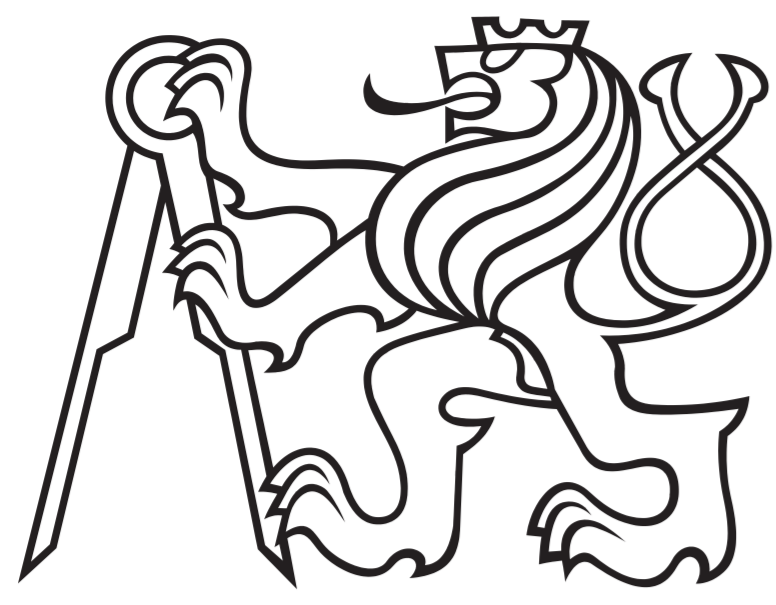
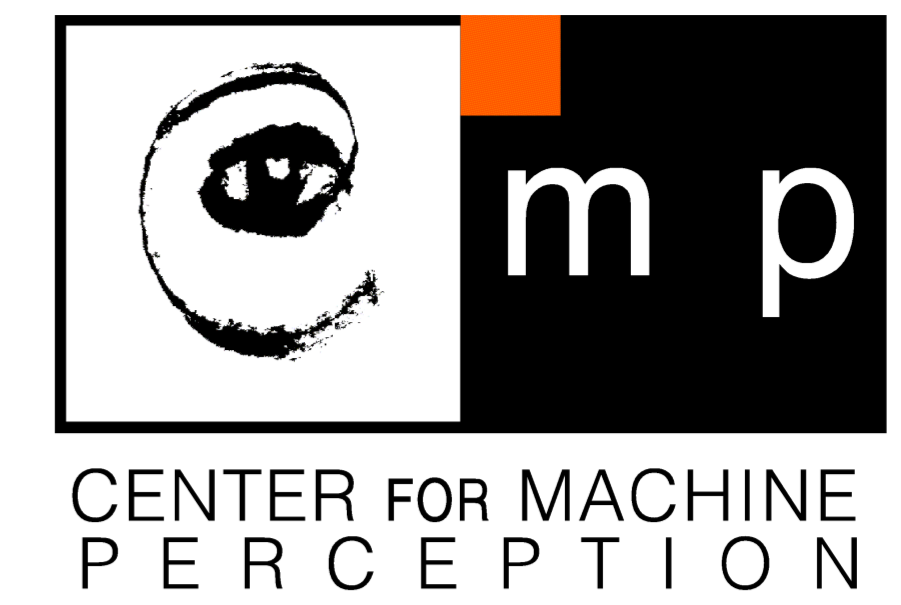


Applications of Computer Vision



Czech Technical University in Prague, Department of Cybernetics
Vladimír Smutný, smutny@cmp.felk.cvut.cz
<http://cmp.felk.cvut.cz>

