POLICE BODY WORN CAMERAS

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***Abstract*- Body worn video (BWV), also known as body cameras and body-worn cameras, is a video recording system that is typically utilized by law enforcement to record their interactions with the public or gather video evidence at crime scenes, and has been known to increase both officer and citizen accountability; although arguments have been made that BWVs primarily protect police. BWVs are notable because their placement, often on the front of a shirt, provides for first-person perspective and a more complete chain of evidence. BWV is a form of closed-circuit television. Police Body-Worn Cameras breaks down what's known – and not known – about the promises, perils, and potential best practices around police body-worn cameras. Both law enforcement and civil rights advocates are excited by the potential of body-worn cameras to improve community policing and safety, but there is no empirical research to conclusively suggest that these will reduce the deaths of black male civilians in encounters with police. There are some documented milder benefits evident from small pilot studies, such as more polite interactions between police and civilians when both parties are aware they are being recorded, and decreased fraudulent complaints made against officers. Many uncertainties about best practices of body-worn camera adoption and use remain, including when the cameras should record, what should be stored and retained, who should have access to the footage, and what policies should determine the release of footage to the public. As pilot and permanent body-worn camera programs are implemented, it is important to ask questions about how they can be best used to achieve their touted goals. How will the implementation of these programs be assessed for their efficacy in achieving accountability goals? What are the best policies to have in place to support those goals?**

I. INTRODUCTION

The Constitution Project Committee on Policing Reforms ("Committee") is grateful to the Task Force on 21st Century Policing ("Task Force") for soliciting comments regarding the use of body-worn cameras by law enforcement. The Committee comprises diverse individuals with expertise in law enforcement and the constitutional issues discussed in the attached brief. Given the recent creation of the Task Force, the Committee worked on a compressed schedule to prepare this submission; please note that the views of the Committee on these issues and recommendations may evolve over time, after further research, internal discussion, and analysis.

The current body camera is much lighter and smaller than the first experiments with wearable cameras. There are several types of body cameras made by several different companies. Each camera basically serves the same purpose, yet some function in slightly different ways than others. Some are meant to be mounted on one's chest or shoulder, others can work as an attachment to glasses or may be worn in a function similar to a headband or on a helmet. As far as sizing goes "most are roughly the size of a Scotch Tape dispenser and weigh anywhere from about 2 ounces (55 grams) to 5 ounces (140 grams). That's somewhere between a large strawberry and a lemon. These lightweight cameras are designed to be worn without any discomfort.

II. METHODOLOGY

This chapter will explain how the data for the present study was collected, and the analytic methods used to reach the succeeding results exploring the impact of the Police body cameras program implementation on civil liability as well as assaults on police officers. As is previously indicated, due to a lack of widely and publically easily available data, as well as time constraints, this thesis is purely a descriptive case study on the Police Department, and does not include a larger sample of departments. However, police body cameras as is explained below.

B. Sample Selection

The use of Body Worn Cameras(BWC) by police departments has recently expanded, Many of these BWC programs are still in their trial phase and have not been in use for more than a few years or even months, nor completely implemented. The

dispersion of BWCs within a department is often limited to just a few districts or shifts during trial periods.

The implementation of a BWC program is one of the most expensive periods because departments must first purchase the cameras themselves. The initial purchasing cost skews the regular annual costs of running a BWC program. Of course, new cameras will have to be purchased in the future for replacements and upgrades, but these procurements should be staggered in comparison to the regularity of standard operating fees.

