

Citywatcher: Annotating and Searching Video Data Streams for Smart Cities Applications



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Internet of Things (IoT)

- Billions of Internet-enabled devices (ICO)
- Many of them have cameras onboard
 - Smartphones
 - Tablets
 - IP-cameras
 - Wearables (Google Glass)
 - Other devices...
 - Public and **Private** surveillance cameras
- Video – greatest source of Big Data.
- Impossible to store and process at one place



Can we make use of video made by private devices?

Smart Cities

- Various applications enhancing and making easier the city life lead to the concept of a ‘smart city’,
- The “Smart City” concept essentially means efficiency, effectiveness and resource optimization.
- Intelligent management and integrated ICT
- This implies a new form of governance, including genuine citizen involvement in public policy in the form of crowdsourcing and crowdsensing
- As the number of cars continues to grow, **road problems** become one of the main issues for city management.



Surveillance cameras

- Modern cities have large networks of surveillance cameras including CCTV, street crossings and the like
- Is it possible to find a video of any accident? No, it is impossible to cover all the city
- Is it possible to destroy a camera before committing a crime at an exact place? It is easy.
- So, does existing city surveillance cover all our needs?



VMSC, Video registers and car black boxes

- **Do people make videos while driving? Yes, and very often!** They want to have evidence in case of an accident
- Do this records contain road accidents with other cars? Yes, we can find tones of such videos on YouTube and other video-hosting services
- Is this information used by road police for better and faster decision making?
- Can a smartphone act as a video register? Why not, it has two cameras.
- Many video-registering applications for smartphones already exist
- **Can data be shared? There is still no such systems**

