A close-up photograph of a man with a shocked expression, his mouth wide open and eyes wide. He is wearing a green jacket. In the background, there are other people, including a woman in a green jacket and a man in a red shirt, suggesting a crowded event or a public gathering.

Life Inside a Skinner Box: Confronting our Future of Automated Law Enforcement

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Disclaimer



The views in this talk are the authors' and don't reflect the official policy or position of the United States Military Academy, Samford University, the Department of the Army, the Department of Defense, or the United States Government.



Why?



We don't want to live in a police state



Meditation on the Law

Driving the Speed Limit on the
Atlanta Perimeter

Automated Law Enforcement

Any computer-based system that uses input from unattended sensors to algorithmically determine that a crime has been or is about to be committed then takes some responsive action, such as to warn the subject or inform the appropriate law enforcement agency.

Additionally, these systems will be capable of automatically imposing some form of punishment. Our proposed conceptualization of automated law enforcement is based on a model that is subject to automation at various points.

Three Points

1. Networked technologies have the potential to automate enforcement of the law.
2. Reckless and pervasive automation can have disastrous and unintended consequences.
3. This audience is in a unique position to defend society and appropriately confront law enforcement systems.



1

The Precursors are in Place

Increased Proliferation of Sensors



Increased Diversity and Sensitivity of Sensors



State Police Pull Over CT Medical Patient for
Tripping Radioactivity Detector

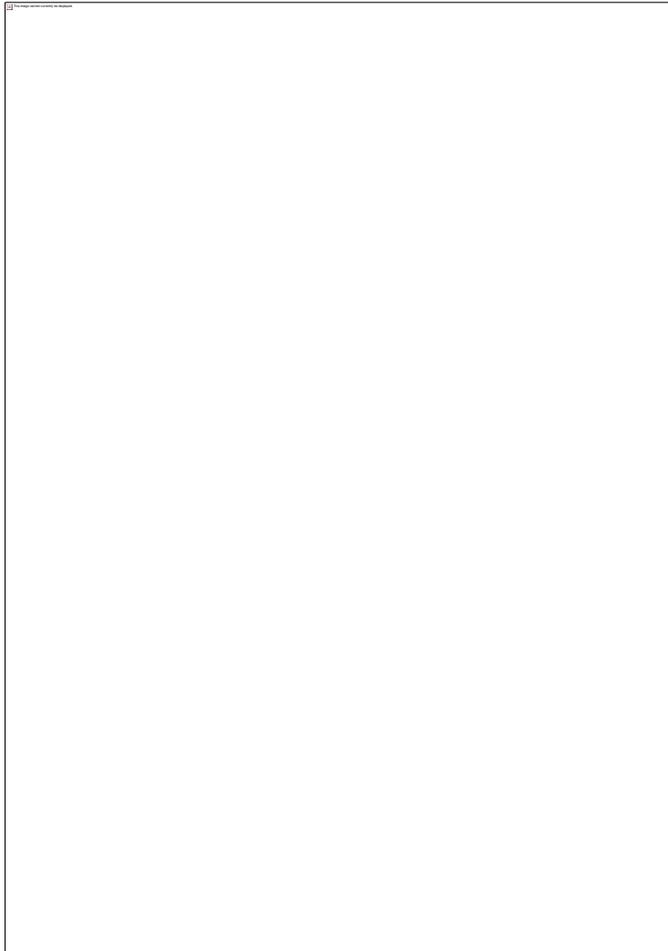


Compulsory Sensing



US Senate Passes Bill Requiring All New Cars in America to Come Equipped with a Black-box by 2015

Mobile Sensors



Honeywell T-Hawk

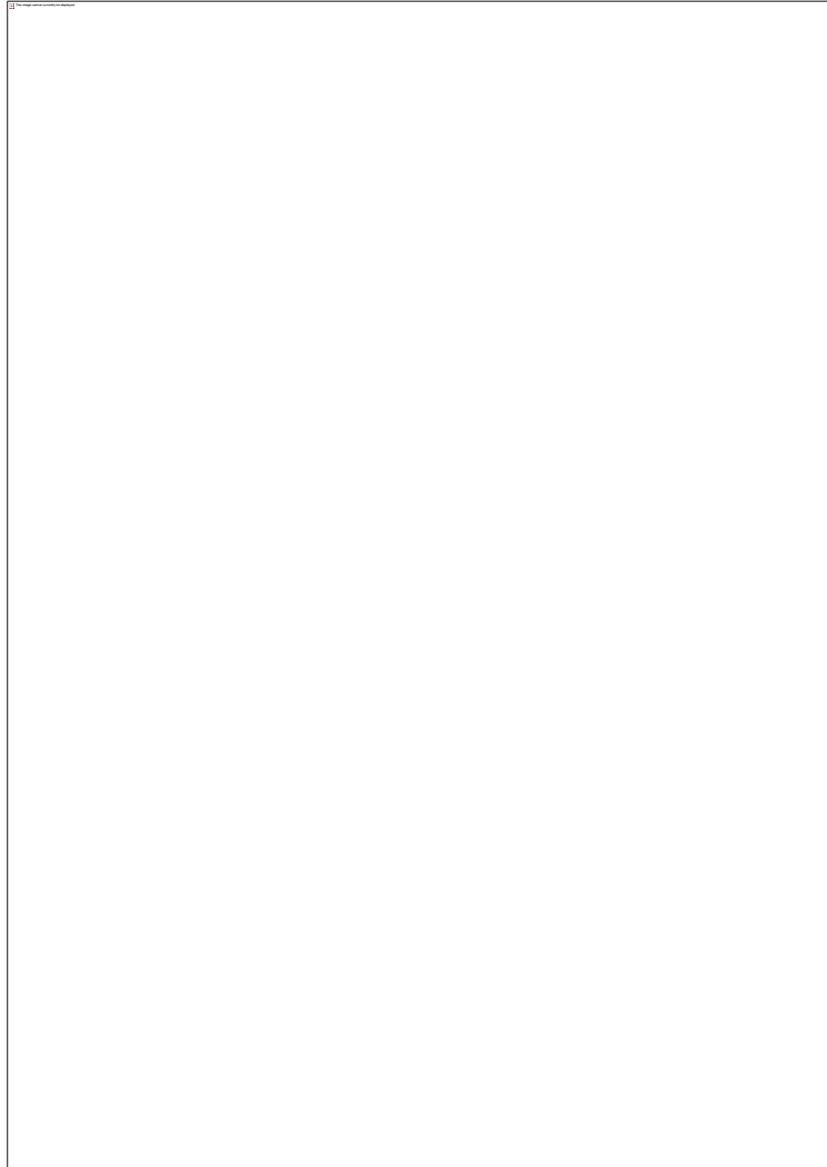
“Intended to provide the dismounted soldier with Reconnaissance, Surveillance, and Target Acquisition (RSTA) and laser designation. Total system weight, which includes the air vehicle, a control device, and ground support equipment is less than 51 pounds (23 kg) and is back-packable in two custom MOLLE-type carriers.”

Tech Transfer



Miami-Dade Police Department's Drones Ready to Fly

3 Billion+ Mobile Devices

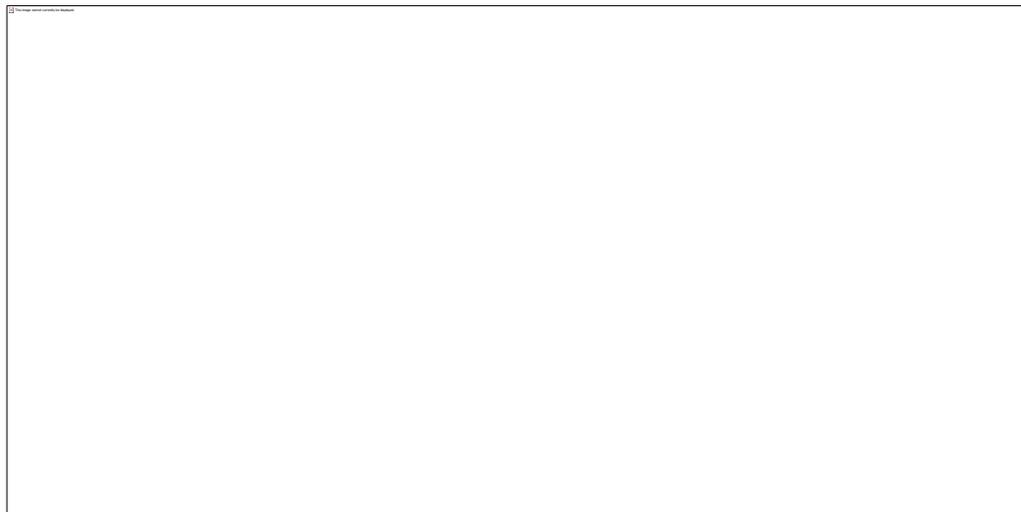


Connected Cars



OnStar

We are Losing Control of our Technology

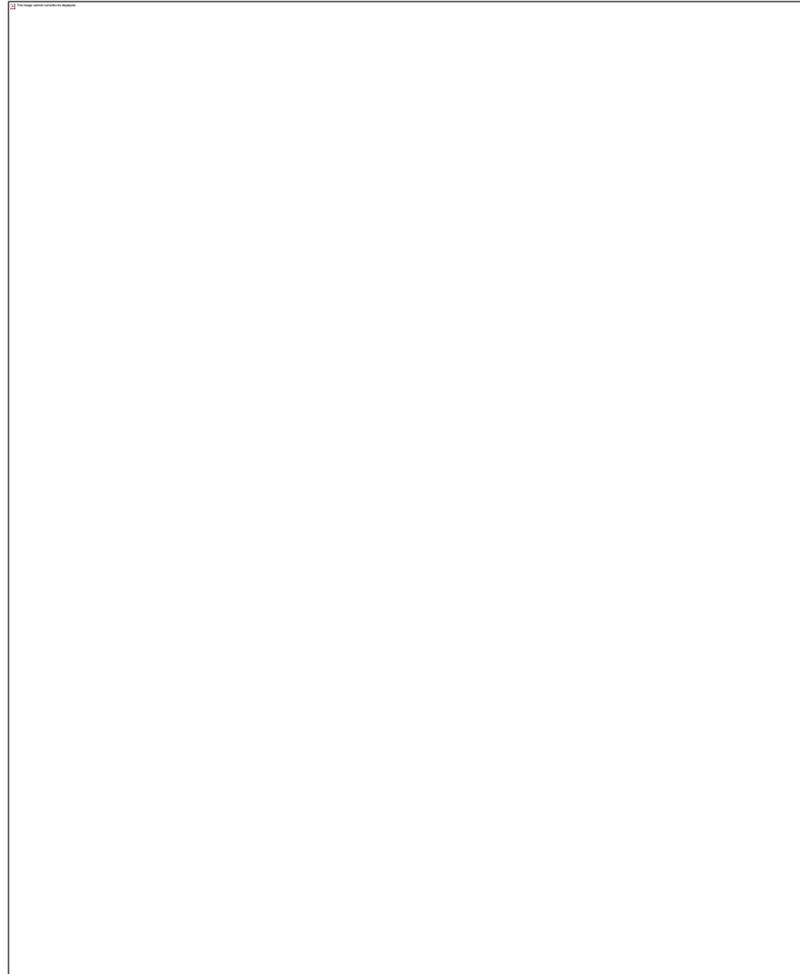


So when I get into a car—a computer that I put my body into—with my hearing aid*—a computer I put inside my body—I want to know that these technologies are not designed to keep secrets from me, or to prevent me from terminating processes on them that work against my interests.

- Cory Doctorow

* Note that this quote is taken a bit out of context. Mr. Doctorow was speculating that he may require a hearing aid at some point in the future.

Facial Recognition



National Identity Registries



India Launches Universal ID System with Biometrics

Crowdsourced Identification



Vancouver Riots

www.identifyrioters.com

Crowdsourced Crime Detection



Internet Eyes - “Detecting Crime as It Happens”

Augmented Reality



Google's Project Glass: One Day...

