HydroPix Monitoring

A Vision-Based Tool for the Understanding of Hydraulic Structures
Presentation Structure

Context
- Problem Statement
- Stormwater
- Combined Sewer Overflows
- Limitations of actual measurement systems

System Requirements
- Hardware
- Algorithms
  - Water Level
  - Surface Water Speed

Partners
Wet-weather problematic in urban areas: an introduction

Combined sewer system

Separated sewer system

CSOs

Stormwater discharges
Stormwater

Main source of pollution for heavy metals, PAHs, in urban areas...

Example: Field survey (US): leaks of oil by vehicles is equivalent to about 27 Exxon Valdez tanker spills every year...
Combined Sewer Overflows

Important source of pollution: phosphorous, nitrogen, organic matter, pathogens and viruses, residues of pharmaceuticals...

Video1 and Video 2
Example of problem: Vidy Bay, Lausanne

Probable effect concentration: 150 [mg/kg]
« Classical » measurements: important flow variations
Accessibility of measuring sites during rain events
Hydraulic behaviour?

Urgent need of a new measurement system!

Hydropix monitoring project
System Requirements

Waterproof
Resistance to corrosion
Lighting
Event-based recording
Intelligent filing
Alarms
Flow measurements
  Water level
  Surface water speed
Remote viewing
Hardware: Cameras

IP68 waterproof cameras
Integrated IR illuminator
Encoder
Hardware testing: deployment @ Denantou CSO
Goals: use cameras for measurements

Estimation of flow

- Water level
- Surface water speed
Results

Robust line detection
Tested on real images
Around 40 configurations
Examples of results...
Project partners

CTI/KTI Project: 2.5 years

EtriNex
  Videosurveillance
  Communications

EPFL/ECOL: hydrology

EAWAG: hydrology

EPFL/BIG: image processing

City of Lausanne
  Purchased a preliminary system
Project Advancement

Hardware: testing phase
Image acquisition: OK
Water level measurement
  Done: robust line detection
  To do: spatial calibration, *in situ* testing
Surface water speed: to do
Database management: to do
Main program and GUI: to do
Thank you for your attention

Questions?