Public Monitoring system

By Darius Gray, Nicholas Le
Advised by Dr. Yufeng Lu

Motivation

- In recent years, safety has become an important priority and as a result, there is a rise in interest in surveillance and security.
- Cities have incorporated surveillance cameras into public areas to decrease crime rates.
- These cameras are not capable of notifying the police for car crashes and violent altercations.

Business Solution

- Market sizing for such application
  - -Total Available Market
  - -Addressable Market
- Ecosystem
  - -Competition, Device partners, Stakeholders, Evolution
- Funding
  - -Federal / State grants, City funding special projects
- Margins
  - -Typical cost of installation Vs Market price point

Sales	Year 1	Year 10
# of New Clients	100	169
Cumulative Client Base	100	1,318
Unit Sales		
Cameras	1,000	1,551
Cumulative Installed Cameras	1,000	12,578
Total Unit Revenue	$ 340,000.00	$ 527,451.59
Service Sales		
Camera Maintenance	$ 500,000.00	$ 6,288,946.27
Cloud Storage Management	$ 120,000.00	$ 1,509,347.10
Subscription Revenue	$ 475,200.00	$ 802,840.40
Total Services Revenue	$ 1,095,200.00	$ 8,601,133.77
Total Sales Revenue	$ 1,435,200.00	$ 9,128,585.37

Figure 1. Sales Projection

Figure 2. Pricing Strategy

NOKIA Proposal

1. Scanning and Monitoring

The system shall provide 24/7 live audio and video streams that can enable the security personnel to perform –

- Image recognition – face, incident, anomalies etc.
- Audio recognition – gun shot, chaos, fights etc.
- Connect to the city / state law enforcement agencies – Police, Fire, Ambulance
- Data Servers with an ability to store the video

2. Data Analytics Platform

The system should be able to –

- Index the data streams received from the scanning and monitoring system
- Provide an user friendly interface to query, generate reports and triggers
- Provide heat maps on third party mapping tools such as Google earth, Maps etc.
- Provide comprehensive user & access rights management to support security and data privacy obligations

Technical Solution

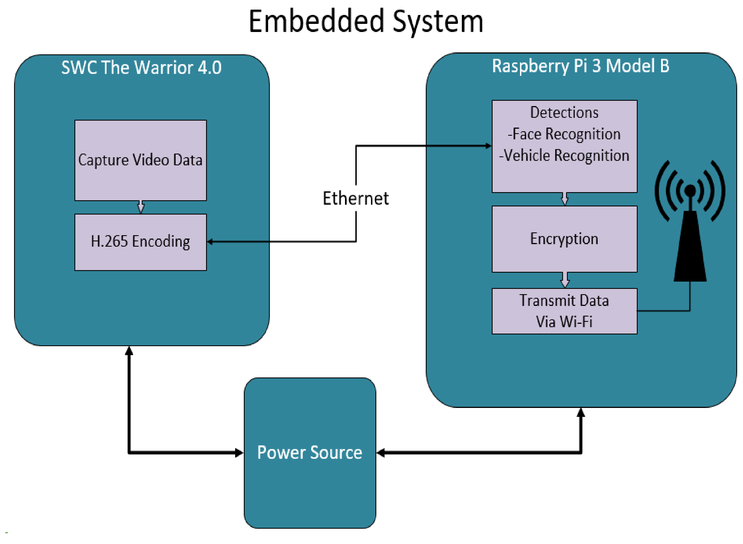

Figure 3. Embedded System

Technical Solution (cont.)

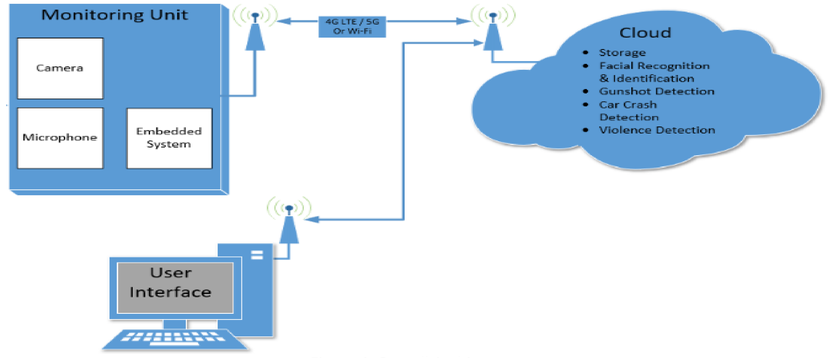

Figure 4. Overall Architecture

Hardware:

Figure 5. SCW The Warrior 4.0
https://www.security-camera-warehouse.com/the-warrior-4-0-26bf4-4mp-fixed-lens-mini-bullet-camera.php

SCW The Warrior 4.0

This camera captures video in 1080p resolution and compresses data with H.265 encoding scheme.

Raspberry Pi 3 Model B

The Raspberry Pi receives the encoded video and performs facial recognition and object detection algorithms. The processed data is transmitted to storage through Wi-Fi.

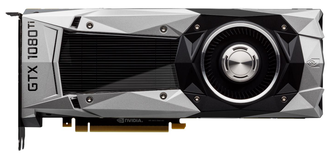

Figure 6. Nvidia GTX 1080 Ti
https://images.anandtech.com/doci/11180/GeForce_GTX_1080ti_Front.jpg

Nvidia GTX 1080 Ti

This graphics card contains CUDA cores used to train and test neural networks for detection algorithms.

Software:

Figure 7. Raspberry Pi 3 Model B
https://www.raspberrypi.org/products/raspberry-pi-3-model-b/

YOLOv3 (You Only Look Once)

The YOLOv3 algorithm uses a single neural network to identify objects within an image in real-time.

TensorFlow

TensorFlow is a software library for machine learning applications such as neural networks.

OpenCV

OpenCV is a real-time computer vision library used to implement Haar Cascades , Local Binary Pattern Histograms for facial recognition.

Summary

- Our team is conducting extensive research to produce a robust feasibility study
- Electrical Engineering point of view - doing an in depth study on technologies that will fit the public monitoring system
- Market point of view - collecting data and information that will influence system design and project product opportunities
- According to our research so far, we have strong evidence of great opportunity for Nokia to pursue a Public Monitoring system

*This project is sponsored by Nokia. The project was completed by a team of two engineering students and six business students.
Business Team: Lexy Franco, Natalie Grande, Kelsey White, Jacob Buchnat, Noah Bollinger, Ben Gibson