



# C2: Camera Cop

## **PREPARED FOR**

Soft Computing

## **PREPARED BY**

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# EXECUTIVE SUMMARY

Millions of closed-circuit television (CCTV) cameras are installed in streets and businesses throughout the world with the stated goal of reducing crime and increasing public safety. Across India, police officials reel off cases where CCTVs have made all the differences in identifying offenders and speeding up investigations.

A 2013 New York Times/CBS poll found that 78% of respondents supported the use of surveillance cameras in public places, and authorities tend to point to spectacular successes — for example, crucial images cameras provided of the [Boston Marathon bombing suspects](#) or the [identification of those responsible](#) for the 2005 London attacks. Still, concerns remain about systems' **potential to violate personal privacy**, overall cost-effectiveness, **data security, transparency and accountability**.

C2: Camera Cop answers all these concerns with a simple solution by incorporating technologies namely **Machine Learning, Cloud computing, Deep Learning and Image processing**, a software that when added to existing network of CCTV camera is capable of **real-time theft and robbery detection** (for prototype). The product proposed is self learning in nature with database collected from crime instances all over the world and thus it **“Learns by its mistakes”** getting better each day. C2: Camera Cop is able to prevent crimes like robbery and theft (included in prototype), crime against women and elderly with minimum human intervention **making our society safe**, with keeping all the concerns of personal privacy, data security, transparency and accountability in check.

C2: Camera cop runs deep learning algorithm to detect the crime, then send a warning alert to concerned authorities along with keeping the instance video in a secured database. Saved video helps in better recognition of the accused and can be used in court of law, **making judiciary system more efficient and prompt**. The software allows the users for **prompt response at the time when crime is happening rather after it**.

A 2017 report by Global Peace Index had claimed India to be the fourth most dangerous country for women travellers. The data highlight the urgent need to ensure proper law and order situation in the country. Pointing to urgent need of such product.

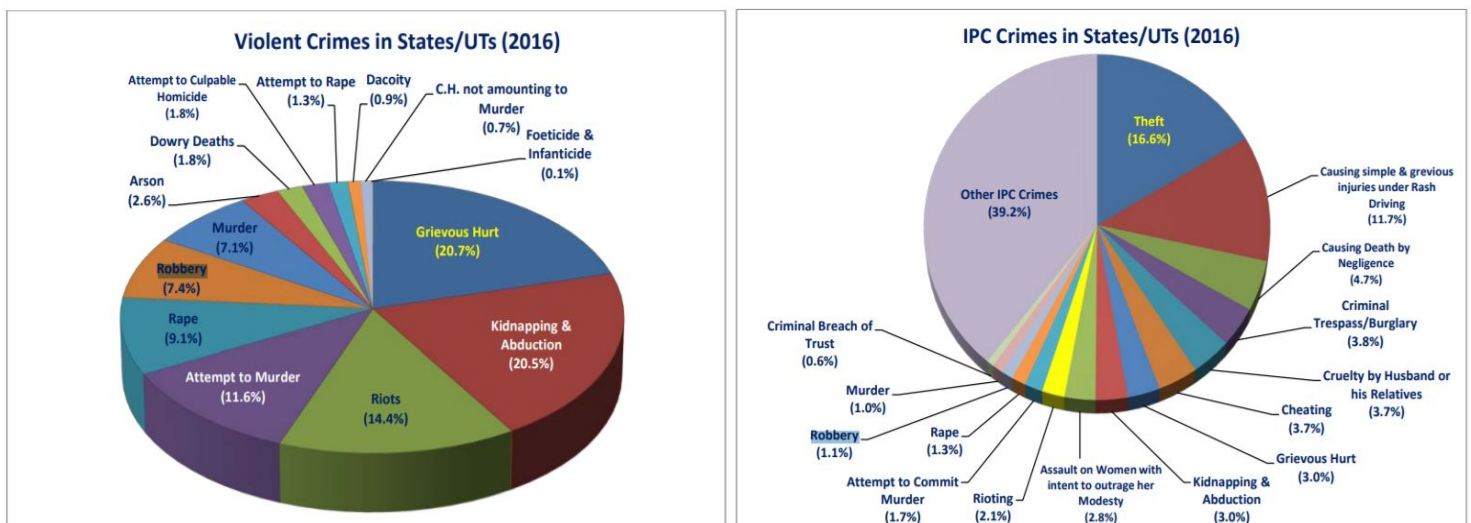
# 1. Product Overview

In recent years, there has been a marked and sustained growth in the use of closed circuit television (CCTV) surveillance cameras to prevent crime in public places in the USA and other Western nations. Amidst this expansion and the associated public expenditure, as well as concerns about their efficacy and social costs, there is an increasing need for an evidence-based approach to inform CCTV policy and practice.

Despite the popularity of closed circuit television (CCTV), evidence of its crime prevention capabilities is inconclusive. Research has largely reported CCTV effect as “mixed” without explaining this variance.

CCTV cameras also have the potential of creating unintended effects, good and bad. The “halo effect” refers to the potential for greater security in areas outside the view of cameras; this could be offset by the “displacement effect,” which pushes antisocial activity to other parts of the city. Cameras could also promote a false sense of security and lead citizens to take fewer precautions, or they could also cause more crimes to be reported, and thus lead to a perceived increase in crime. And as with the 2013 revelations of [widespread data collection](#) by the U.S. National Security Administration, the indiscriminate gathering of information on law-abiding citizens, however well-intentioned, has the potential for misuse. The Washington Post [reported in February 2014](#) that new aerial video surveillance technologies are being deployed that can monitor virtually everything in an area the size of a small city.