B. The Evolution of Video Surveillance

Stationary video surveillance, such as closed-circuit television (CCTV), has become a ubiquitous tool of policing. CCTV rose to prominence in the 70's and 80's as a means to monitor public spaces including roads, public transportation hubs, parking lots, retail spaces, malls, and other privately owned public spaces. Stationary surveillance cameras in public spaces were initially employed for crime-control and, subsequently, for anti-terrorism efforts. Their use is rooted in deterrence theory, which posits that the awareness of being scrutinized will deter potential criminals for fear of apprehension. As a form of "public order policing, "video surveillance could encourage civilians and officers to behave in a less confrontational manner towards each other. However, the deterrent potential of cameras may be overestimated. While there is no clear-cut evidence of their efficacy in reducing crime, past studies have shown that public CCTV surveillance may deter crimes or they may merely displace them to other areas18; they may have a negligible effect on violent crime, they may even increase other types of crime, such as petty theft, because victims gain a false sense of security over their belongings from the presence of cameras20; and when their impact is significant, it may be limited to certain areas, like car parks.

Mobile forms of police video surveillance became more common with the spread of dashboard-mounted cameras in police cruisers, more commonly referred to as "dashcams." These were initially implemented as a means of supporting convictions in cases of traffic stops for Driving-Under-Influence or Driving-While-Intoxicated, as well as in drug arrests, and to document consent in vehicular searches. As of 2007, dashcams were being used by 61% of police departments, but their utility is limited to interactions within the camera's view that take place around vehicles, unlike mobile body-worn cameras, which accompany police throughout the course of their duties.

There are many makes and models of body-worn cameras, each with different features and capabilities. In March 2014, the National Institute of Justice published a market report that examined the features of 18 different models of body-worn cameras. The most salient of these features from a civil rights perspective are:

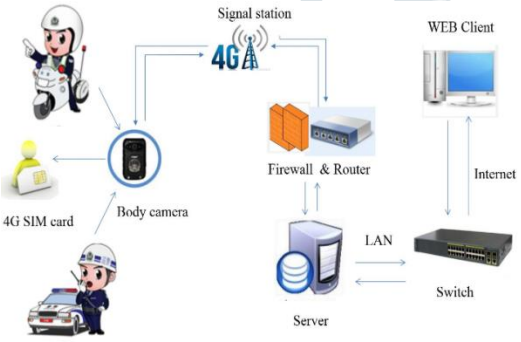
C. Location of the Camera Mount: Where a camera is mounted determines what the camera sees. The most common mount is the chest, but chest mounts may not capture the full scene. Lapel mounts (slightly higher up on the uniform) give a better view, but may be more likely to be knocked off during altercations.Head mounts (usually located on sunglasses) record most closely "exactly what the officer is seeing, unlike lapel or chest mounts, which don't account for what the officer sees when they swivel their head away from the direction their body is facing, but officers cannot always wear sunglasses, and some find head mounts uncomfortable.

D. Recording Capabilities: Some models of body-worn cameras have continuous recording capabilities (sometimes called a "pre-record buffer") 31 that allow the cameras to keep the footage from just *before* a triggering event. For example, the AXON Body by TASER constantly records footage, and automatically keeps the 30 seconds of video *before* the officer presses the record button, as well as what happens after. Those additional 30 seconds of footage are meant to ensure that the videos include the context leading up to an event, and may be helpful if an officer does not press record in the immediate heat of an altercation. Although many cameras can record continuously, there are significant concerns about privacy, and some police departments have determined that the volume of video associated with continuous recording would be too costly to store and maintain. The marginal cost of storing extra hours of video, however, is likely to decline in tandem with the plummeting cost of all kinds of digital storage.

E. Evidentiary Safeguards: In order for body-worn camera video footage to be admissible in court, the person seeking to submit it "must provide evidence of its identity and integrity, usually by showing a chain of custody tracking the item from its acquisition to its presentation at trial."36 Many body-worn camera models offer various safeguards to ensure that the data is not manipulated.37 The AXON Body by TASER International forbids users from deleting a video on the camera and marks the video with a security hash, which verifies that the video hasn't been tampered with. TheFirst HD from Digital Alley offers optional software that logs each use of the video and generates a chain of custody report. Notably, the evidentiary standards used in court are higher than those that can be used at the plea bargain stage. Video footage without the

evidentiary safeguards required to make it admissible in court could still be used persuasively in pretrial situations.