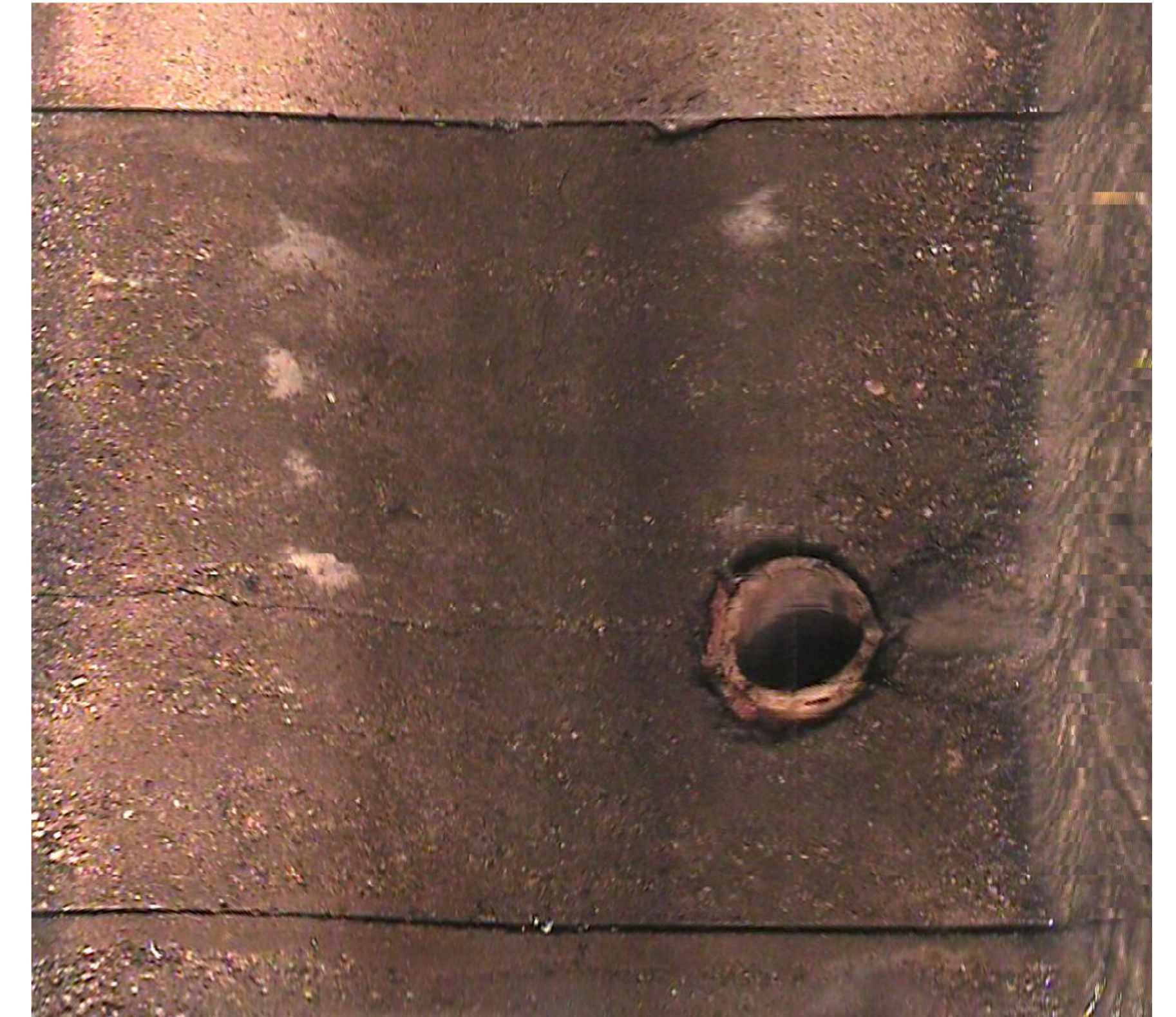


Sewerage Inspection

The sewerage inspection robots are used to inspect sewerage for cracks and other kind of damages. Our proposed method shows directly the walls of the pipe using panoramic camera instead of standard pan and tilt camera where the user shall stop the robot and navigate the camera to look around the robot. The method further allows to mosaic captured images to the single unwrapped image which is very easy to survey and store. Single although large image replaces a video-tape including its storage and retrieval problems.