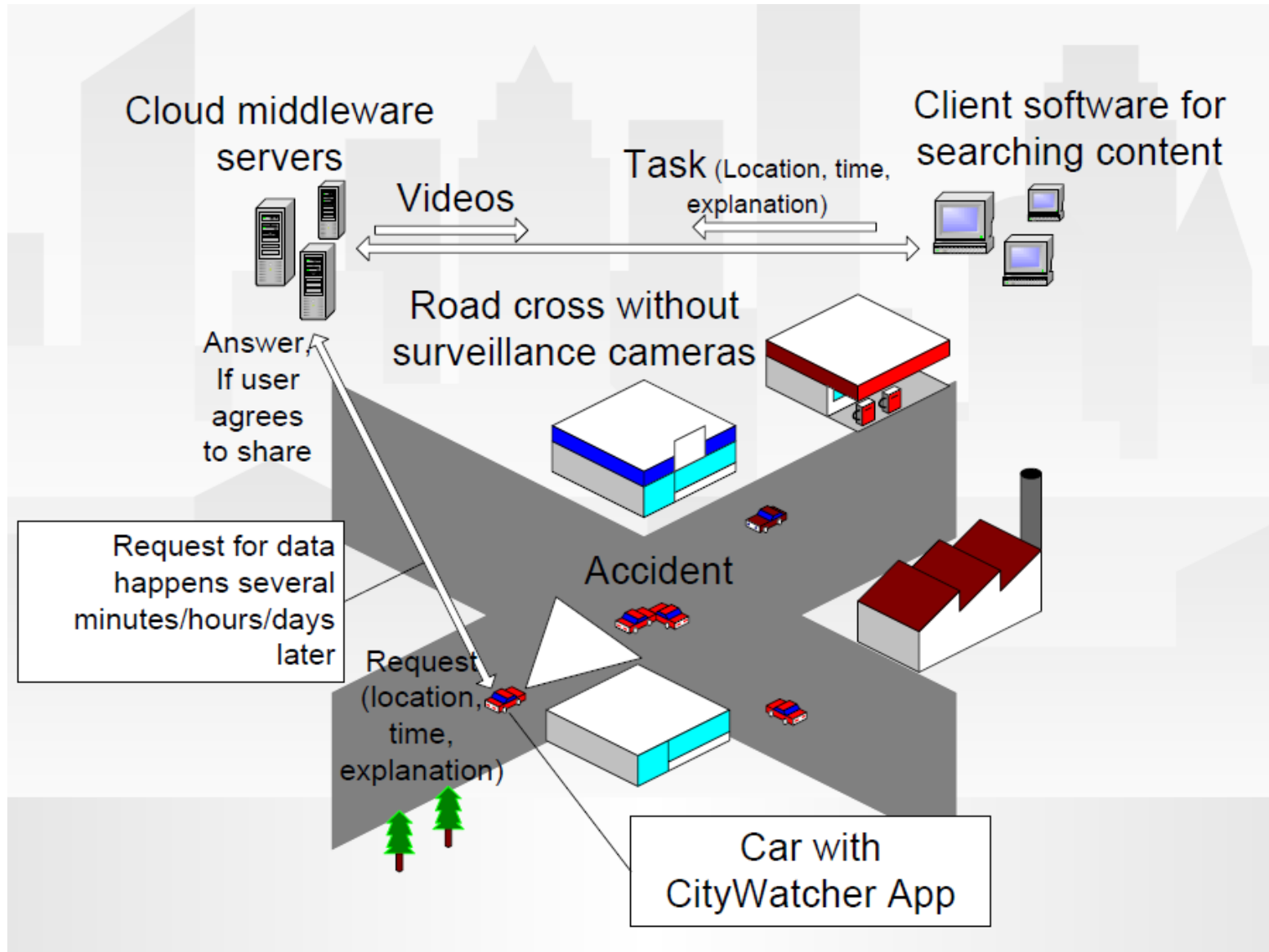


Is crowdsourced surveillance possible?



- People have data needed for making life better (faster and more precise problem solving)
- Will they want to share it? Smart city can give some incentives for those who provide useful data, e.g. lowering the transport taxes or by reducing fine points, or by giving some priorities in a queue for police service
- Insurance companies may pay for data
- Crowdsourcing can be a strong method of collecting annotated data, though it has some issues