<http://www.youtube.com/watch?v=9c6W4CCU9M4>

<http://www.wsvn.com/news/articles/local/21003198189967/>

<http://www.nbcmiami.com/news/local/Miami-Dade-Police-Departments-Drones-Ready-To-Fly-137434223.html>

Conversion of Analog Systems to Digital

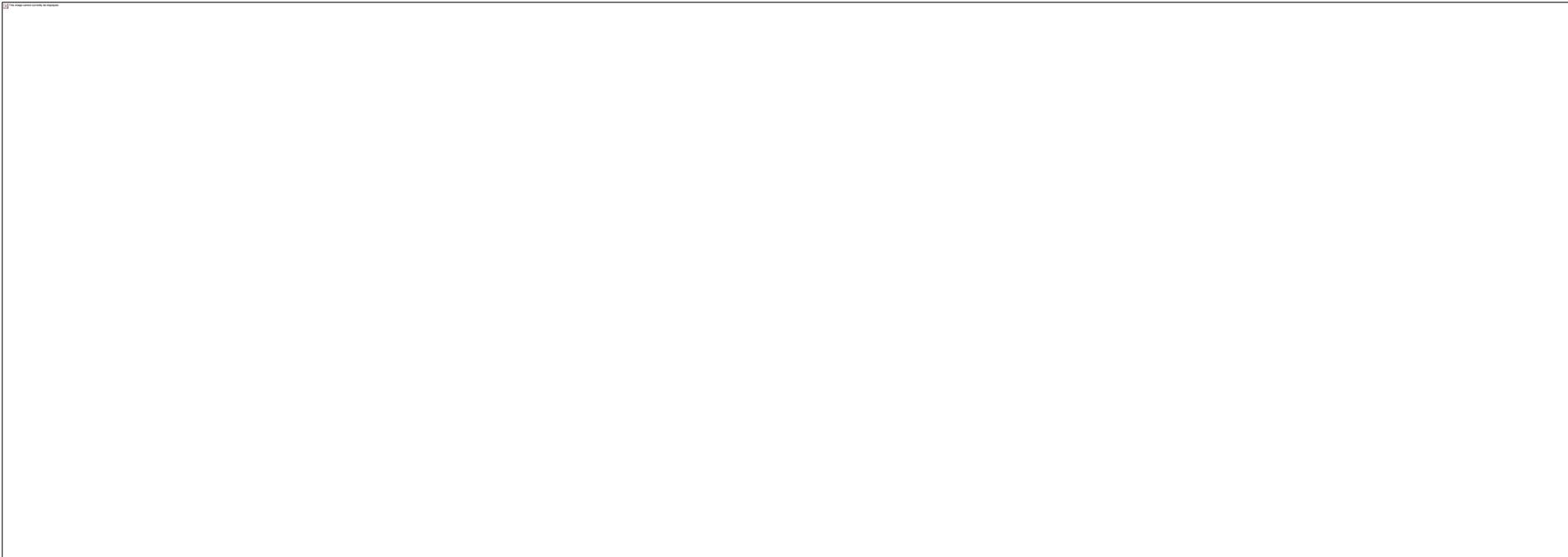


Improved Algorithms



Cordon: 32 Vehicle Tracking Across 4 Lanes

Increased Analytics

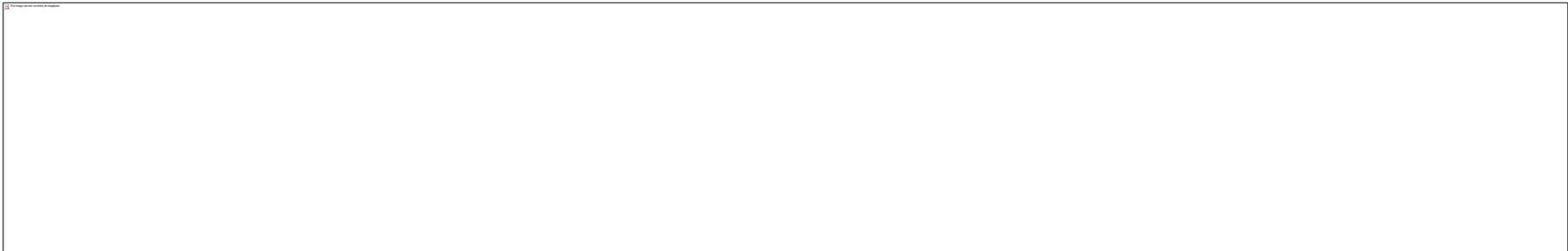
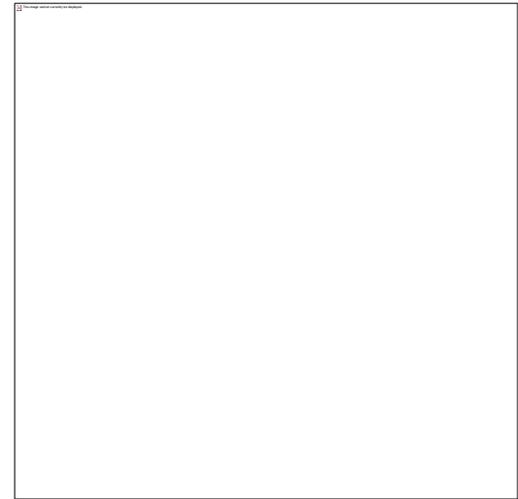
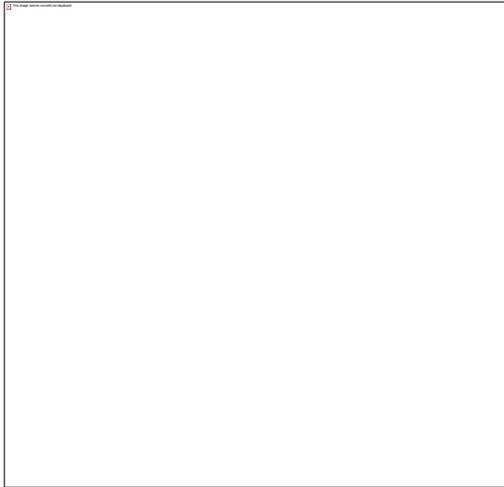


Wide Area Motion Imagery (WAMI)

See also Persistent Stare Exploitation and Analysis System (PerSEAS)



Location Tracking





Predictive Policing is on the Rise

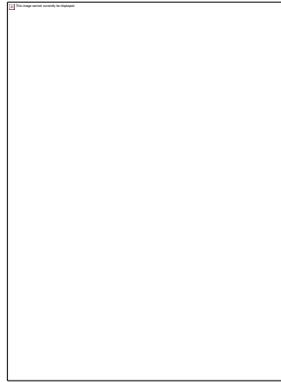
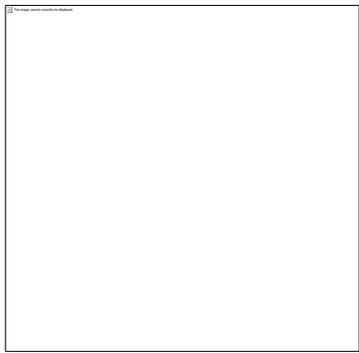
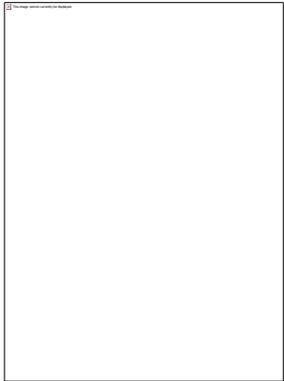


California Police Praise Predictive Policing

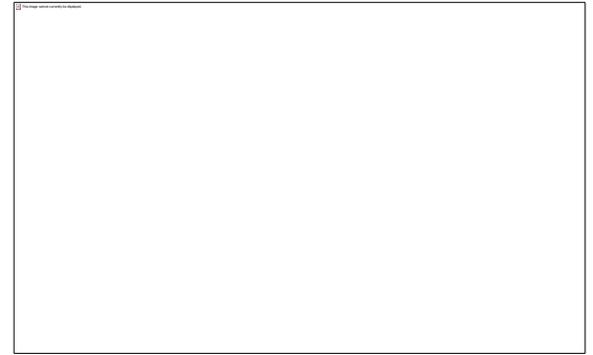


Minority Report

Lots of Interested Parties



Federal, State, and Local Law Enforcement



Insurance Companies

* Note that we aren't stating that these specific entities are necessarily interested in Automated Law Enforcement, but in general we argue such types of entities are.

http://en.wikipedia.org/wiki/Oregon_State_Police
<http://www.coolgadgetconcept.com/coolest-police-badge/>
http://en.wikipedia.org/wiki/File:BlA_Police_Officer_Badge.jpg