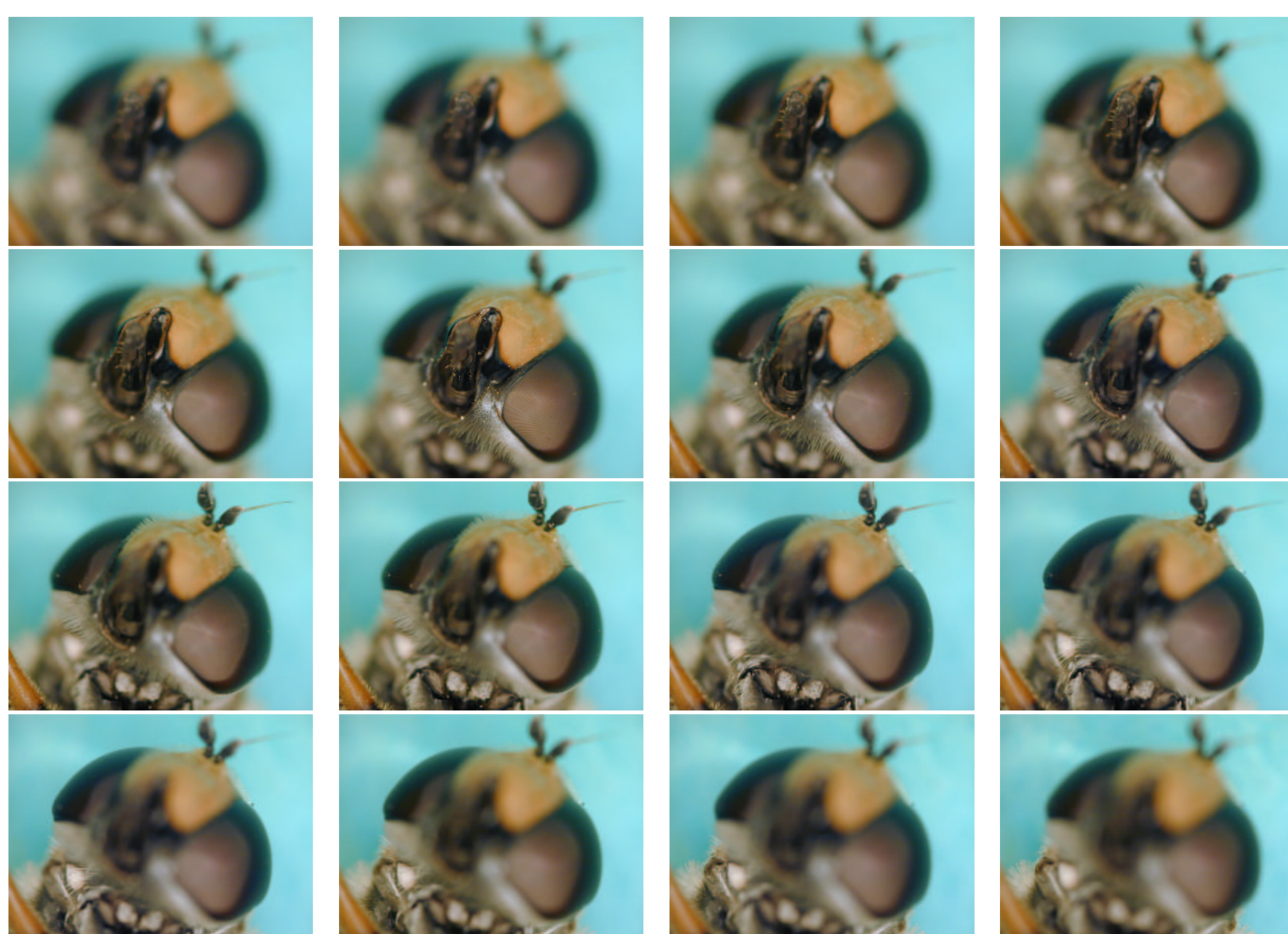
Model of Sewerage Robot



Unwarped Image Presented to the User

Digital Focus of Microscope Images

The microscope with large magnification shows images with very low depth of field. One can capture a series of images, where focused slices neighbour or overlap. The focused regions could then be detected and synthetically focused images could be composed from focused regions only. The whole procedure could be automated with motorized microscope, but the focused image could be built from manually captured images as well. The method is suited for opaque scenes and is used in industry.



Input Images



Digitally Focused Image

3D Reconstruction from Wide-Field Camera

The construction of a 3D model could be done also from panoramic or wide field of view images. The advantage is that much fewer images are needed to capture a large part of a scene. For example, when omnidirectional cameras are used, the whole scene can be reconstructed from just two views. When fish-eye lens with up to 180° field of view is used, about four images are required. This type of imaging is particularly suited for scenes surrounding the position of a viewer, as is typical in urban scenes, movie industry, or reconstructions from borescope images. Omnidirectional or fish-eye images exhibit severe non-linear distortion, but it can be efficiently modeled and the reconstruction procedure does not significantly differ from the case of narrow field of view images.



Input Fish-eye Image



3D Model from Only Two Input Images