

Use this document to show research for which body cameras we should use for the project.
Display pros and cons for each camera. Main points to focus on are battery life, connectivity and easy to wear.

8 hours of battery life

Camera size - weight

Power consumption

Bluetooth , gps

5 fps?

Camera Model	Pros	Cons
https://mview.com.au/products/matrix2/ Used in lots of industries such as: <ul style="list-style-type: none"> - Security - Emergency Services - Law Enforcement - Industrial - Local Government 	<ul style="list-style-type: none"> - 12hr battery life - Can live stream - Provides encryption for video data - Has GPS 	<ul style="list-style-type: none"> - Storage starts at 32Gb and costs to go up, would need to check how long the video is wanting to be running for -
https://www.axon.com/products/axon-body-2	<ul style="list-style-type: none"> - Very durable for lots of different conditions - Records in low-light and HD - Can record for up to 12hrs - Has to option for in-built in field data tagging - Has accessories available for the product - battery and case 	<ul style="list-style-type: none"> - Connections to the server and how we could apply our own model training not clear
https://azure.github.io/Vision-AI-DevKit-Pages/	<ul style="list-style-type: none"> - Connects into Azure and the current API being used by the company - 1550 mAh battery, 16GB memory, and 4GB RAM - enough ram? - Made for AI and object detection 	
http://www.hihope.org/en/pro/pro1.aspx?mtt=23	<ul style="list-style-type: none"> - AI Intelligent Recognition Ability - Supports cloud 	

	storage	
https://www.raspberrypi.com/products/raspberry-pi-4-model-b/ Will need to get equipment to run <ul style="list-style-type: none"> - Power supply - Micro SD card with raspberry pi OS installed - Keyboard and mouse - Cables for micro hdmi ports 	<ul style="list-style-type: none"> - Recommended by inviol employee to use - Can support 8GB space, allows lot of leeway for video size for detections - Easy to program and set up how we require 	<ul style="list-style-type: none"> - Need to find camera parts to go along with - however, this does allow for customization which is a pro
https://www.arducam.com/product/arducam-12mp-imx477-mini-high-quality-camera-module-for-raspberry-pi/ <ul style="list-style-type: none"> - 12MP - 	<ul style="list-style-type: none"> - Configured to work with a raspberry pi - Fits raspberry pi lenses 	
https://www.dji.com/nz/dji-action-2	Lightweight aluminum alloy body, easy to wear 4K/120fps, with artificial intelligence editor, with a wide field of view of 155 degrees. DJI's built-in stabilization algorithm detects and corrects camera shake and rotation in real-time to keep the lens level in any situation	<ul style="list-style-type: none"> -Easy to overheat -High price
https://www.inricosolutions.com/Mobile_Radio_BodyCam/144.html?gclid=CjwKCAjw682TBhATEiwA9crl32aqBaQl33zJsGnTdFRYYpVDgjxfpIQgn-nhIWW_H-xWlfsiOK0WUBoCe4MQAvD_BwE	<ul style="list-style-type: none"> - When the storage space is full, the previously recorded video will be automatically deleted and the latest video will be saved - Quality assurance, equipment with IP68 international protection rating - 3200mAh Battery - Wi-Fi, Bluetooth, NFC available 	<ul style="list-style-type: none"> - camera body is relatively large -

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https://www.novestom.com/?gclid=CjwKCAjw682TBhATEiwA9crl39nW_u-3a-gUo6JJSiDm0XvOHsFIREDZA2CIII_3uHpEMfkb0O6OrxoCMEsQAvD_BwE	<ul style="list-style-type: none"> - Multiple recording resolutions 1296P(30 FPS)/1080P(30 FPS)/720P(30 FPS)/480P(30 FPS) - Continuous recording time: VGA 14 hours - All metal structure, strong and durable - 3 air outlets on the motherboard to effectively control overheating - WIFI: Support AP and STA mode. 	