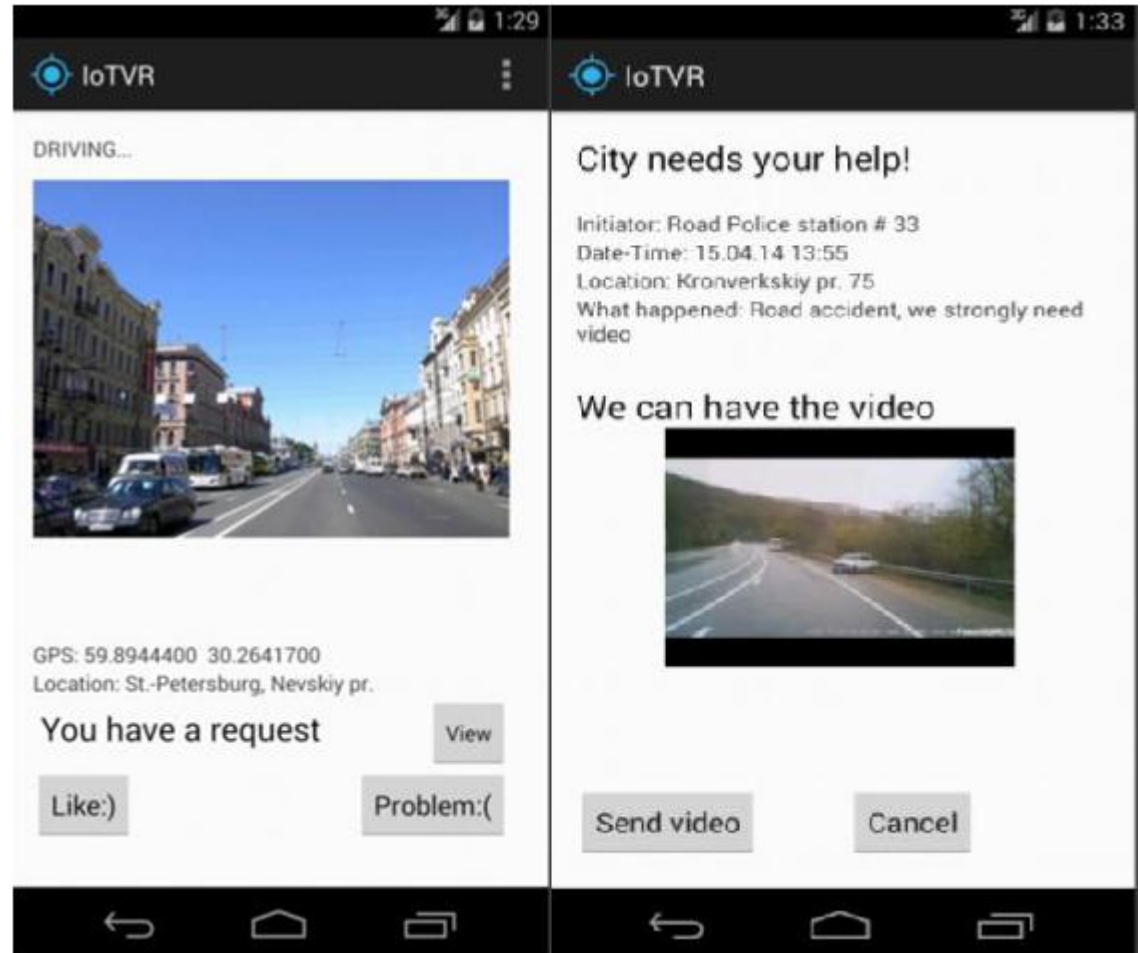
Use case: Road accident investigation



Android application

Features:

- Video recording
- Video annotating (gps coordinates, time)
- Self-discovery
- Authentication with middleware
- Request processing (like 'Have you been(time, location) ?')
- Asking the owner to watch and share video
- Loading part of the video to the cloud



Who is the owner of the video fragment?

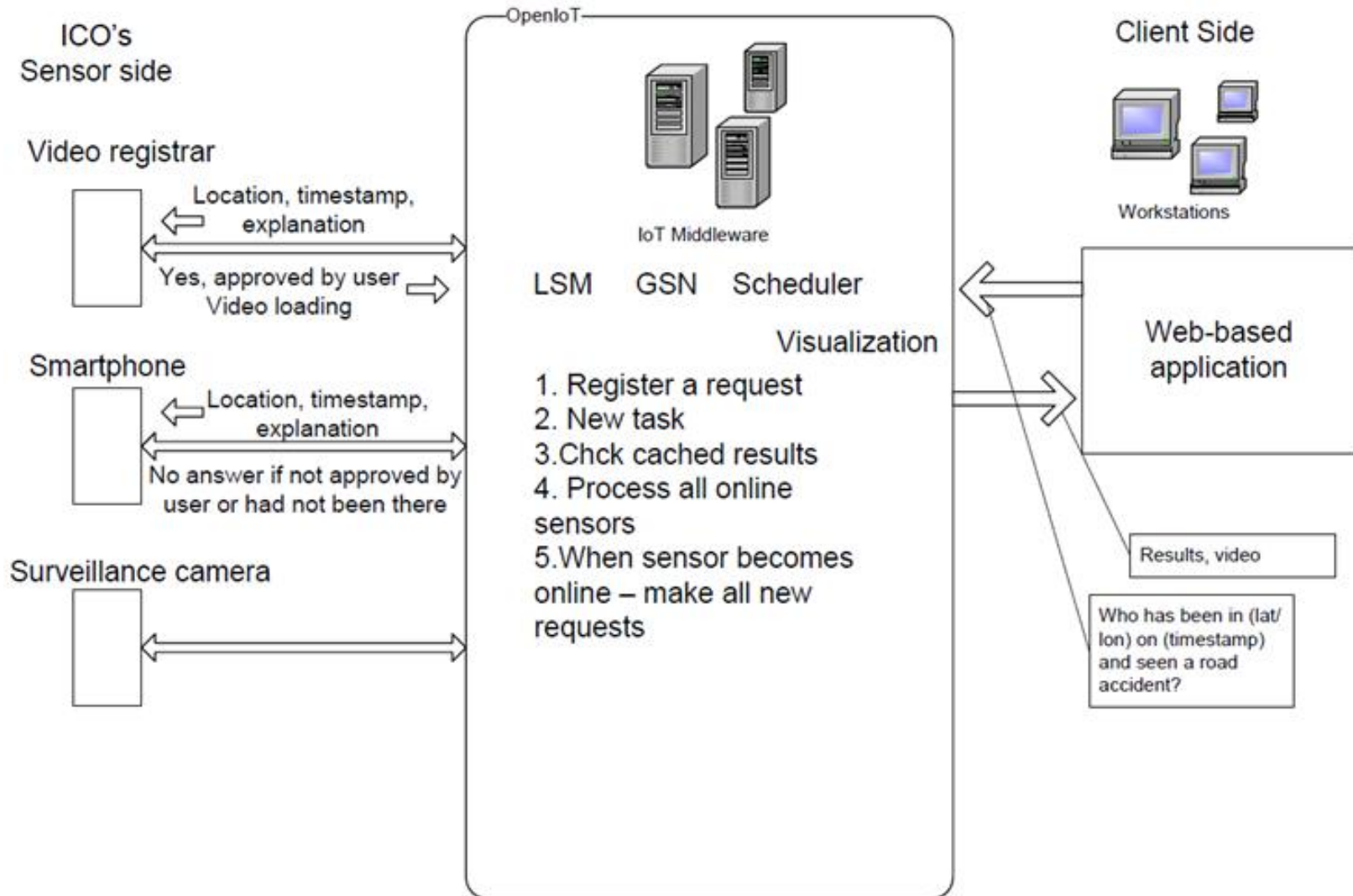
- We suggest that a video fragment can be loaded into the cloud only after the owner of a smartphone gives his permission