Well Intentioned Officials

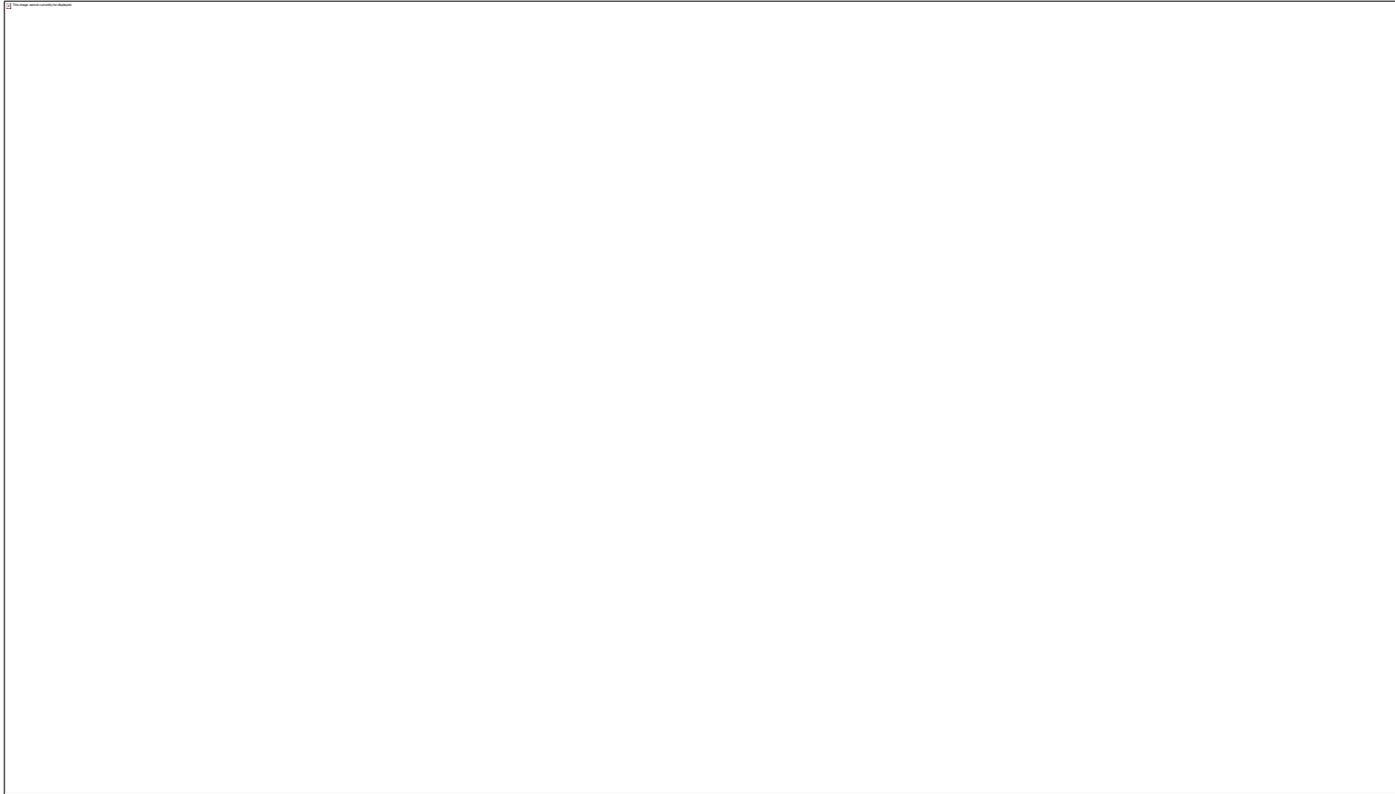


New York City Soda Ban

“Strict Enforcement” Business Models Exist



Quotas Exist

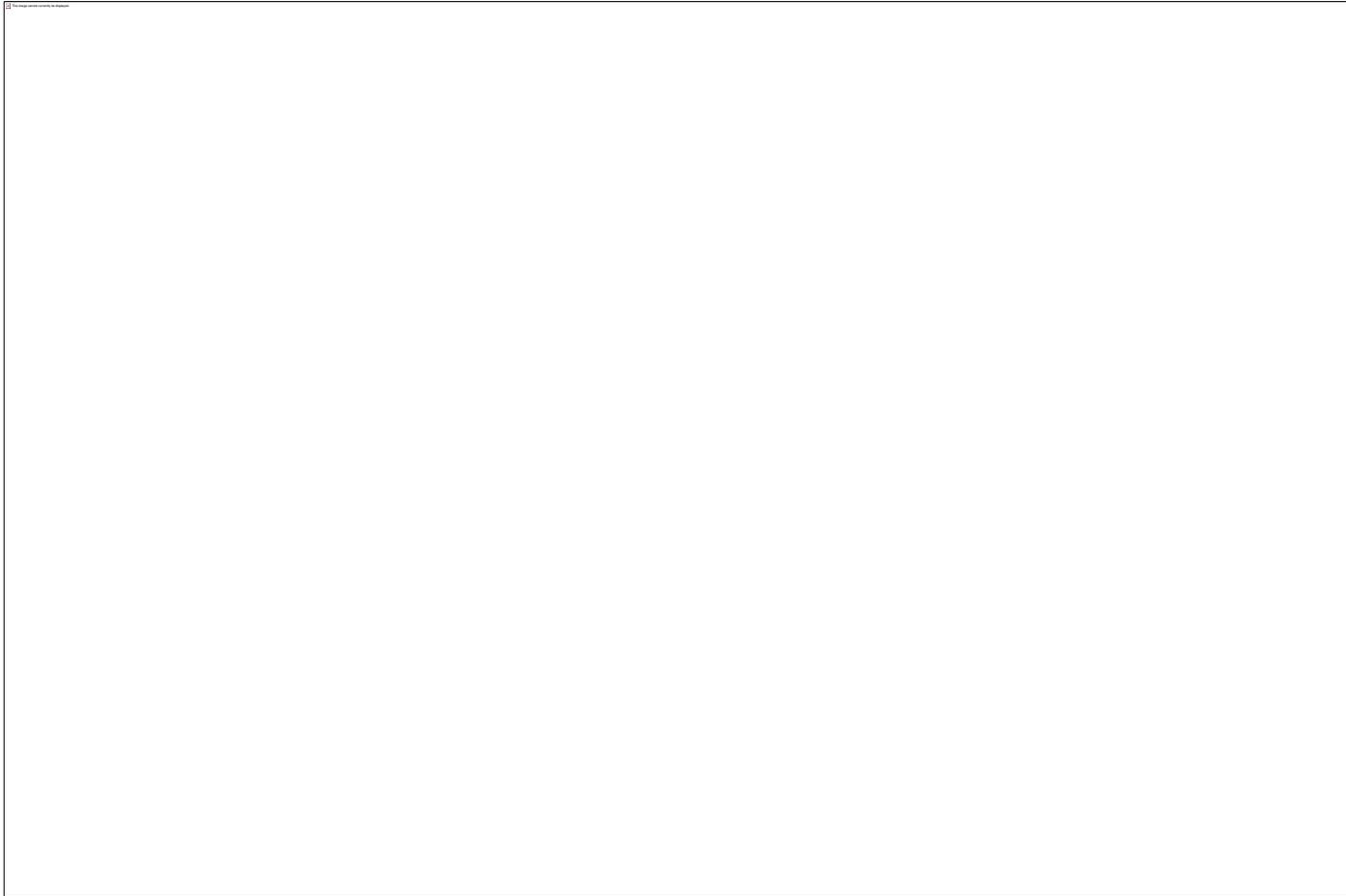


August 25, 2011 - This is to remind all PBA members that any threat of retaliation for failure to perform a specific numbers of police actions (summonses, stop and frisks, arrests etc.) within a specified time period is a violation of the quota law and a grievable offense. We encourage all of our members who experience the threat of retaliation or punishment to file an immediate grievance with the PBA. The attached form was developed to expedite the grievance process in these cases.

Bait Cars



and Other Types of Bait...



And Illegal Enforcement...



And 'ol Charlies workin' out real good down at the corner store where the red light is. He sees them out-of-state plates two blocks away. Whey they get right on top of that green light, ol' Charlie pushes that secret button underneath the corner drug store counter. And that yellow light only lasts for a tenth of a second.

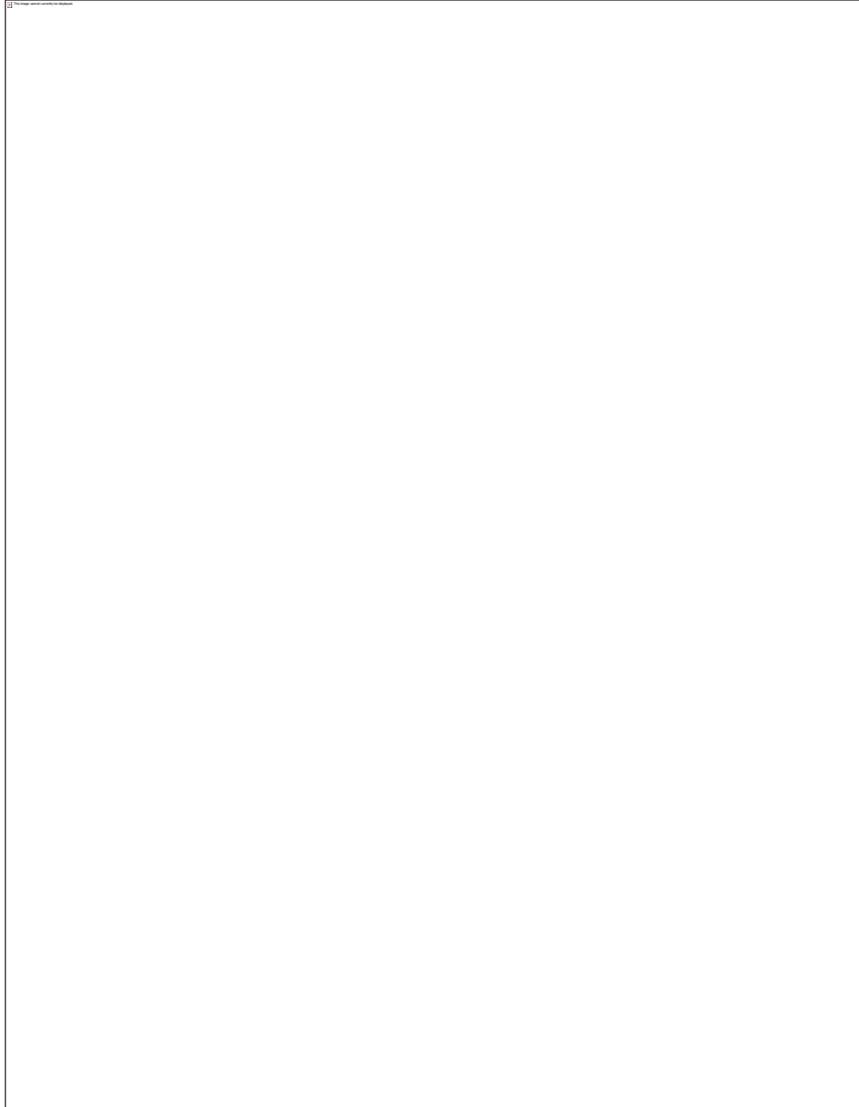
- Hoyt Axton (Speed Trap)



Some Regimes May Take Enforcement to a Whole Other Level

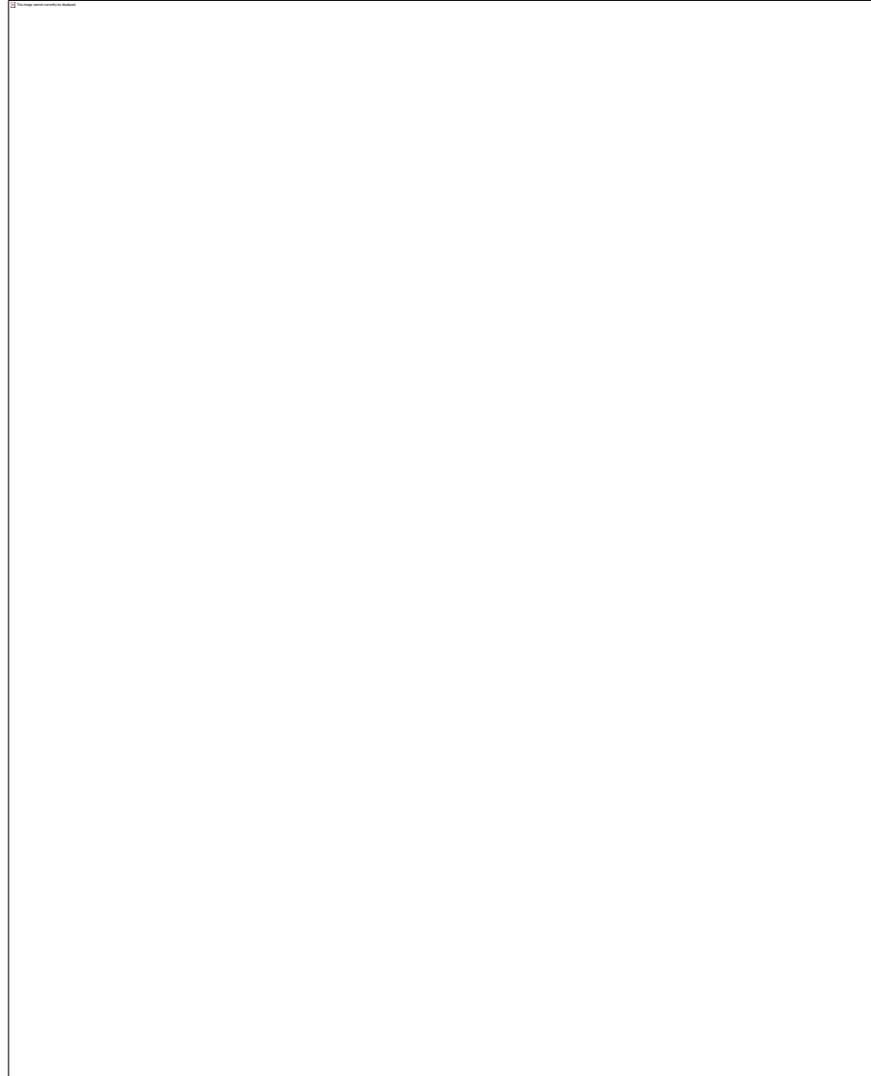


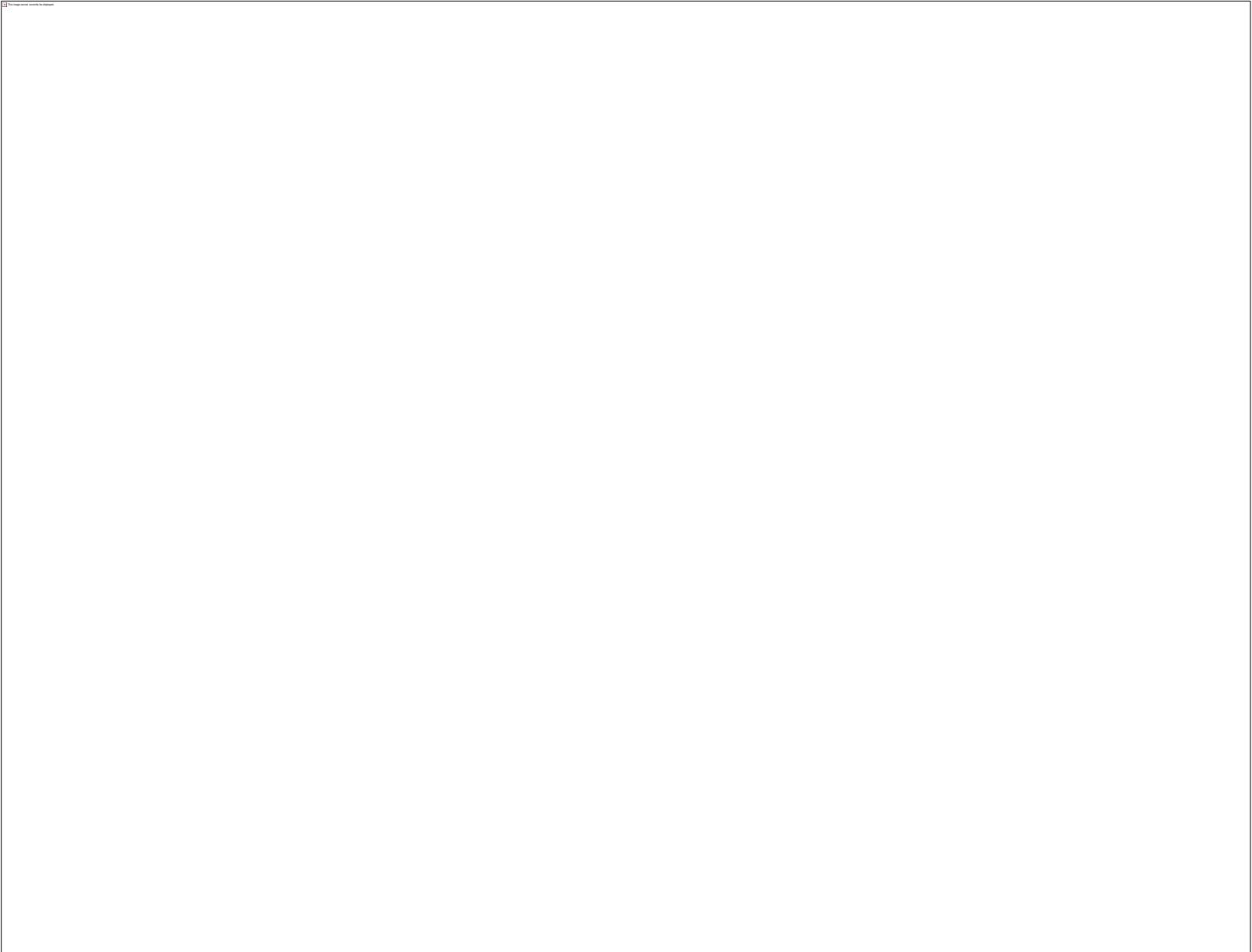
Citizens Who Want a Free Lunch...





