Course	Practical Robotics and Smart Things - 2021
GitHub Repository	https://github.com/Bobby-Wan/Object-Following-Robot

Project author		
№	Name	Faculty Number
1	Bozhidar Atanasov Atanasov	45257

Project name	Face following robot

The project implements a face tracking robot, using a simple gimbal and two servo motors. The ‘brain’ of the robot is a Raspberry pi 4B, which is used to take feed from a camera attached to the gimbal. After processing the feed, the Pi sends commands to the servos, so they can recenter themselves on a face, if one is recognised.

Here are the hardware specifications:

- *Pi Camera v1.3*
- *Raspberry Pi 4B* - processes the video feed and send control signals to the servos
- *two analog servo motors (model* Feetech SG90) - control the pan/tilt of the camera
- *3D printed body of the gimbal* - compatible with the servos above
- breadboard, usb power module, jumper wires

Software specifications:

- the main part of the project is implemented in Python3, using openCV algorithms for image processing
- a basic pretrained model for face recognition
- (to be implemented) a web interface to be able to see what the robot ‘sees’ after it has detected an object in real time. The interface will include a menu for manual/auto control.
- python GPIO module for communicating with the servos

Implementation:

- Facial recognition algorithm - the algorithm is called Haar Cascade Classifier. Similar to CNNs, but with some differences. For example, kernels are applied to small windows of the image instead of the whole image. Also, not all kernels are applied to every window - if the algorithm decides that what it’s looking at is not a face, it does not apply the higher-level kernels and goes to the next window. This helps for real time image processing