

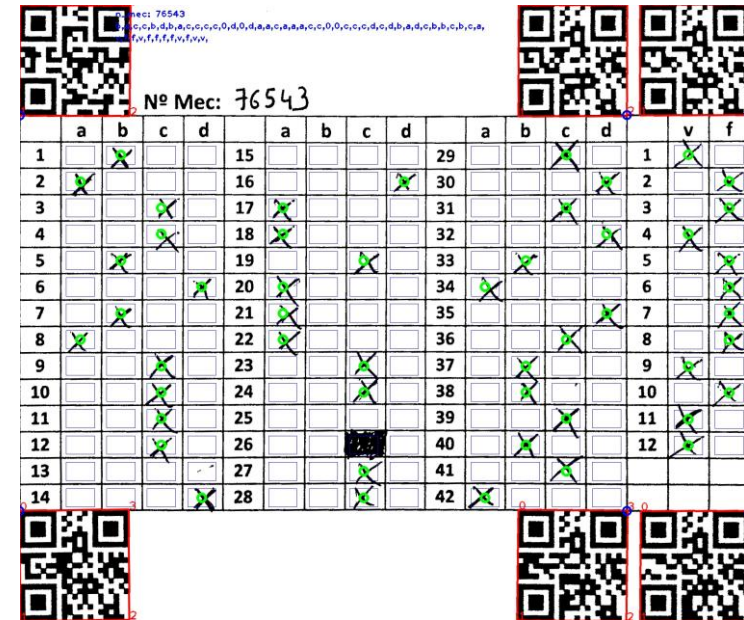
Computer Vision 2021/2022

Projects





- Automatic correction of exam.
- First using QR Codes or Aruco, then evaluate without.



- Live demo: Capture image with camera and correct exam.



- Start with simple case (image and squares), but evolves to real puzzle.
- Detect the pieces and characterize the contours.
- Join the images in a single “bigger” image, eventually guide user to make puzzle
- Live demo show the user how to make the puzzle



- Detection of a coloured object and estimate its movement in 3D
- Possible to use Kinect sensor or stereo image
- Evaluate the alternative to use aruco markers on a pen.
- Evaluate errors or alternatives.
- Allow to do “painting in 3D” showing results in Open3D
- Live demo: 3D drawing showed live in open3D



- Replace some contents of a video by other image data
 - Objective: select an object on a frame (ex. selection by a user)
 - Detect and track the same object in consecutive frames
 - Change the content by the new one in that selected/detected part
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- Live demo: replace white board in class with video or image (possible to use markers?)

3D structured light reconstruction system



- 3D Reconstruction system based on structured light using a projection pattern and a camera.
- Show resulting 3D point cloud in open3D
- Possible to use Sony Xperia projector

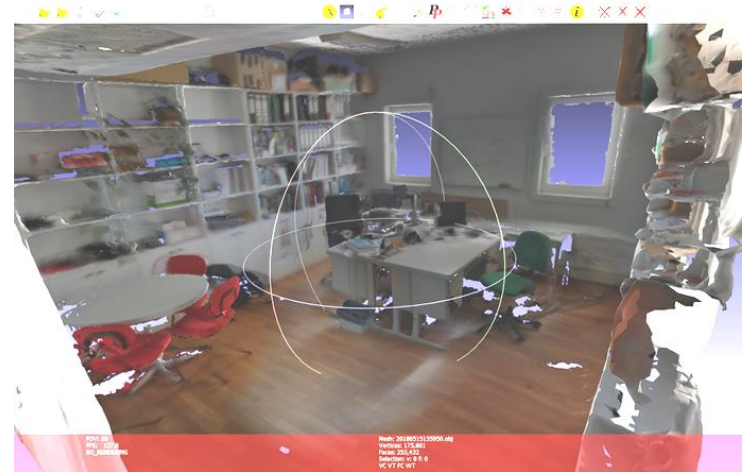


- https://www.youtube.com/watch?v=bxOZi9N_cR4
- Live demo acquire a ball passing on a table

Kinect Based 3D reconstruction system



- Acquire several images of environment (room) with Kinect.
- Merge and process all the images to create a 3D model/mesh with texture information.
- Evaluate different meshing and registering algorithms.
- Allow alignment of live feed with model



- Live demo: register a live view of the Kinect with the model. Show real time point cloud in correct location in model.