Social Media





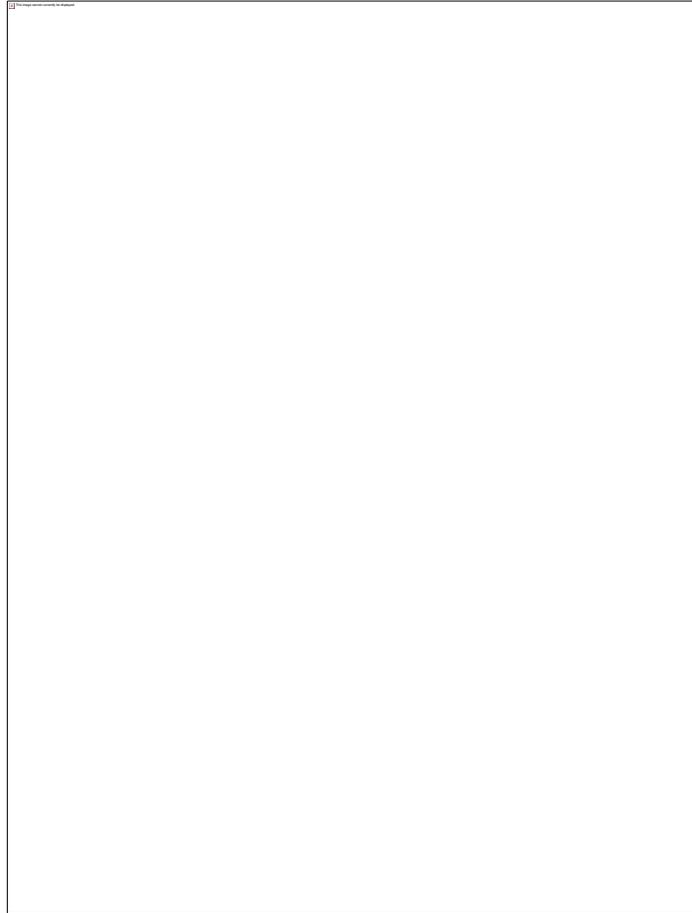
Successful Prototypes



Bus Lane Enforcement
Red Light Enforcement
Speed Limit Enforcement
Stop Sign Enforcement
Congestion Charge
HOV Lane
Railroad Crossings
Illegal Parking
Illegal Turns



The Inadequacy of Law



Sniffer Dogs

Florida v. Harris

Florida v. Jardines

<http://www.scotusblog.com/case-files/florida-v-harris/>
http://en.wikipedia.org/wiki/File:Border_detection_dog.jpg
<http://www.scotusblog.com/case-files/cases/florida-v-jardines/>



So Where is all the Heading?

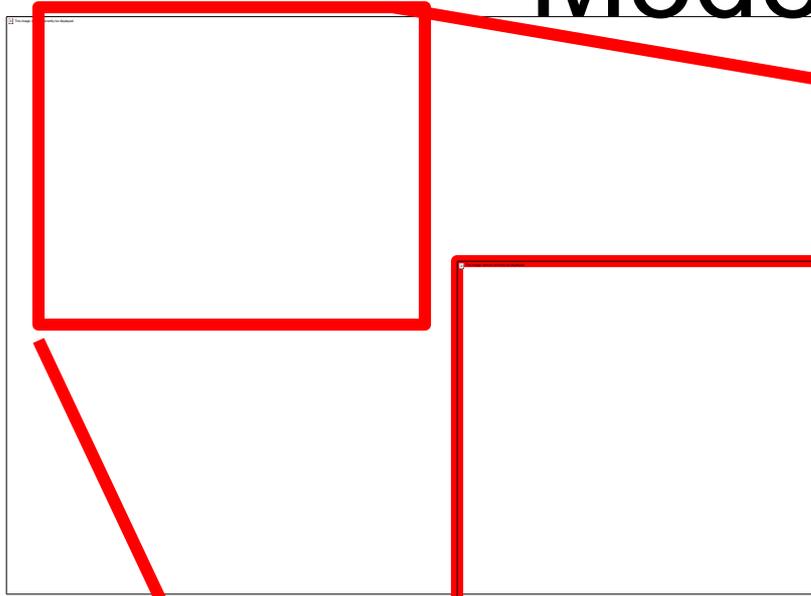
- Enabling technologies
- Ubiquitous sensors
- Promiscuous data sharing
- Security and financial incentives
- Well intentioned law enforcement
- Complacent citizenry
- Law lagging technology
- Successful prototypes

So How Does the Law Work?