In India, the fourth most dangerous country for women travellers, the crime rate is rising each year with 2016 statistics for robbery and theft (the crimes focused for prototyping) are:



The prototype alone is able to focus on 7.4% of Violent crimes and 17.7% IPC crimes giving the software a incredible scope for social and monetary benefits.

The need and value of C2: Camera Cop, the software for automating the crime detection from CCTV footage can be estimated from the statistics reported by Government of India for 2016 thefts and robbery, which is

#### L) Offences Against Property

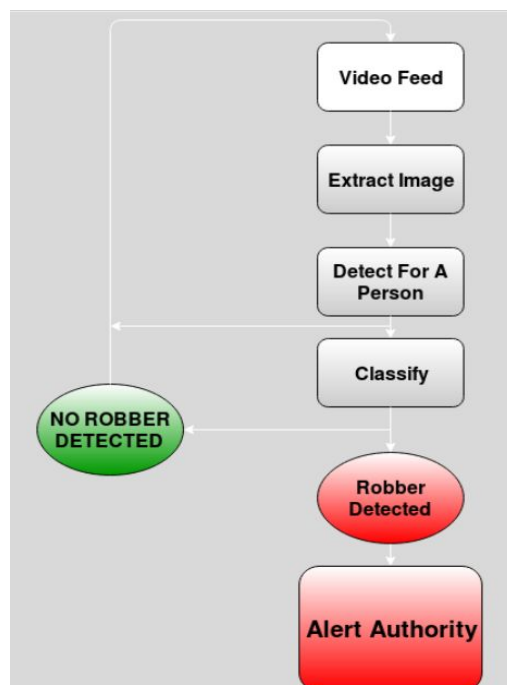
- i. During 2016, a total of 7,96,032 cases were reported under offences against property (26.8% of total IPC crimes) out of which, theft (4,94,404 cases) followed by criminal trespass/burglaries (1,11,746 cases) accounting for 62.1% and 14.3% respectively. [Table – 1A.4]
- ii. Delhi UT reported maximum number of cases (1,30,928 cases) followed by Maharashtra (59,097 cases) and Uttar Pradesh (56,550 cases) accounting for 26.5%, 11.9% and 11.4% of total theft cases respectively. [Table – 1A.4]

Year	2014	2015	2016
Value of Property Stolen (in crores)	7,515	8,210	9,733
Value of Property Recovered (in crores)	1,576	1,350	1,459
Percentage Recovery of Stolen Property	21.0%	16.4%	15.0%

The recovered property percentage is decreasing each day with value of stolen property increasing each year, pointing towards a need for technological intervention in current methodology and **C2: Camera Cop addresses the required innovation** via the use of technologies like Deep Learning, Machine Learning, Cloud Computation and Image Processing.

#### How does our application work ?

The methodology used for creating the software is :



Steps followed while creating the application :

- **Step 1:** Frame extraction from live feed.
- **Step 2:** Detect a person, if person not present application reports no crime.
- **Step 3:** Classification, separates out the crime scene
- **Step 4:** Alerting the authority
- **Step 5:** Asking the authority for verification of the scene detection.(This steps allow the software to add the currently misclassified scene into the training dataset, using which model can be fine-tuned periodically)
- **Step 6:** Save the crime scene in secure database for detection and proof.

## 2. Obstacles

Obstacles that may occur during industry wide implementation of the application are:

- The current CCTV camera quality may not provide the adequate resolution for application to make a better decision leading to reduced performance.
- Inadequate network of CCTV cameras, where the crime may increase in blind spots.
- Insufficient public support and confidence in the application, during the early days of self training of classification model.
- Proper installation and staff training for control room staff.
- CCTV camera security.

## 3. Technical Obstacles

Technical obstacles that may occur during industry wide implementation of the application are:

- The ever changing crime scene with the ever changing human behaviour.
- Image processing for the feed coming from areas with low lighting, making the detection tough.
- Improper human intervention.
- Imprecise verification by authorities.

## 4. Hardware

The application only requires a proper network of the CCTV spread across the area for which detection is required.

Thus reducing the implementation cost to minimum, where only servers of data storage is required.

## 5. Problems overcome by software

- The concern about potential to violate personal privacy is addressed by reducing the human intervention in the process where the feed will not be accessed for most of the time.
- Overall cost-effectiveness is increased by reducing the cost of human capital hired for continuous monitoring of the feed.
- Data security is assured by a secured database with access given only to proper authorities and concerned party.
- Transparency and accountability is guaranteed by the fact that a deep learning model is incapable of the bias in human behaviour.
- Providing a better chance for safe and secure society
- Making judiciary system more efficient and prompt.
- Stopping crimes before it's too late. *"Prevention is better than cure"*
- Better identification of the person responsible for

## 6. Prototype Demo

The demo can be found at this link: <https://youtu.be/NtL2oVe2Jyc>

## 7. Future Steps

- Make the current model more generalised for all the crimes. Detecting more serious Crimes like Lethal Attacks, Molesting, etc.
- Advanced data security, creation of the cloud data architecture (DBMS) for storing the recorded data.
- Recognition of fugitives in a huge crowd which can map it to a central database
- Next generation AI and cameras for securing goods and property
- Business dealings and partnerships with authorities and firms working in securities division for final implementation.