Automatic live keystone Projector correction



- System to correct automatically images from projectors projected on non flat surfaces
- Possible to use Sony Xperia projector



- https://www.youtube.com/watch?v=uWRPQHrA_3k
- Live demo moving and correcting projector image in class



- Create a stereo set-up with two cameras.
- Calibrate and adapt algorithm to produce 3D point cloud live
- Evaluate and document error, etc regarding:
 - Disparity algorithm results
 - Camera position/baseline influence
- Live demo: acquire a ball passing on a table and show live 3D points in open3D



- Create a surveillance system to detect changes in the field of view of a fixed camera, running for hours/day.
- Adjust to lighting conditions changes.
- Provide a system to automatically analyze the full video fast forwarding to events of interest automatically.
- Provide statistics about the system (number o events occurred, etc...).
- Recognize and track some specific events (people, etc...)

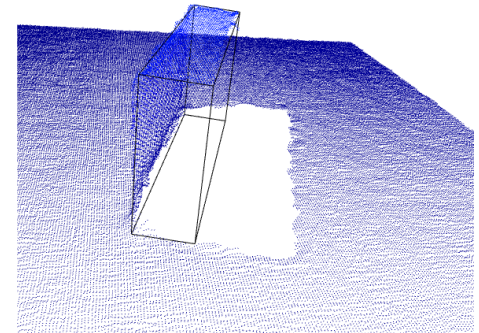
- Live demo: use some gestures and position to control mouse, click, etc...

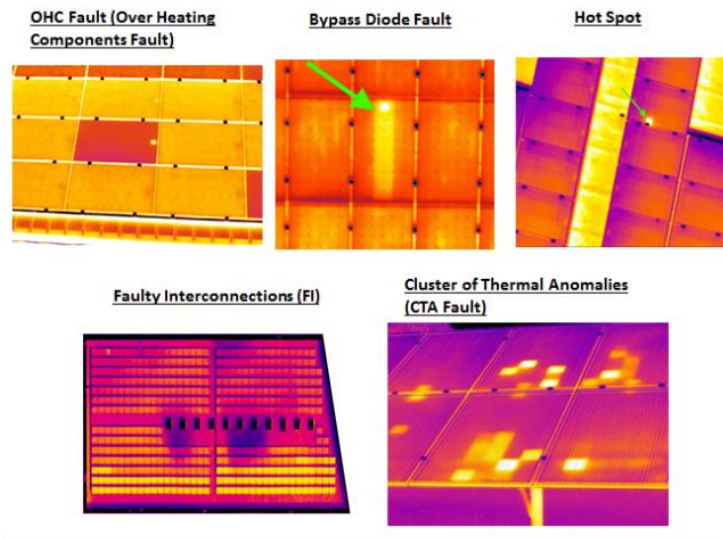


PROPOSALS FROM COLLABORATORS/PROJECTS



- Detection of box dimensions based on pointclouds from Visionary-s (data from FFonseca company)
- Simple example (one box) then multiple box
- Possible to acquire data with Kinect as well