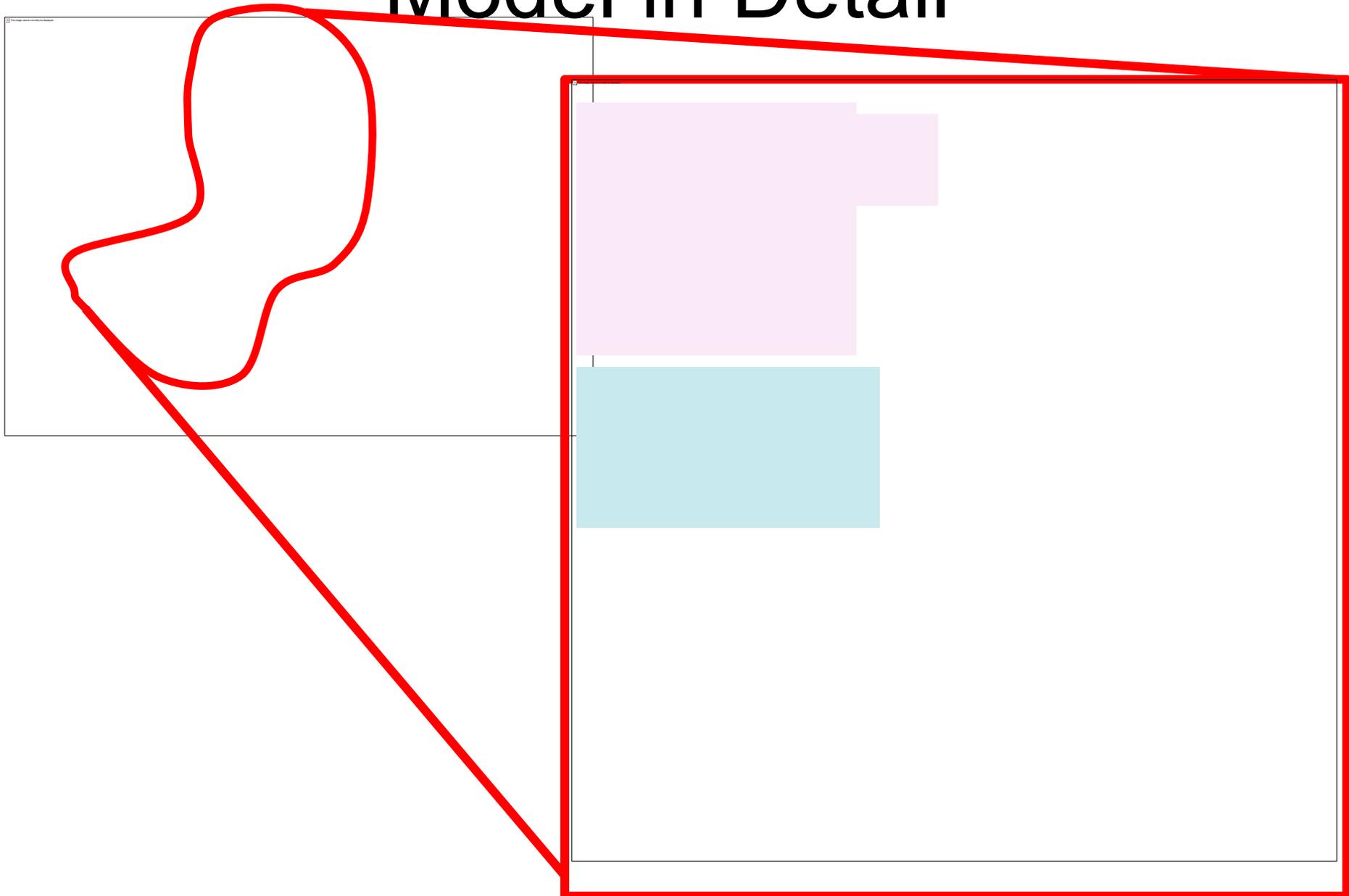


Model in Detail

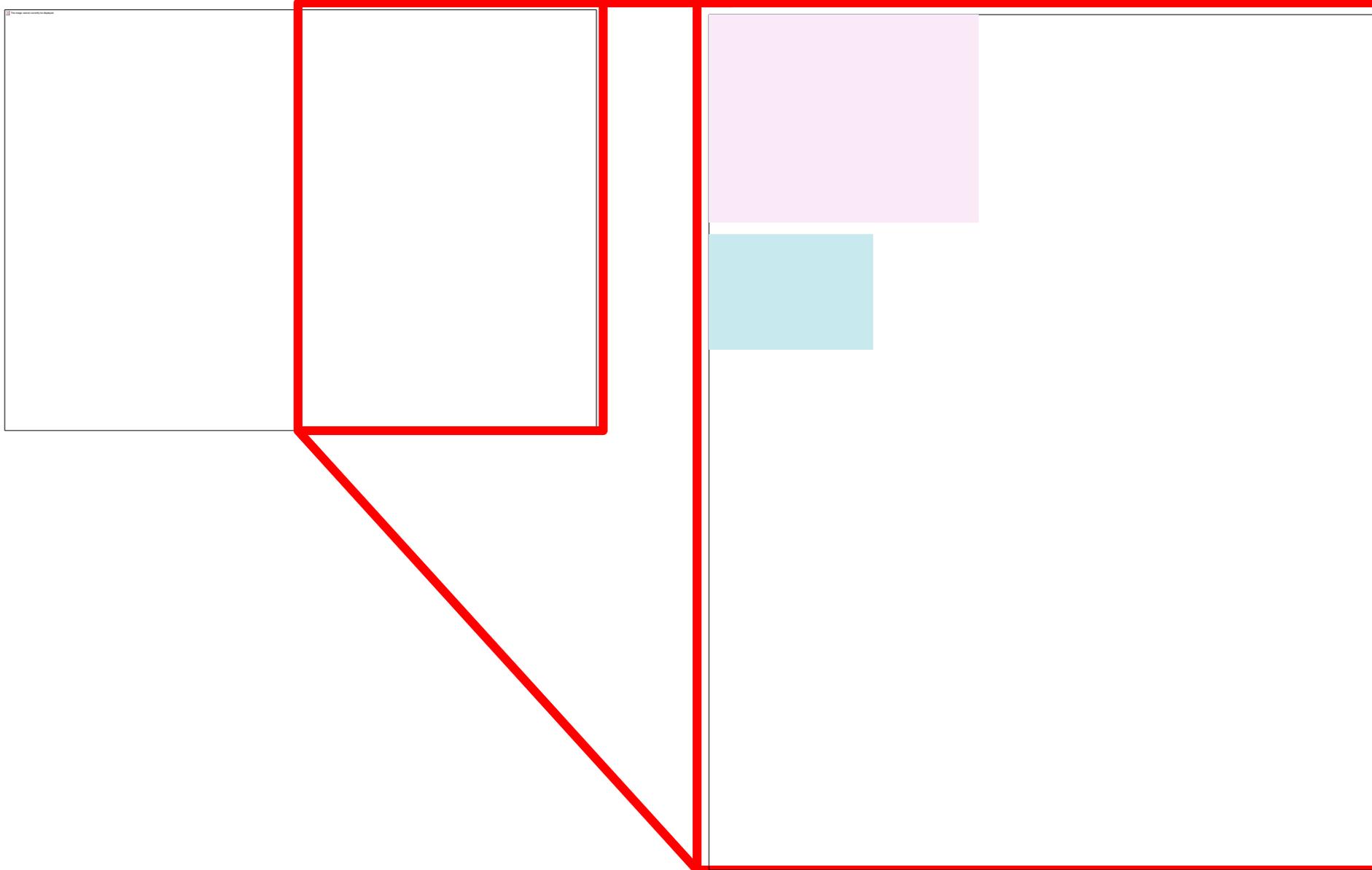




Model in Detail



Model in Detail





Punishment Feedback Loop



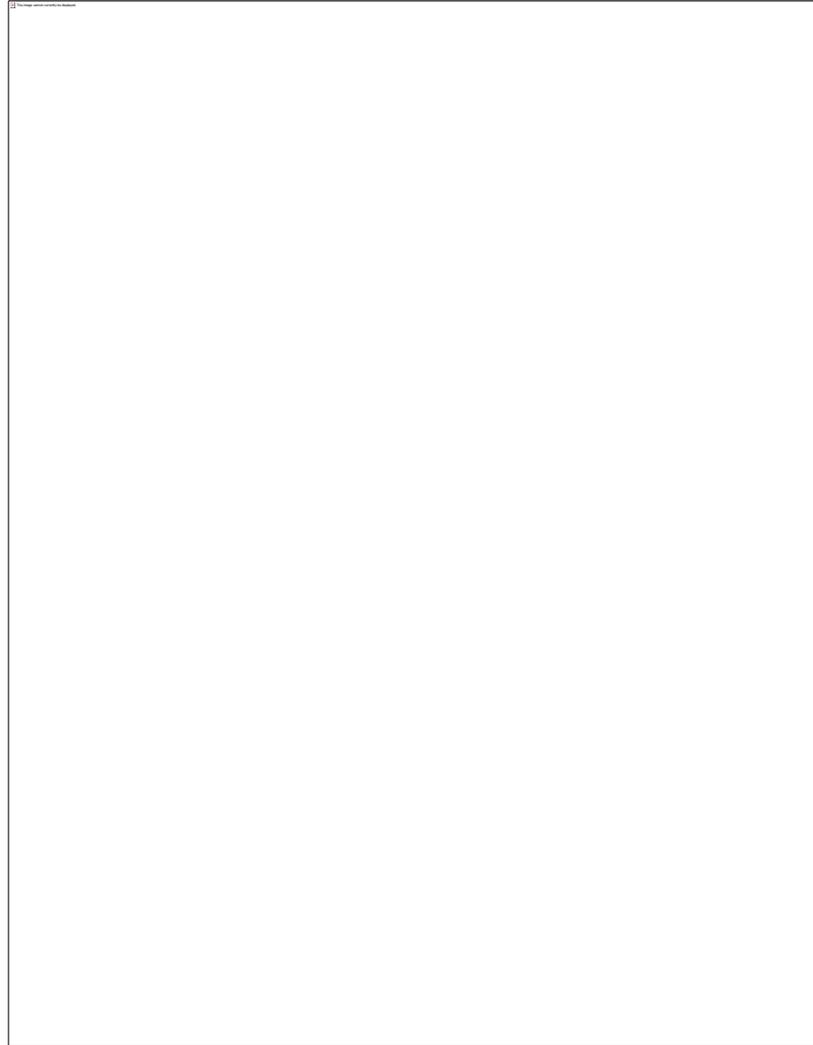
Punishment Capabilities

Notice



Virginia Traffic Information

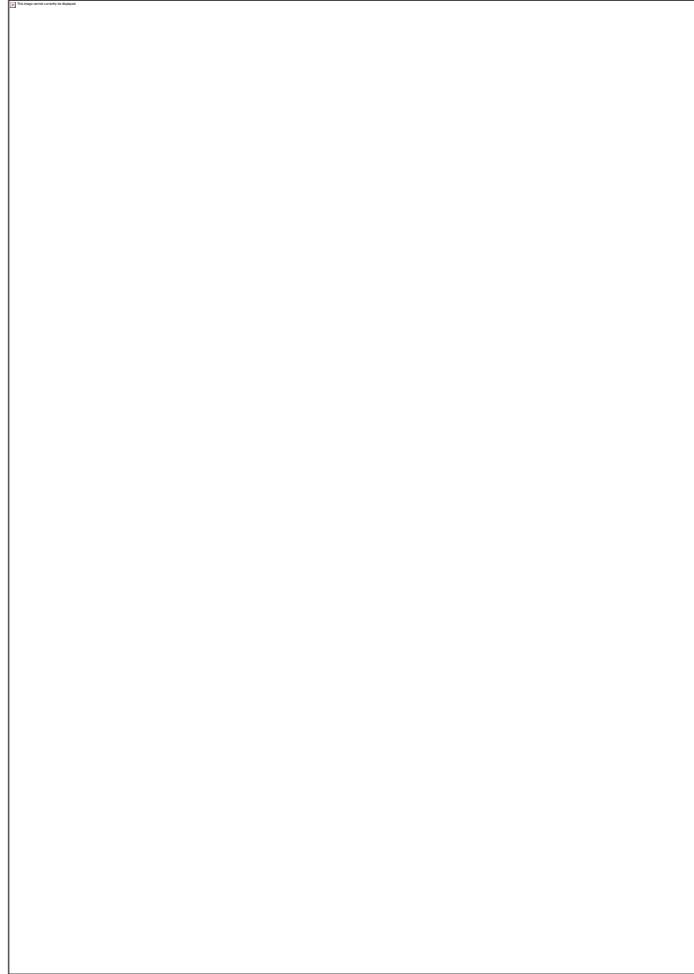
Notice



Montgomery County, Maryland

Intersection Safety Signal Warning Notice

Warning



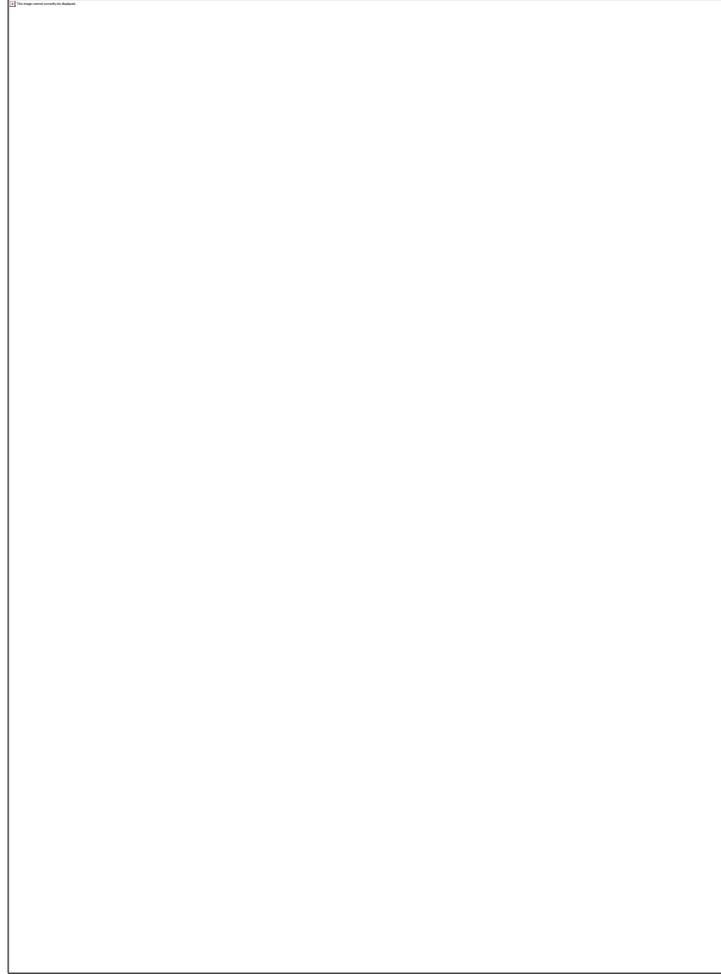
Highway Speed Display

Embarrassment



Ohio Department of Rehabilitation and Correction
Offender Search Database

Citation / Points / Fine



Howard County, Maryland, Traffic Camera Fine

Arrest



TASER and iRobot are Collaborating on a TASER-Shooting Robot

Prosecution

```
public bool ConfigureSnapshots
{
    get { return configureSnapshots; }
    set
    {
        configureSnapshots = value;
        snapshotsLabel.Visible = value;
        snapshotResolutionsCombo.Visible = value;
    }
}
/// <summary>
/// Provides configured video device.
/// </summary>
///
/// <remarks><para>The property provides configured video device if user confirmed
/// the dialog using "OK" button. If user canceled the dialog, the property is
/// set to <see langword="null"/>.</para></remarks>
///
public VideoCaptureDevice VideoDevice
{
    get { return videoDevice; }
}
```

Source Code from iSpy Camera Security Project



Confinement



The New Generation III Alcohol and Marijuana Sensing House Arrest Ankle Bracelet With Active GPS Is Now Available for only \$3.00 per day!



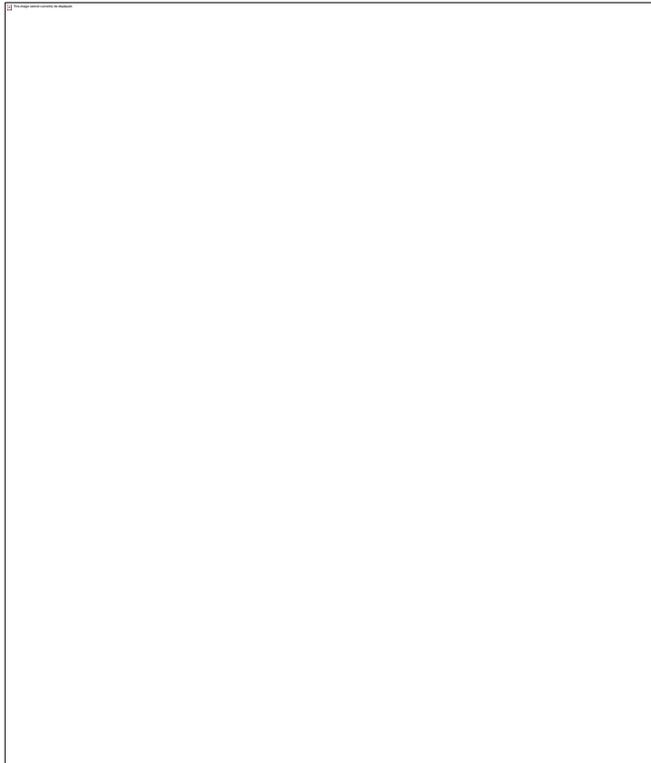
Confinement



The New Generation III Alcohol and Marijuana Sensing House Arrest Ankle Bracelet With Active GPS Is Now Available for only \$3.00 per day!

Electronic Monitoring Just Got Better!