Open Source Repos	Notes
https://github.com/RangilYu/nanodet	<p>NanoDet-Plus:</p> <p><i>NanoDet is a FCOS-style one-stage anchor-free object detection model which using Generalized Focal Loss as classification and regression loss.</i></p> <p><i>In NanoDet-Plus, we propose a novel label assignment strategy with a simple assign guidance module (AGM) and a dynamic soft label assigner (DSLAs) to solve the optimal label assignment problem in lightweight model training. We also introduce a light feature pyramid called Ghost-PAN to enhance multi-layer feature fusion. These improvements boost previous NanoDet's detection accuracy by 7 mAP on COCO dataset.</i></p> <ul style="list-style-type: none"> - Very fast at model training, would help remove the time worry from model training - Lightweight, would not take up much space on the camera, allows for wiggle room there - Easy to use + training friendly

https://github.com/kiyoshiiriemon/yolov4_darknet https://arxiv.org/abs/2004.10934 - YOLOv4 explanation	YOLO Comparisons, v2 vs v3 vs v4 <ul style="list-style-type: none"> - Would be using v4 as most accurate and up to date
https://github.com/ciber-lab/pictor-ppe	Real Time Detection of Personal-Protective-Equipment (PPE) <p><i>Introduction</i> The repository presents Tensorflow 2.0 (Keras) implementation of real-time detection of PPE (e.g., hard hat, safety vest) compliances of workers. The detailed procedures can be found in the following paper.</p> <p><i>Article</i> Deep Learning for Site Safety: Real-Time Detection of Personal Protective Equipment Nipun D. Nath, Amir H. Behzadan, Stephanie G. Paal Automation in Construction 112, pp. 103085</p> <p><i>Please cite the article if you use the dataset, model or method(s), or find the article useful in your research. Thank you!</i></p> <ul style="list-style-type: none"> - Will be perfect to use for detecting incorrect use of PPE as stated in our model training scope.
https://github.com/PaddlePaddle/Paddle	PaddlePaddle <p><i>PaddlePaddle, as the first independent R&D deep learning platform in China, has been officially open-sourced to professional communities since 2016. It is an industrial platform with advanced technologies and rich features that cover core deep learning frameworks, basic model libraries, end-to-end development kits, tools & components as well as service platforms. PaddlePaddle is originated from industrial practices with dedication and commitments to industrialization. It has been widely adopted by a wide range of sectors including manufacturing, agriculture, enterprise service, and so on while serving more than 4 million developers, 157,000 companies and generating 476,000 models. With such</i></p>

	<p><i>advantages, PaddlePaddle has helped an increasing number of partners commercialize AI.</i></p>
<p>https://github.com/ljzycmd/SimDeblur</p>	<p>SimDeblur</p> <p><i>SimDeblur (Simple Deblurring) is an open source framework for image and video deblurring based on PyTorch, which contains most deep-learning based state-of-the-art deblurring algorithms. It is easy to implement your own image or video deblurring and restoration algorithms. To the best of our knowledge, this is the first general framework for image/video deblurring.</i></p> <ul style="list-style-type: none"> - Would be good to use if we find that the the video feed we are getting is to blurred / if the detection isnt as accurate due to blurring
<p>https://github.com/xinntao/BasicSR</p>	<p>BasicSR</p> <p><i>BasicSR (Basic Super Restoration) is an open-source image and video restoration toolbox based on PyTorch, such as super-resolution, denoise, deblurring, JPEG artifacts removal, etc.</i></p>
<p>https://github.com/VITA-Group/DeblurGANv2</p>	<p>DeblurGAN-v2</p> <p><i>We present a new end-to-end generative adversarial network (GAN) for single image motion deblurring, named DeblurGAN-v2, which considerably boosts state-of-the-art deblurring efficiency, quality, and flexibility. DeblurGAN-v2 is based on a relativistic conditional GAN with a double-scale discriminator. For the first time, we introduce the Feature Pyramid Network into deblurring, as a core building block in the generator of DeblurGAN-v2. It can flexibly work with a wide range of backbones, to navigate the balance between performance and efficiency. The plug-in of sophisticated backbones (e.g., Inception-ResNet-v2) can lead to solid state-of-the-art deblurring. Meanwhile, with light-weight backbones (e.g., MobileNet and its variants), DeblurGAN-v2 reaches 10-100 times faster than the nearest competitors,</i></p>

