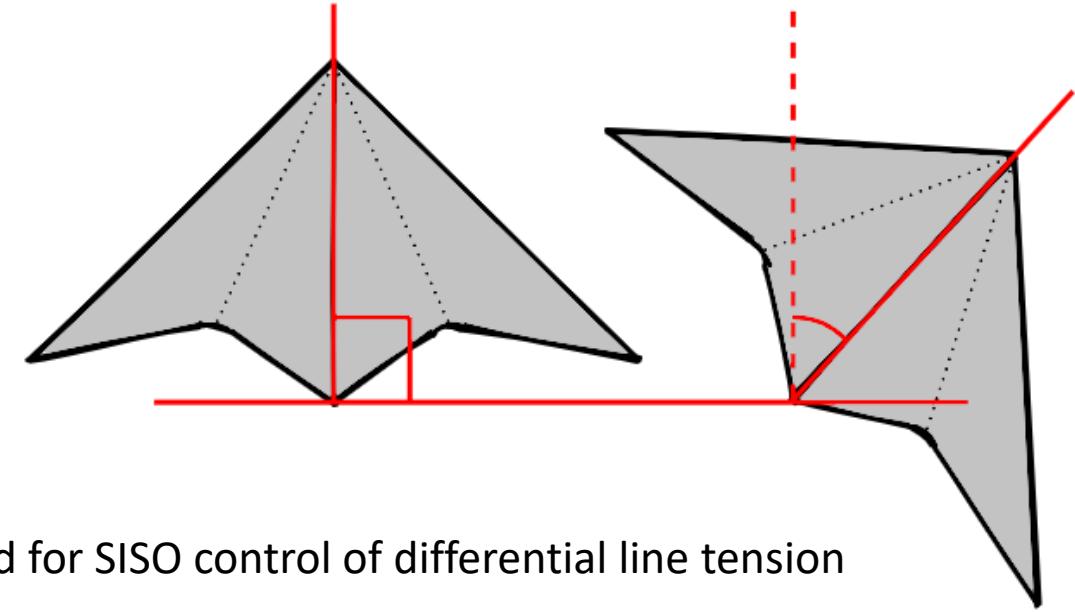
Data source and some explanations from
<https://www.changingforests.com/drones-ai/>

This project is aimed to measure tree height at the forest edge from drone videos. Different methods may be applied to validate the canopy height simultaneously instead of actual survey.

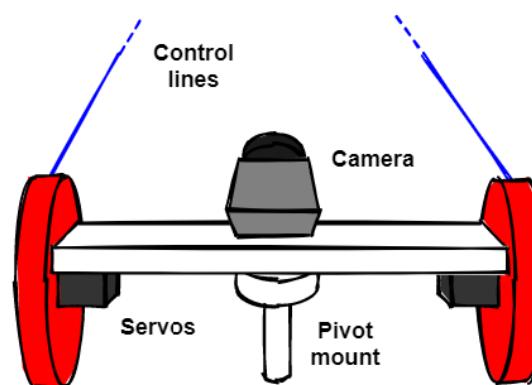
Kite orientation sensing for two-line control

S. Allen

Determining kite orientation from the ground offers feedback for automated control without adding flight weight.



Kite centreline deviation from vertical sensed for SISO control of differential line tension



FEEDBACK



Good Depth



Knees Over Toes

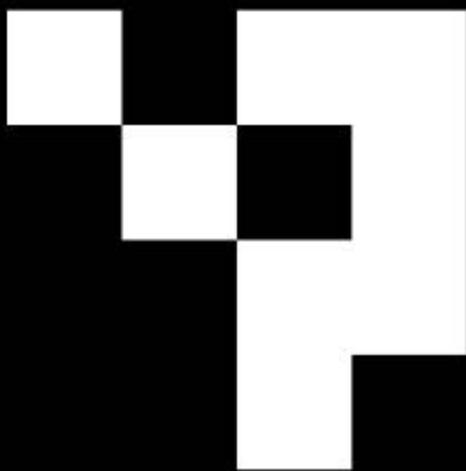


REAL TIME GUIDED EXERCISES

Offer feedback to a person conducting exercises regarding their form with relation to an ideal execution

Simon Read

Understanding the Drag Flick through motion tracking.



Difficult skills are often hard to perfect without the presence of an expert in the skill set. Mastery requires repetitive action with minor adjustments through visual interpretation.

Using online sources, I would like to track the motion of a difficult skill and trial using fiducial markers to mimic the angle and trajectory required for the skill.