Execution



Samsung Techwin SGR-1 robot (left) is deployed along the Korean DMZ



2

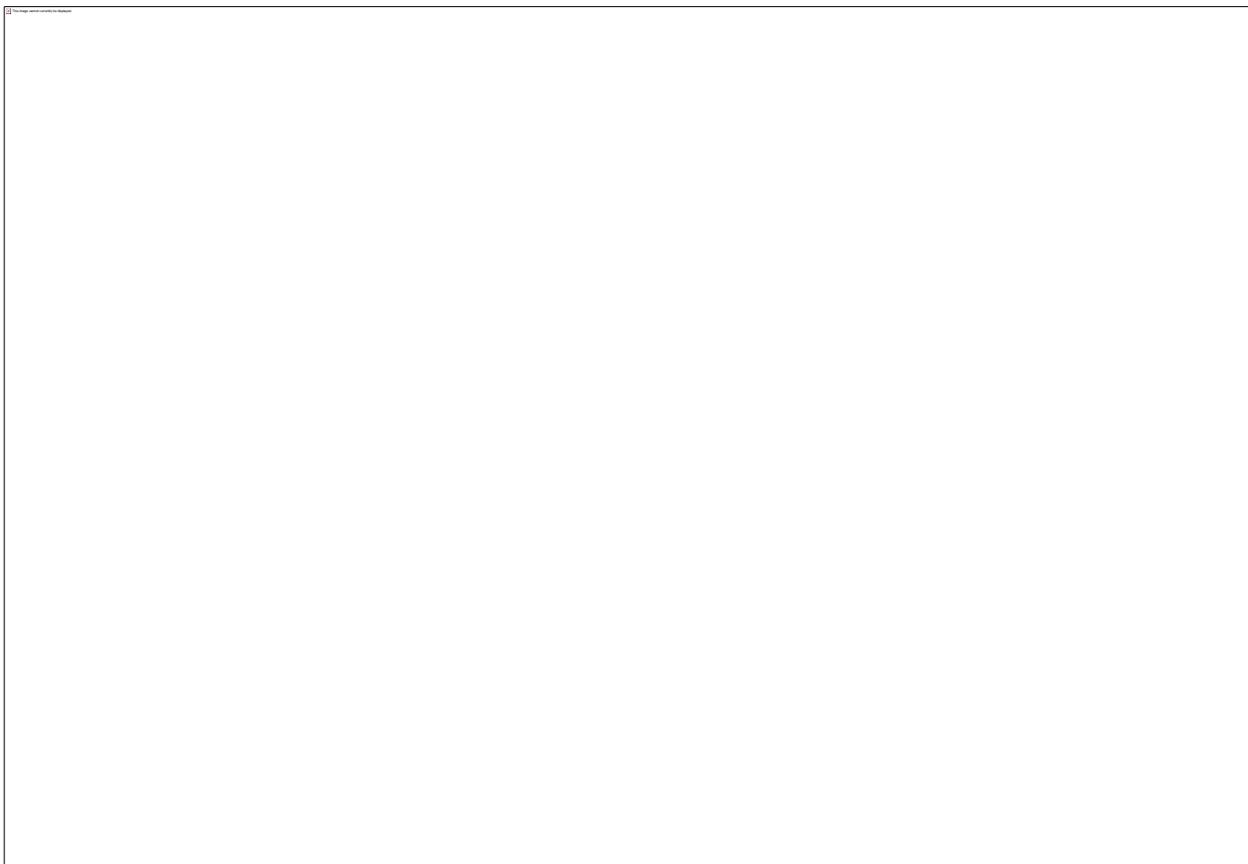


Advantages and Disadvantages

More Secure Society

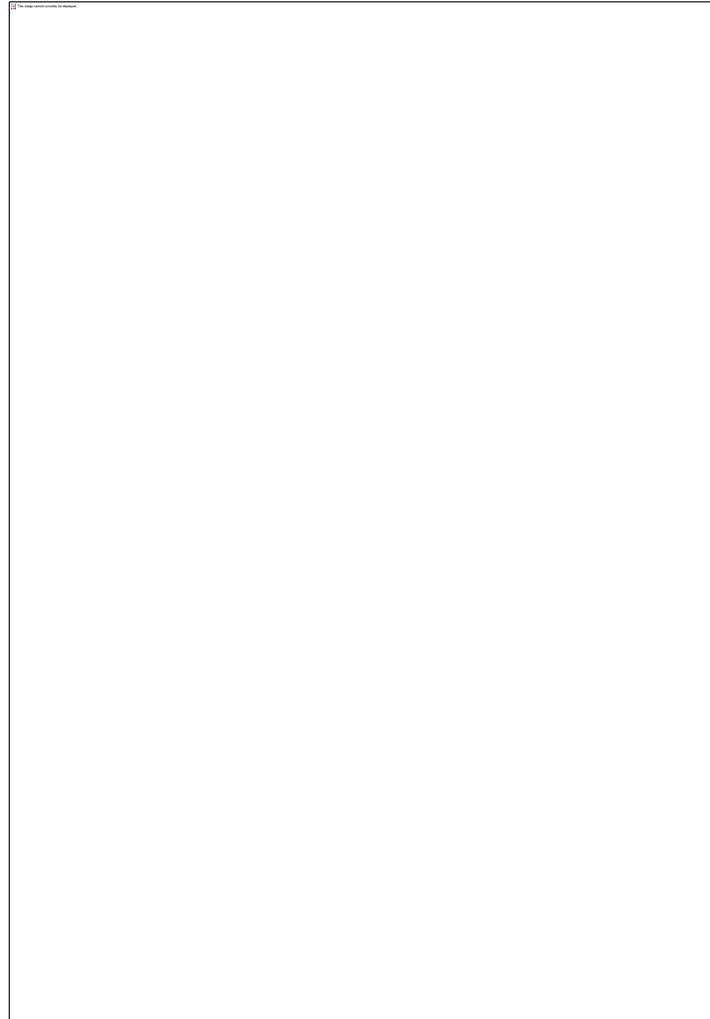


Safer Society



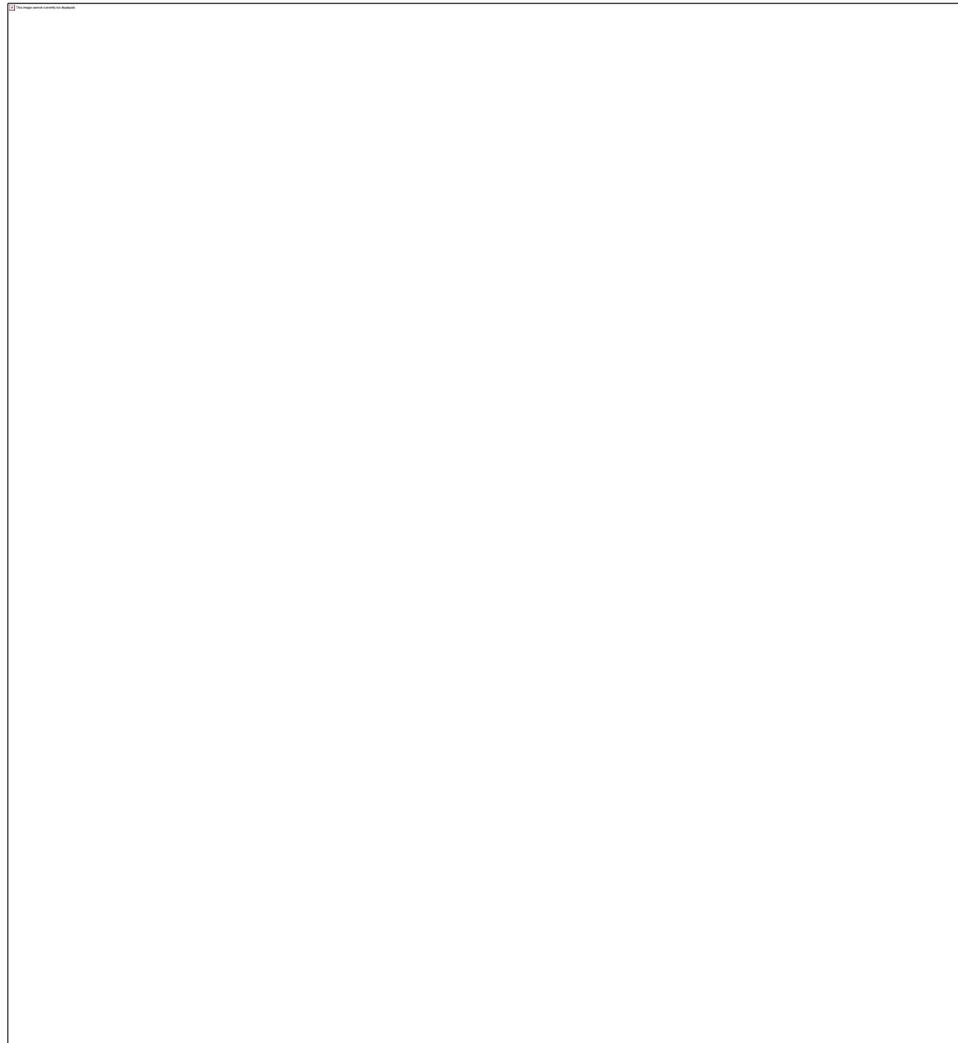


Increased Efficiency





Financial Incentives



Reduce Bias

Respect the badge

He earned it with his blood

Fear the gun

Your sentence may be death because

I am THE LAW!

You won't f**k around no more

I am THE LAW!

I judge the rich, I judge the poor

I am THE LAW!

Commit a crime, I'll lock the door

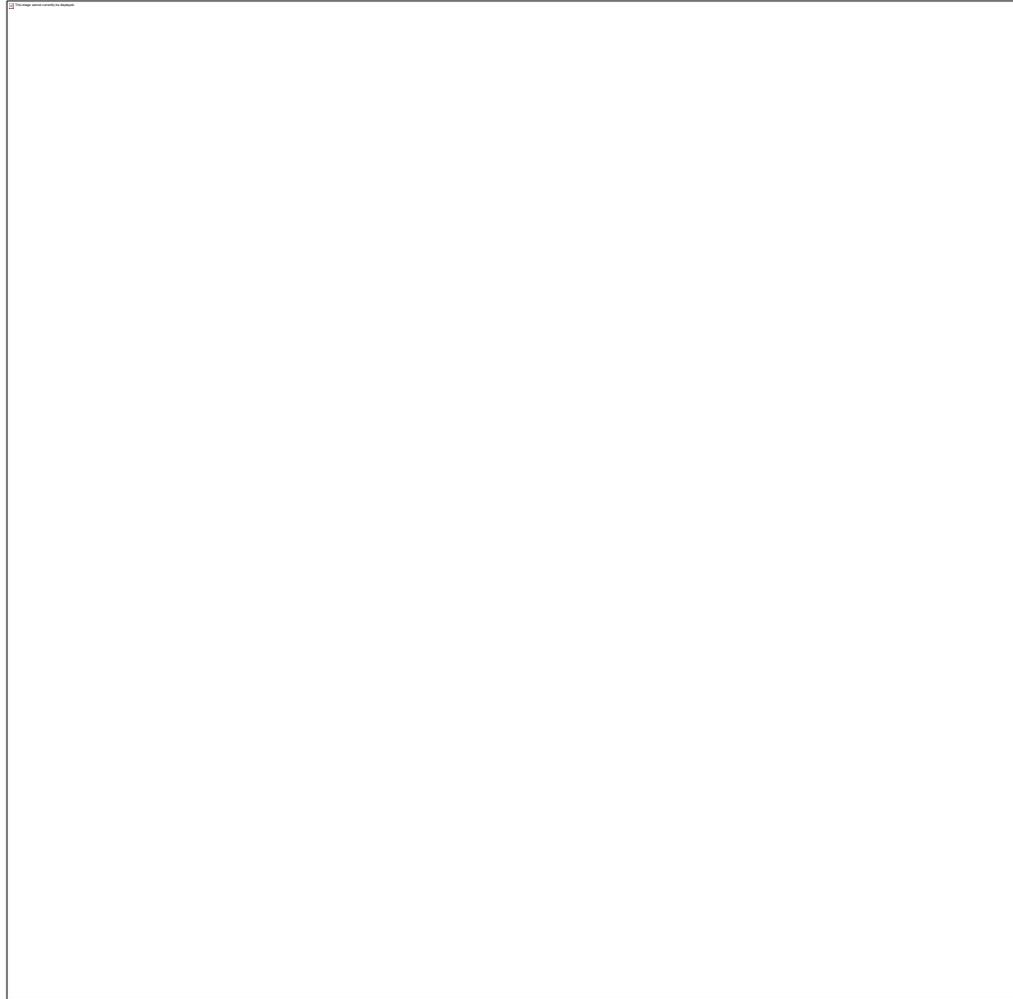
I am THE LAW!

Because in Mega-City

I am THE LAW!

- *Anthrax (Judge Dredd / I am the Law)*

Equal and Fair Enforcement of Law



Driving While Black

Equal and Fair Enforcement of Law



Crack



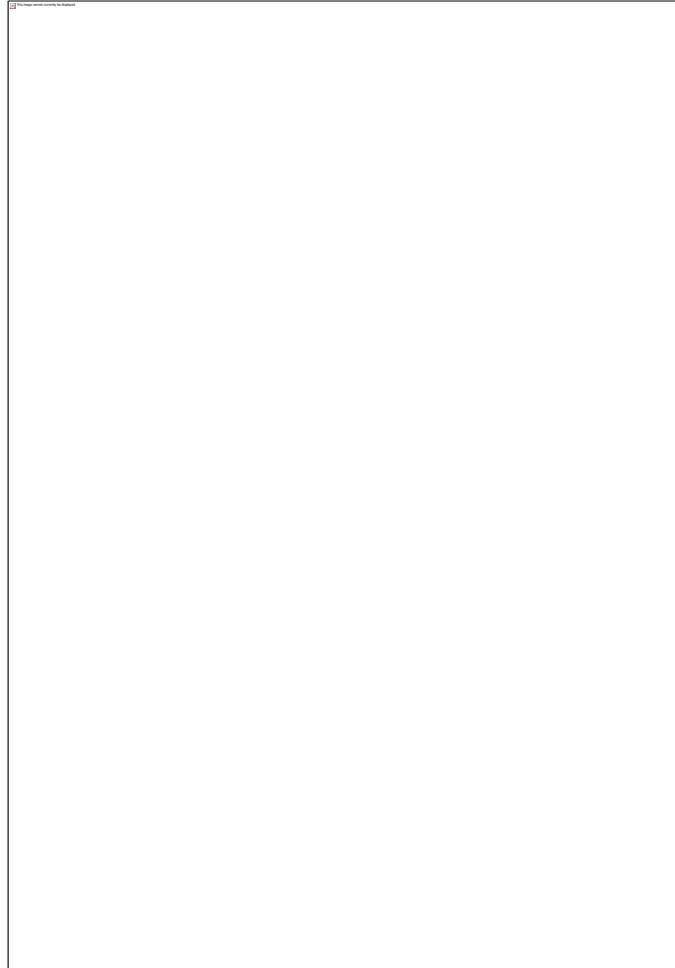
Cocaine

Protection from Abuse



Dallas set to pay \$1M for two Separate Police Abuse Cases

Increased Opportunity for Abuse



McCarthy-era Propaganda Comic Book

False Positives



ED-209

Please put down your weapon,
you have 20 seconds to
comply...