- If the users feels that he/she has just made a recording of something important – it can be submitted by user without any requests and will be stored in the cloud database

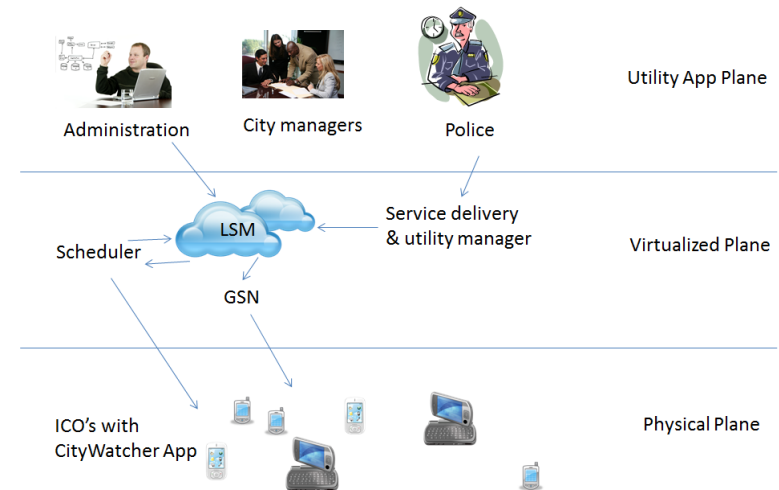


CityWatcher system architecture



Using OpenIoT as a Platform

- What is OpenIoT?
 - New open source middleware platform for intelligent IoT applications
 - OpenIoT platform gives us an efficient and advanced way to fusing data sources.
- Who will host the system?
 - We expect the city administrations to become service providers and a host to an OpenIoT platform



Future work

- More use cases, modular platform:
- Pervasive object search – face recognition, plate number recognition (searching for a stolen car), searching for other objects
- Reporting city problems with CityWatcher
- Gathering drivers health parameters for city traffic analyses and stress zones determination



Thank You

- Feel Free to Ask Questions...