Skink Identification



Skinks have unique scale patterns between their ear and shoulder.
Identifying individual skinks is of interest to conservation efforts



Automated UAV livestock monitoring and herding

-Stuart van Turnhout

There are many potential applications for automated UAVs on livestock farms. UAVs are already used to herd animals but this has not yet been automated. If successful, and with the addition of automated gates, large chunks of farm management could be fully automated. Additional functionality could include monitoring of stock numbers, pests, fencing condition, and water/food levels.



FACIAL AND BODY LANGUAGE ANALYSIS FOR LIE DETECTION

Te Atawhai Maginness
91135912

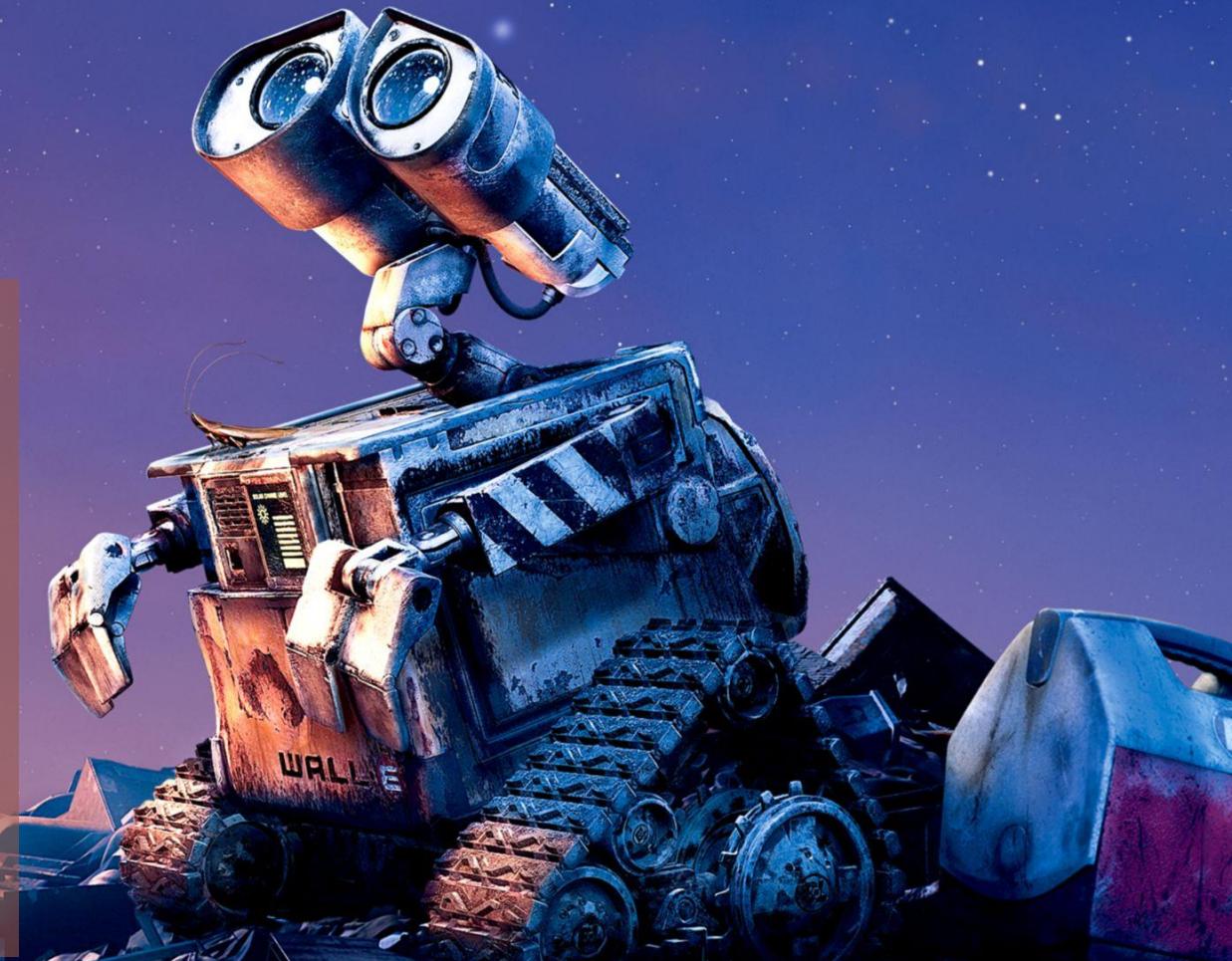
Track the following visual cues in an interview environment to determine the likelihood that the responder is telling a lie:

- Changes in facial expression
- Eye movements/blink rate
- Changes in body language
- Visual enhancement of the skin to monitor change in heart rate

AUTONOMOUS ROBOT OBSTACLE AVOIDANCE

Goal: develop an algorithm allowing a robot to move from one location to another specified location whilst avoiding obstacles

Wikke Nijhof



IR LED Constellations Tracking in 3D Space

Toby Bourke



This project aims to track multiple individual IR LED Constellations within 3D space with the use of multiple cameras.