<puts down weapon>

You now have 15 seconds to
comply

I am now authorized to use
physical force

...

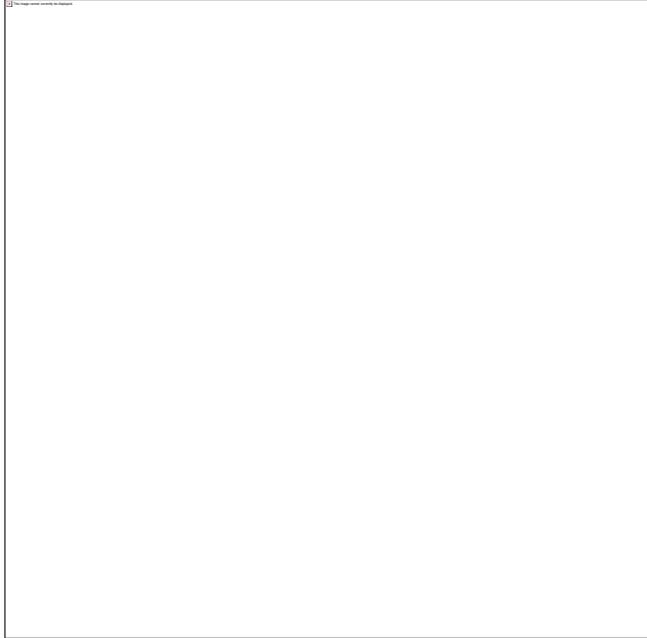
Dick, I am very disappointed...

Sir, I'm sure its only a glitch...

False Negatives



Misidentification



Terror List Snag Nearly
Grounded Ted Kennedy

“If they have that kind of difficulty with a member of Congress, how in the world are average Americans, who are getting caught up in this thing, how are they going to be treated fairly and not have their rights abused?”

- Senator Ted Kennedy



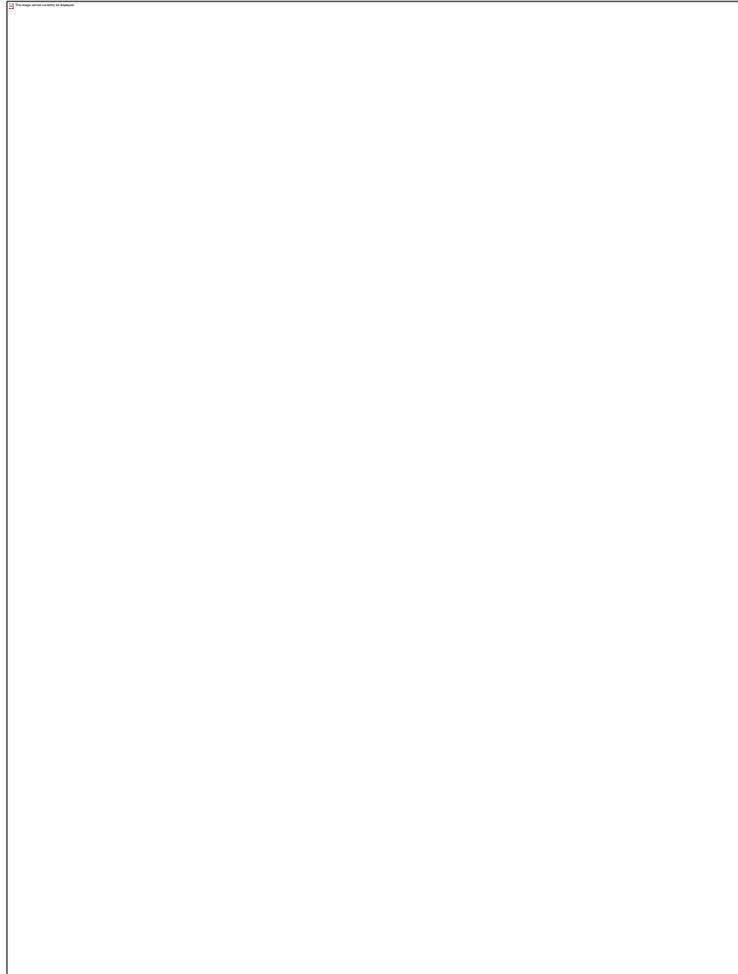
Less Compliant Populace



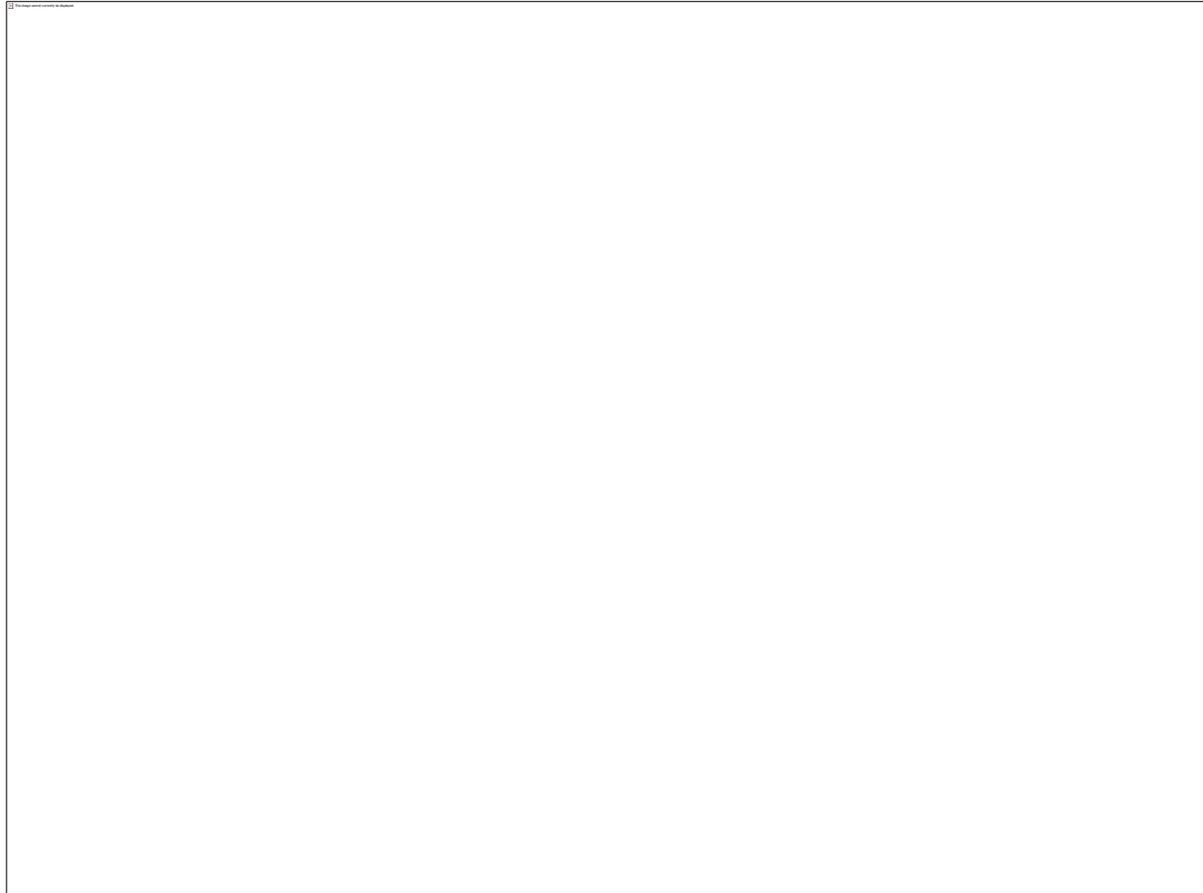
Risk of Unproportional Response



Social Control



Loss of Power



Montgomery County Maryland Police “Photographed Speeding Past Camera with Extended Middle Finger”