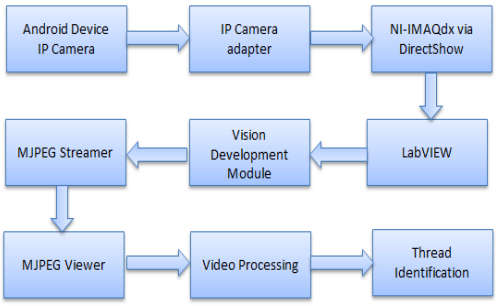
F. Tracking Features: Time/Date stamps and GPS functions can also help to protect the authenticity and integrity of videos. Everybody-worn camera examined in the market report has a time/date stamp embedded in the recorded video. However, few models have GPS capabilities that can imprint the recording location onto the video (a feature sometimes called "geotagging").Incidents can spread out over multiple locations, and the lack of precise location metadata can decrease the evidentiary value of these recordings. Theoretically, for assessment purposes, the aggregate location data can also be used to map where use of force or other incidents take place, in order to pinpoint sources of problematic police-public interactions. The same predictive policing tactics used to identify hotspots of criminal activity could be similarly used to predict hotspots of violent police-civilian encounters, and to identify the factors that contribute to these, in an effort to promote transparency and accountability in the geographies of community-police relations that could most benefit from it.



G. Video Management: Video software allows users to manage the body-worn camera recordings. A popular cloud-based video management tool, Evidence.com (owned by TASER International) markets itself as a "digital evidence management system that allows the agency to securely store and track access to any type of digital evidence."

H. Developing a Strategy - Once you have completed a video evidence needs assessment and identified the personnel that require input into a possible solution, the next step is to develop a plan or a blueprint that addresses the needs of all involved. The flowchart below is an example that may address the needs of a larger police agency. The example can be scaled down to accommodate smaller agencies.

III. INSTRUMENT DEVELOPMENT



A. IP CAMERA:

In an ever more crowded and complex world, people are more aware of the need for security, both in business settings and at home. The need for alarm systems, limited access, extra locks, and passwords are all common these days. Surveillance via a system of digital cameras is also gaining popularity, and such systems can be surprisingly affordable for those on a tight budget. Such surveillance commonly uses internet protocol cameras, also known as IP cameras, to effectively monitor important locations in a home or office. While it is standard in many commercial and industrial settings, these cameras can easily be used for home surveillance too.

IP cameras are very popular in video data capture and processing. IP stands for Internet Protocol, but these electronic devices are more popular as network cameras, webcams, or CCTV cameras. They are used in homes, offices, vehicles, and public places. IP cameras come in basic units, right up to complex multi-channel security systems with advanced built-in software. In order to understand how IP cameras work, consumers should consider the applications for the devices, as well as video data capture and resolution.

IP cameras have various residential and commercial applications for secure video transmission, as long as high bandwidth and dedicated networks are available. IP cameras either have wired or wireless connections, and are used both indoors and outdoors, during the day and at night. Their remote access gives users peace of mind; they can watch footage in and around their homes or businesses even while away from the properties

B. Benefits of IP camera over analog technology include:

- Remote administration from any location.

- Digital zoom.
- The ability to easily send images and video anywhere with an Internet connection.
- Progressive scanning, which enables better quality images extracted from the video, especially for moving targets.
- Adjustable frame rates and resolution to meet specific needs.
- Two-way communication.
- The ability to send alerts if suspicious activity is detected.
- Lower cabling requirements.
- Support for intelligent video.

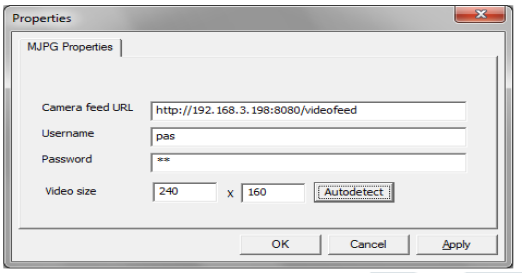
Disadvantages of IP surveillance include greater complexity and bandwidth demands. One alternative for organizations with substantial investment in analog technology is to use a video server to, in effect, turn analog CCTV cameras to IP cameras. A video server is a small standalone server that converts analog signals to a digital format and provides the analog cameras with IP addresses.