	<p><i>while maintaining close to state-of-the-art results, implying the option of real-time video deblurring. We demonstrate that DeblurGAN-v2 obtains very competitive performance on several popular benchmarks, in terms of deblurring quality (both objective and subjective), as well as efficiency. Besides, we show the architecture to be effective for general image restoration tasks too.</i></p>
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Additional Camera Hardware	Notes
https://www.e-consystems.com/camera-modules/imx327-sony-starvis-full-hd-camera-module.asp	<p>e-CAM220_CUMI327_MOD is a Full HD ultra-low light MIPI camera module. This Full HD camera module is based on 1/2.8" Sony® STARVIS™ IMX327 CMOS sensor with 2.9-µm pixel size. Its high sensitivity in both visible and near infrared region helps to produce extraordinary images under extreme low-light conditions or even no light (nearly 0 lux) conditions. e-CAM220_CUMI327_MOD's capabilities make it ideally suited for challenging outdoor light conditions.</p> <p>Camera lens module to use to help with low light issues with detections - could be useful if we are wanting to detect in a warehouse</p>
https://www.raspberrypi.com/products/raspberry-pi-high-quality-camera/	<p>Raspberry Pi camera option</p> <ul style="list-style-type: none"> - <i>The Raspberry Pi High Quality Camera is the latest camera accessory from Raspberry Pi. It offers higher resolution (12.3 megapixels, compared to 8 megapixels), and sensitivity (approximately 50% greater area per pixel for improved low-light performance) than the existing Camera Module v2, and is designed to work with interchangeable lenses in both C- and CS-mount form factors. Other lens form factors can be accommodated using third-party lens adapters.</i> <p>Lenses detailed below are able to be attached to this.</p>
https://www.raspberrypi.com/products/camera-module-v2/	<p>Raspberry Pi camera: The Camera Module 2 can be used to take high-definition video, as well as stills photographs.</p>

	<p><i>It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge. There are lots of examples online of people using it for time-lapse, slow-motion, and other video cleverness. You can also use the libraries we bundle with the camera to create effects.</i></p>
https://www.raspberrypi.com/products/raspberry-pi-zero-case/	Case for the raspberry pi - option
https://www.adafruit.com/product/4563	<p>Raspberry pi camera lens</p> <ul style="list-style-type: none"> - 6mm, 3MP wide-angle lens - <i>Wide angle lenses are good for getting shots of a big area, for wildlife cameras, security cameras, doorbell cams, etc. The video may be distorted around the edges to fit it all into the sensor.</i> - Wide lens will be really helpful for detecting when employees are close to dangerous objects? Help with peripheral vision - get a better scope of what is happening around the employee wearing the camera
https://www.adafruit.com/product/4562	<p>Raspberry pi camera lens</p> <ul style="list-style-type: none"> - 16mm, 10MP, telephoto lens - <i>Telephoto lenses are great for distance shots - especially good when you need to take photos or videos of far away cats. Includes a thumbscrew to quickly and easily assemble onto the HQ Camera Board.</i> - Good for distance, might be helpful with wanting to detect objects in front of the employee wearing the camera and get a clearer picture of other people around them.
https://www.uctronics.com/arducam-for-raspberry-pi-ultra-low-light-camera-1080p-hd-wide-angle-pivariety-camera-module-based-on-1-2-7inch-2mp-starvis-sensor-imx462-compatible-with-raspberry-pi-isp-and-gstreamer-plugin.html	<p>Raspberry pi camera lens</p> <ul style="list-style-type: none"> - <i>Arducam Pivariety is a Raspberry Pi camera solution to take the advantage of using its hardware ISP functions. For a long time, Raspberry Pi users are limited to use the closed-source official supported camera driver and camera modules (V1/V2/HQ). Now Arducam made it possible to provide well-tuned ISP for Pivariety camera modules with Auto Exposure, Auto</i>

	<p><i>White Balance, Auto Gain Control, Lens Shading Correction, etc.</i></p> <ul style="list-style-type: none">- <i>This B0333 is a new member of Arducam Pivariety series, which adopts a 1/2.8Inch 2MP STARVIS sensor IMX462, assembled with a wide aperture M16 lens, so as to can get much more decent image quality than the Official cameras in low light conditions.</i>- <i>Different from the raspberry pi provided lenses, allows for wide-angle and low light, again good for in the warehouse detecting objects</i>
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