Lost Jobs





Questions Necessary to Confront Automated Law Enforcement

Method of Implementation

Control

Discretion

Perfection of Enforcement

Legal Integration of Algorithms

Preemptive / Post Hoc Enforcement

System Error / Malfunction

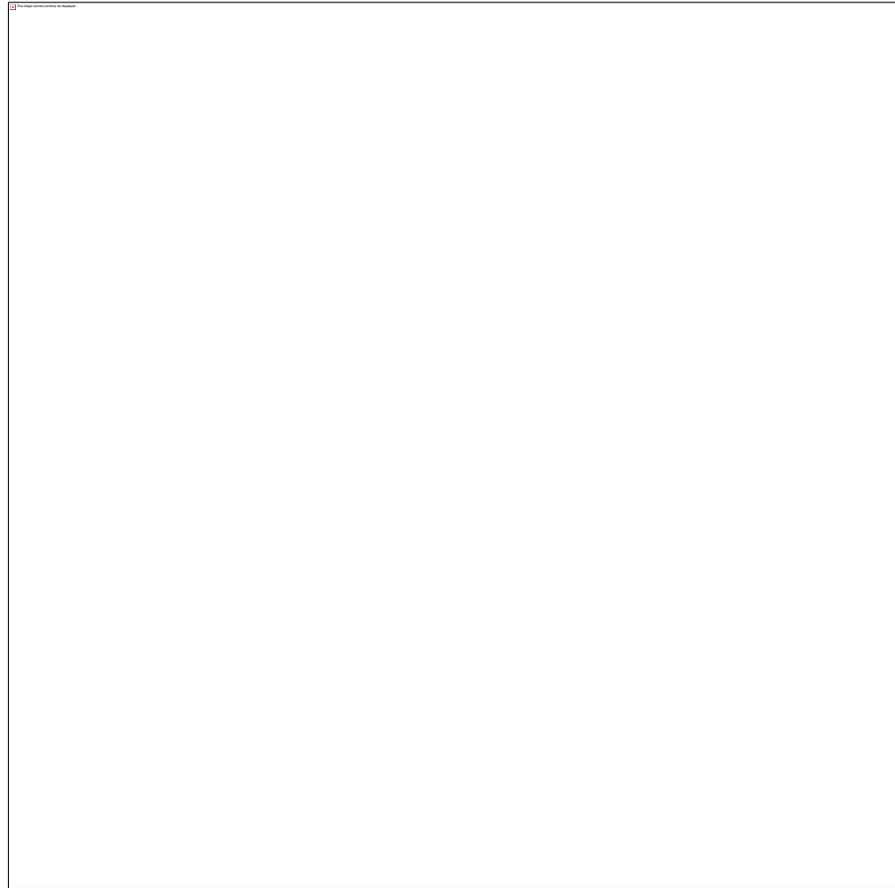
Administrative Burden

Procedural Safeguards

The Social Cost of Automation



Perfect Enforcement of the Law



No Jaywalking

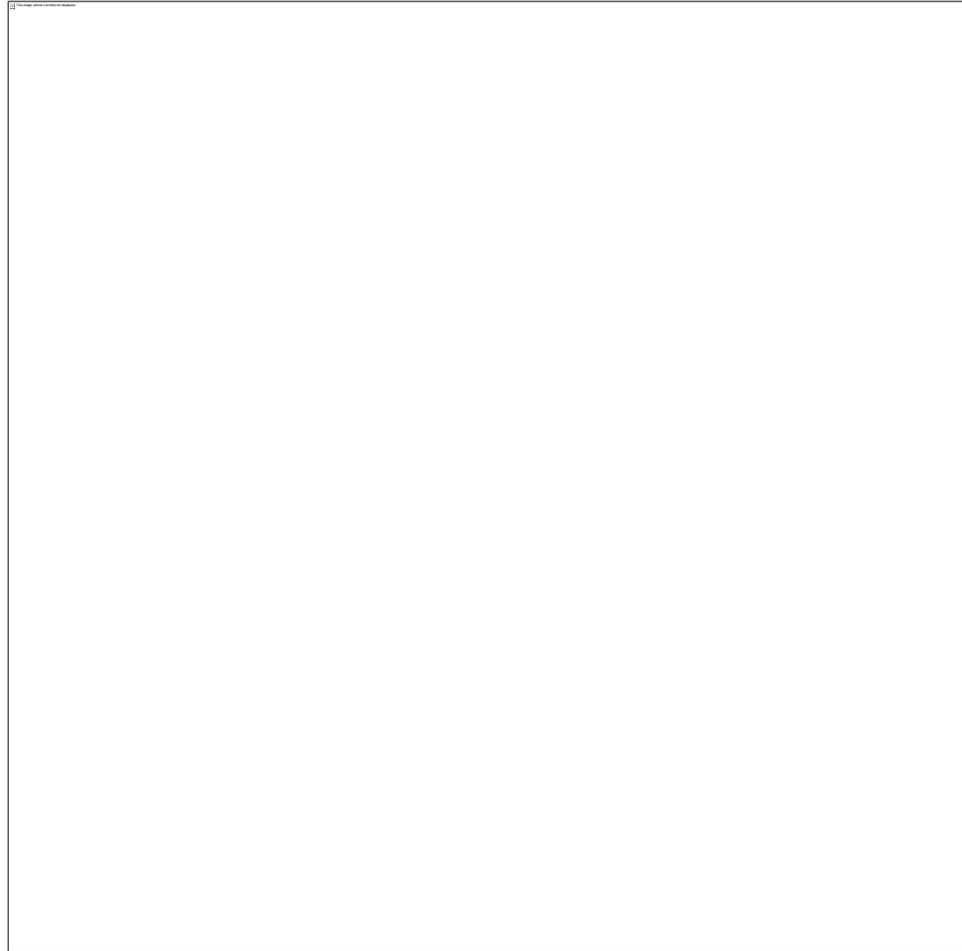


Loss of Human Discretion



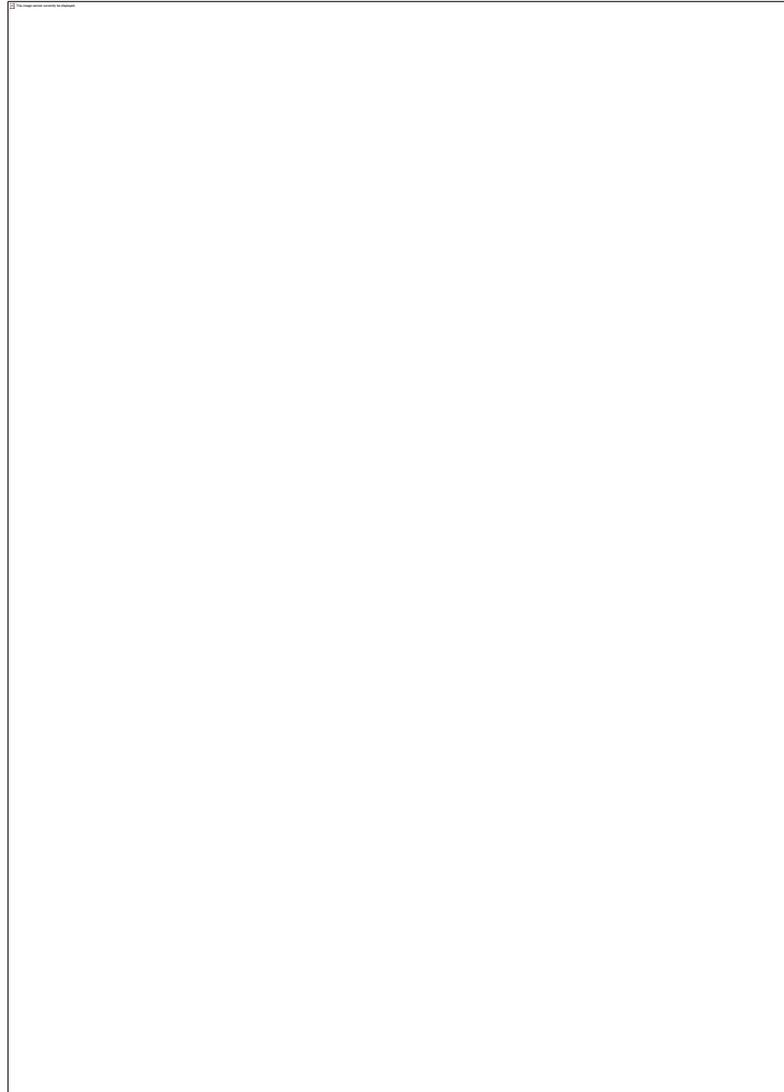


Automation Bias





Chilling Effects



Overflowing the System





Societal Harm



3

Analysis



Procedural Safeguards

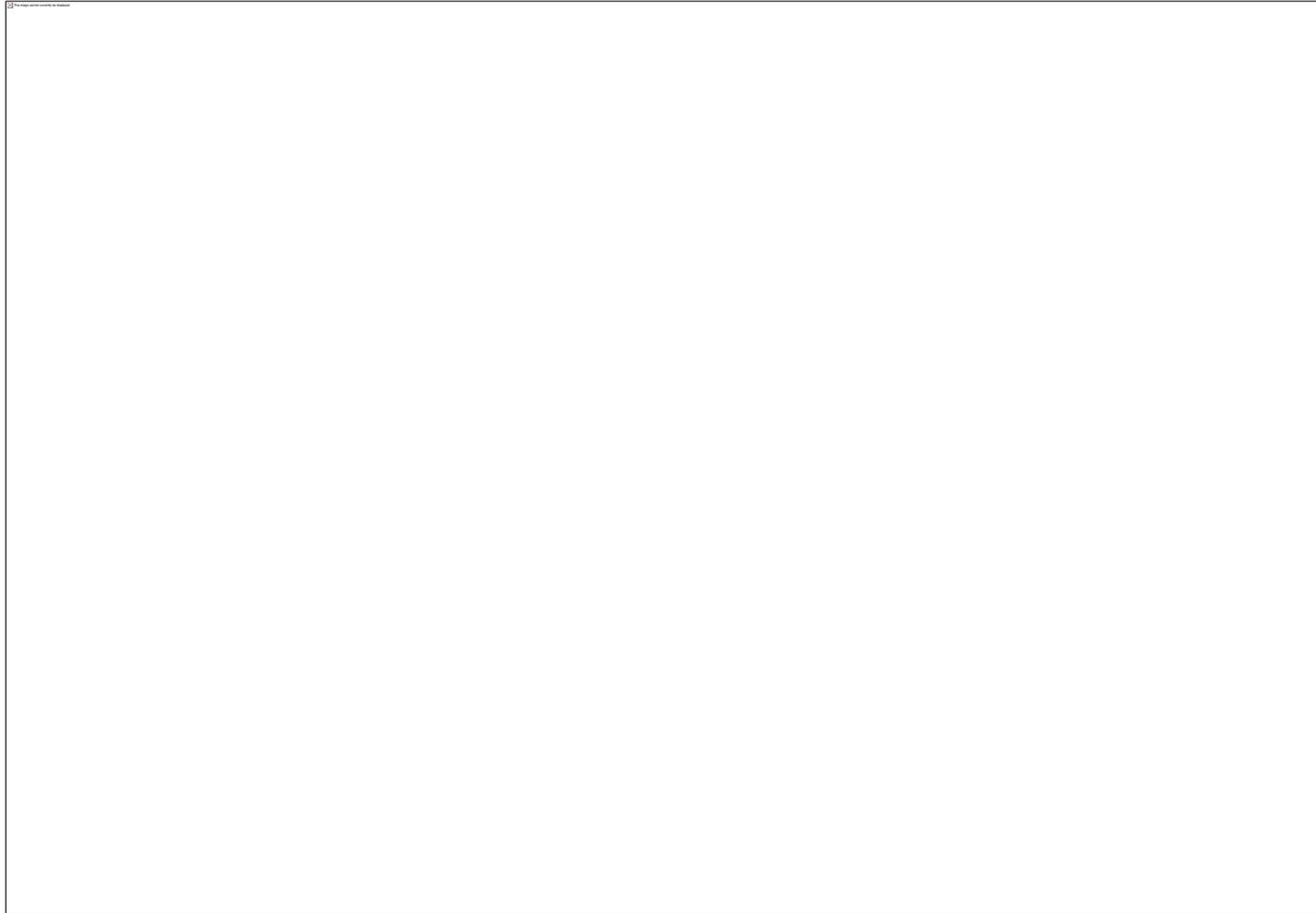
Due Process

Privacy

Freedom of Expression

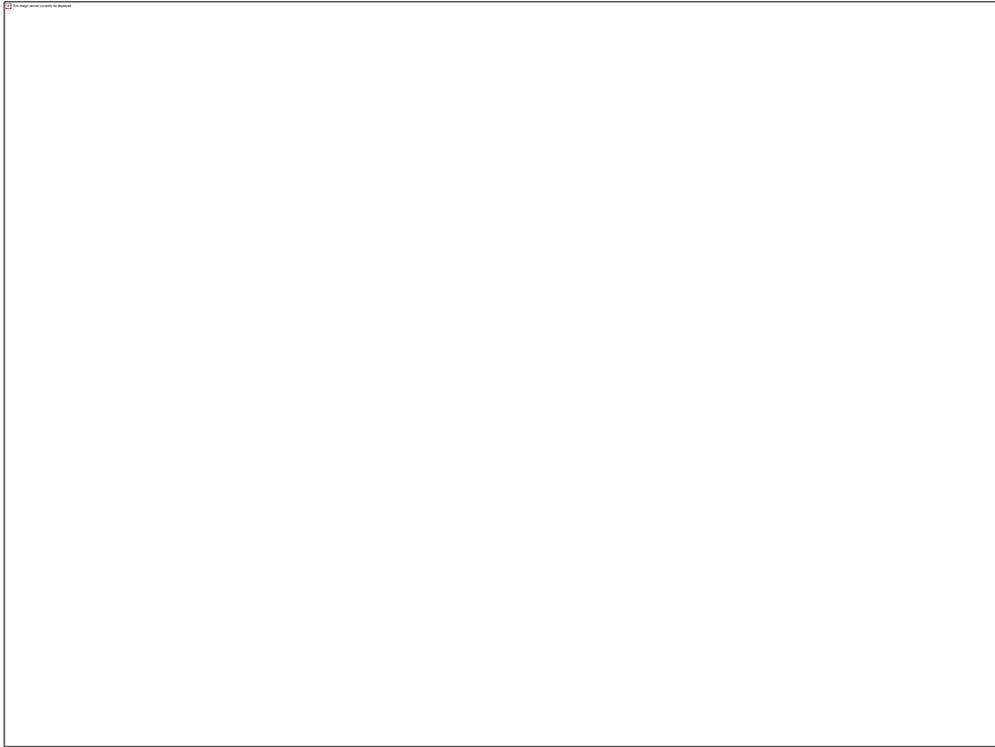
The Necessity Defense

Transparency



Countermeasures

Countermeasures



For more see our HOPE 9 talk

Defeat the Sensor

Detect

Monitor

Bypass

Shield

Exploit sampling rate

Scattering

Disable

Destroy

Jam

Spoof

Camouflage

Defeat the Network

Defeat the Processing

and more...

Competing Sensors



GPS Defense Against Radar

Algorithmic Laws?



Cruise Control set to 42 mph



Research Agenda

- Metrics to Assess Risk/Benefit
- Design for Transparency
- Design for Accountability
- Manual Overrides
- Built-in Security

This isn't Going to Happen Overnight



Cuyahoga River Fire

Be Careful What You Build



Three Points (redux)

1. Networked technologies have the potential to automate enforcement of the law.
2. Reckless and pervasive automation can have disastrous and unintended consequences.
3. This audience is in a unique position to defend society and appropriately confront law enforcement systems.



For More Information...

- Lisa Shay, Dominic Larkin, John Nelson, and Gregory Conti. "A Framework for Analysis of Quotidian Exposure in an Instrumented World." IEEE International Carnahan Conference on Security Technology, October 2012. (accepted, to be published)
- Lisa Shay and Greg Conti. "Countermeasures: Proactive Self-Defense Against Ubiquitous Surveillance." HOPE 9, July 2012.
- Lisa Shay, Woodrow Hartzog, John Nelson, Dominic Larkin and Gregory Conti. "Confronting Automated Law Enforcement." We Robot, April 2012.
- Greg Conti. "Our Instrumented Lives: Sensors, Sensors, Everywhere." DEFCON 18, July 2010.

We'd also like to thank John Nelson and Dominic Larkin for their support of this work.



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Questions?