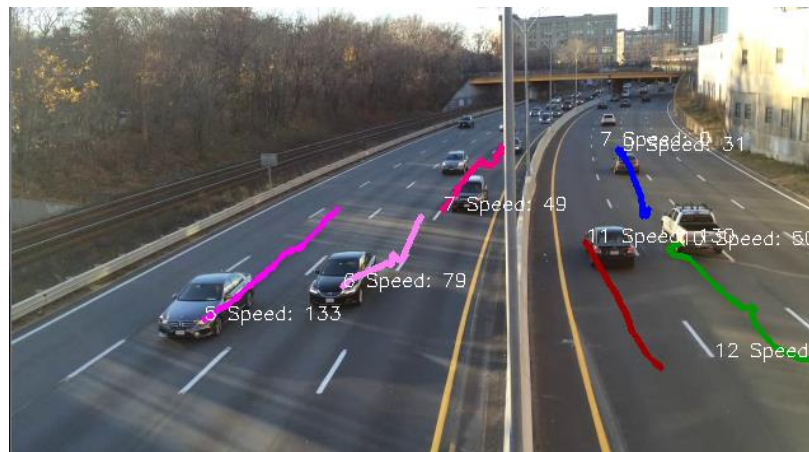


Este projeto tem como objetivo desenvolver um sistema capaz de detetar anomalias em painéis solares recorrendo a visão térmica. As anomalias mais comum em painéis solares podem ser facilmente identificadas a partir da temperatura de superfície dos mesmos (como exemplificado na Figura 1). Podemos utilizar a temperatura média dos painéis como referencia de modo a procurar e segmentar zonas com grande diferença de temperatura.



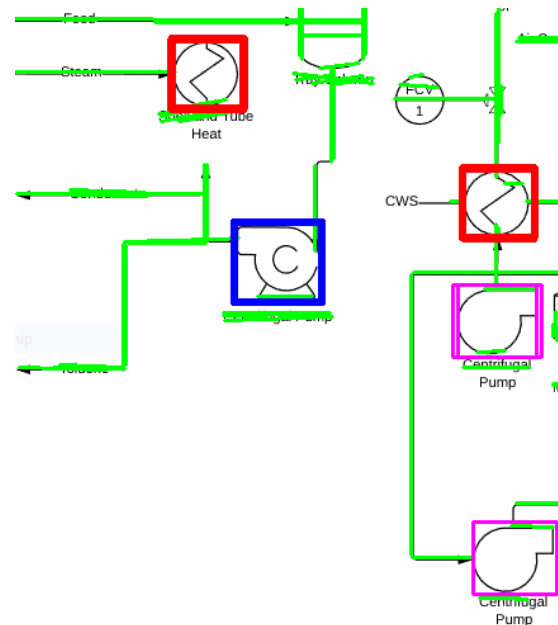
O objetivo deste projeto é desenvolver um sistema capaz de efetuar monitorização e tracking de pessoas em espaços fechados. Para isto poderemos definir uma zona de interesse na nossa imagem para a qual deverá manter contagem do numero de pessoas presentes.

- Este projeto tem como objetivo o desenvolvimento de sistema de radar rodoviário, para medir velocidade de veículos a circular na via. O sistema irá consistir de uma camera instalada acima da faixa de rodagem com vista para os veículos em circulação. Tal como apresentado na Figura 1.





- Documento P&ID (Piping and instrumentation diagram) são usados na industria para esquematizar processos industriais, incluindo toda a tubagem de produção, equipamentos e métricas para controlo de uma determinada fábrica.
- O Objetivo desde projeto é desenvolver um sistema capaz de digitalizar automaticamente P&ID permitindo identificar os simbolos do diagrama ligações entre os diversos elementos e reconhecimentos de texto utilizando tecnicas de OCR.



- edupark.web.ua.pt
- Test of algorithm for leave classification from pictures





- Integration of OpenCV in Unity (or other libraries for) for mobile/hololens tracking of visual elements in industry (Bar Code, QR Code, OCR,etc...)
- Live demo: move in class and find/detect several markers in a given order. Define interaction methods to go on for next object



- Datasets:
 - <http://homepages.inf.ed.ac.uk/rbf/CVonline/Imagedbase.htm>
 - ...
- Proposals from students:
 - In line with master
 - Personal interest
 - Investigation of other topics