C. IP CAMERA ADAPTER:

IP Camera Adapter is a universal way to connect any network cameras that use MJPG or static images to the PC for use with applications that work with regular USB cameras.

Configuring the camera adapter

Open the configuration application



Camera feed url option is where the program will get the video from. It may be a Movie JPEG stream or a URL to get JPEG, PNG or BMP frames. You can even serve static files, using a URL like file:///C:/name_of_file.bmp URL. Supported protocols are: HTTP, FTP, TFTP, TELNET, FILE.

• **Username** and **Password** are the username and password that will be used for the server connection.

• **Video size** is the resolution of the virtual camera. When this setting is different from feed resolution, image will be cropped or padded with borders. Use the Autodetect button to detect it from video stream, also checking if the camera is accessible.

• **Note**: Applications using the camera must be restarted for resolution changes to take effect.

• **Note**: Some versions of ESET NOD32 are known to break the MJPG feed. If you run into this issue, disable Web Protection in NOD32->Setup->Antivirus and antispyware**.**

D. VIDEO PROCESSING:

In electronics engineering, video processing is a particular case of signal processing, which often employs video filters and where the input and output signals are video files or video streams.

The Different Flavors of Video and Image Processing

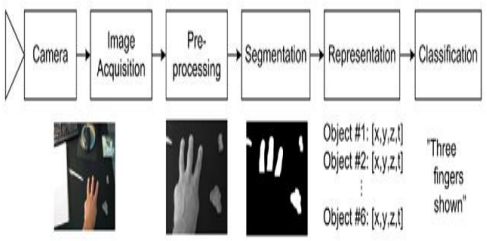
The different video and image processing methods are often grouped into the categories listed below. There is no unique definition of the different categories and to make matters worse they also overlap significantly. Here is one set of definitions: Video and Image Compression This is probably the most well defined category and contains the group of methods used for compressing video and image data. Image Manipulation This category covers methods used to edit an image. For example, when rotating or scaling an image, but also when improving the quality by for example changing the contrast.

Image Processing Image processing originates from the more general field of signal processing and covers methods used to segment the object of interest. Segmentation here refers to methods which in some way enhance the object while suppressing the rest of the image (for example the edges in an image).

Video Processing Video processing covers most of the image processing methods, but also includes methods where the temporal nature of video data is exploited. Image Analysis Here the goal is to analyze the image with the purpose of first finding objects of interest and then extracting some parameters of these objects. For example, finding an object's position and size.

Machine Vision When applying video processing, image processing or image analysis in production industries it is normally referred to as machine vision or simply vision.

Computer Vision Humans have human vision and similarly a computer has computer vision. When talking about computer vision we normally mean advanced algorithms similar to those a human can perform, e.g., face recognition. Normally computer vision also covers all methods where more than one camera is applied



The block diagram provides a general framework for many systems working with video and images

Even though this topic is titled: "Video and Image Processing" it also covers basic methods from Image Manipulation and Image Analysis in order to provide the reader with a solid foundation for understanding and working with images and video.

E. General Framework

No matter which category you are working within (except for Video and Image Compression) you can very often apply the framework illustrated in Fig. 1.2. Sometimes not all blocks are included in a particular system, but the framework nevertheless provides a relevant guideline.
Underneath each block in the figure we have illustrated a typical output. The outputs are from a gesture-based human-computer-interface system that counts the number of fingers a user is showing in front of the camera.

Below we briefly describe the purpose of the different blocks:

Image Acquisition In this block everything to do with the camera and setup of your system is covered, e.g., camera type, camera settings, optics, and light sources. Pre-processing This block does something to your image before the actual processing commences, e.g., convert the image from color to gray-scale or crop the most interesting part of the image (as seen in Fig. 1.2).