Differentiating between tracker constellations and non-tracker constellations is a requirement.

Shark Detection



Aim: To identify sharks at beaches using aerial images from drones.

Torben Stovold



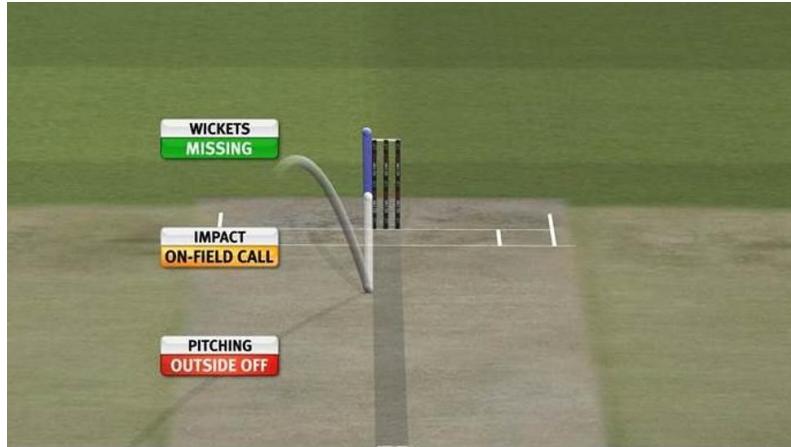
Produce Scanner

- Supermarket Produce detection in real time for non-barcoded items.

Tristin Weastell

Third Umpire in Cricket

If the ball hits the batsman's pads, check if the ball was going on to hit the stumps

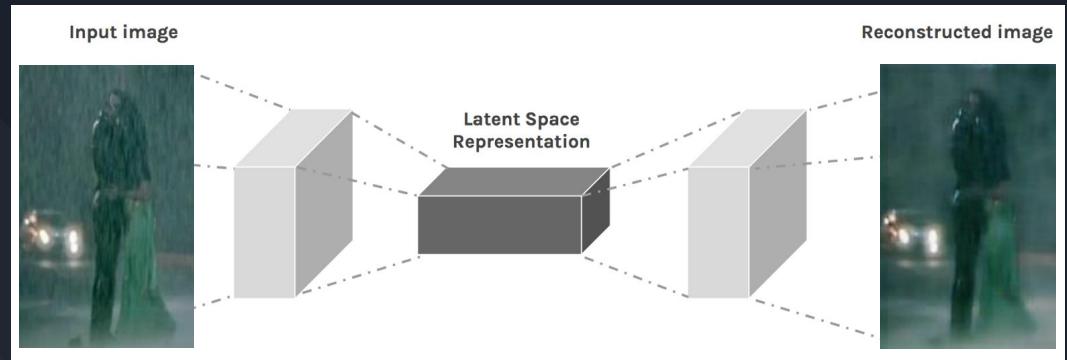


An Investigation into the Effects of a Denoising Autoencoder When Preprocessing Weather-Obscured Imagery for Use in Classifier Networks

Vinnie Jamieson

Object classifying neural networks may see a change in their performance if the input they work with, images in weather conditions, is preprocessed by an autoencoder.

A comparison will be made between the outputs of a classifier network before and after an autoencoder has reconstructed weather-obscured imagery.



Recognising Chord Structures on a Piano

The goal is to develop a program that can identify chord shapes and structures in real-time for future use in musical training and composition. This can be further developed to work in conjunction with music making software such as Sibelius.



Potential Applications:

- Musical training
- Online tutoring
- Practical composition
- Experimentation with chord sequences

By William Herewini

Work piece geometry and quality assurance

My final year project is working to automate a powder coating line.

The goal of my computer vision project is to determine approximate object shape in 3D to be used to generate a tool path and for checking quality of work done.



Harrison Pollard

Calculating dice totals from polyhedral dice

Yu Duan

The aim of the project is to find the value of each of the rolled dice and calculate the total of all rolled dice.

The dice that will be used would be polyhedral dice shown in the image.