Segmentation This is where the information of interest is extracted from the image or video data. Often this block is the "heart" of a system. In the example in the figure the information is the fingers. The image below the segmentation block shows that the fingers (together with some noise) have been segmented (indicated by white objects).
Representation In this block the objects extracted in the segmentation block are represented in a concise manner, e.g., using a few representative numbers as illustrated in the figure.

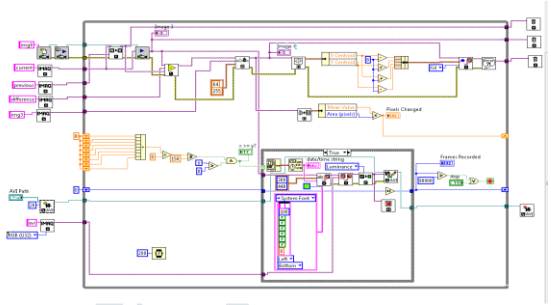
Classification Finally this block examines the information produced by the previous block and classifies each object as being an object of interest or not. In the example in the figure this block determines that three finger objects are present and hence output this.

It should be noted that the different blocks might not be as clear-cut defined in reality as the figure suggests. One designer might place a particular method in one block while another designer will place the same method in the previous or following block. Nevertheless, the framework is an excellent starting point for any video and image processing system.

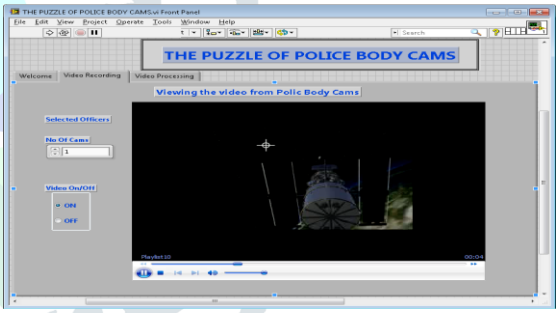
The last two blocks are sometimes replaced by one block called BLOB Analysis. This is especially done when the output of the segmentation block is a black and white image as is the case in the figure. In this topic, we follow this idea and have therefore merged the descriptions of these two blocks into one BLOB Analysis.

IV RESULTS

A. BACK PANEL OF SYSTEM



B. FRONT PANEL OF SYSTEM



C. Results of the Rialto Experiment (incidents)

V. CONCLUSION

Although there are merited concerns with the implementation of BWCs, the benefits presented outweigh the concerns especially regarding the current climate of policing mistrust and perceptions of police illegitimacy that trickle down to campus police departments. Much of the concerns can be addressed with policy that limits the access and control of the recordings. One such

policy recommendation is limiting the footage released by police departments to the public by blurring faces in the footage to protect privacy and identity of people captured and using a fact finder to determine whether a department can release certain footage. This is just one way that policy can mitigate some of the concerns with BWC implementation without losing the benefits provided by their presence. Just as the public questions the conduct of police officers throughout history, one might question what effect the presence of a BWC would have on events that live-in infamy throughout history. Jackson writes, "Demonstrating to the public that its decision-making process is neutral and fair relies on the department's ability to communicate this point through both word and deed. That communication must take on both what may be a complex history between the department and the communities it serves and other factors that shape public views" (Jackson, 2015). Just as the problems faced by campus police at modern university are comparable with a small cities problem, the solution to this problem must be equally as comparable. Increasing transparency by implementing another level of oversight is the recommended solution. Moving forward with modern campus policing, it is advisable for campus police departments to adopt BWC technologies so that they may continue to build and maintain the trust of their unique campus constituents and the perception of their practices is legitimate. Future research should include conducting longitudinal studies that attempt to quantify the impact that BWCs have on police legitimacy in campus settings. A potential study should include surveying campus constituents about their perceptions of the campus police's legitimacy before and after BWCs are implemented. Additionally, records regarding complaints regarding officer conduct should be analyzed to determine if an impact exists when implementing BWCs. Finally, surveying officers about their perceptions, similar to that of the Orlando study discussed earlier, should be conducted.

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