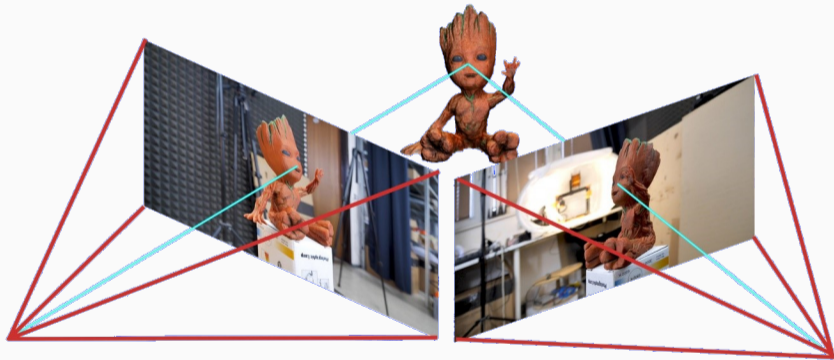


The application of photogrammetry in fire protection engineering

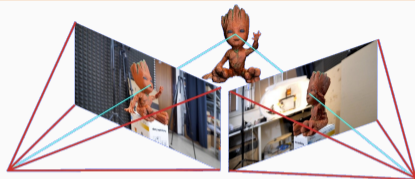
Ing. Ondřej Dupal
UCT Prague
December 3, 2020



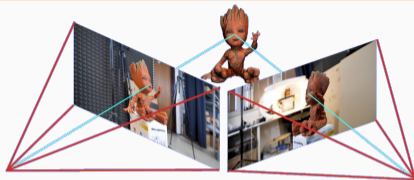
What is a photogrammetry and why we use it?



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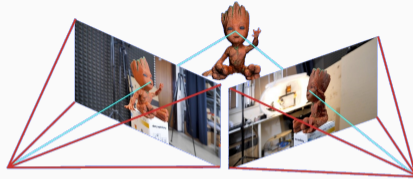


What is a photogrammetry and why we use it?



Burning cars modeling

What is a photogrammetry and why we use it?



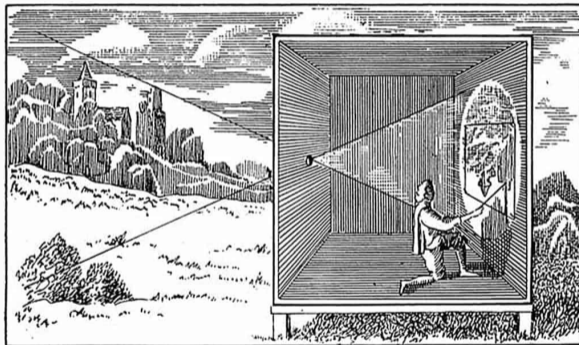
Burning cars modeling



Bulk density of charred EWP

What is the principle of photogrammetry?

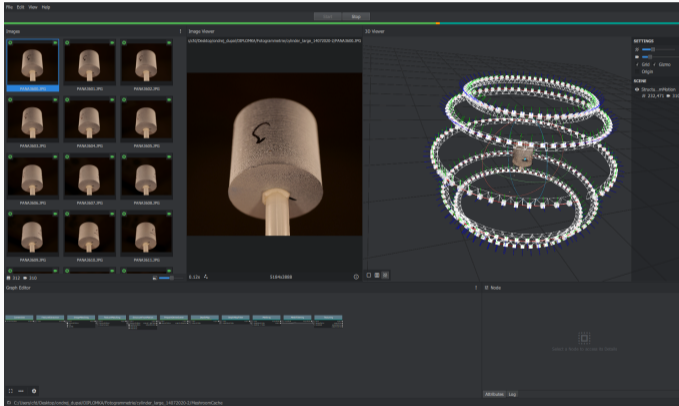
Camera obscura



A photograph is a matrix of points representing the points in 3D space without any information of the depth.

What does the photogrammetry software do?

Meshroom



1. Image matching
2. Features matching
3. Structure from motion
4. Cloud of points
5. Meshing
6. Texturing

3D reconstruction of a car for CFD fire simulation

Objective: to achieve a nice 3D mesh of a car

Used software: 3DF Zephyr



Set of given photos

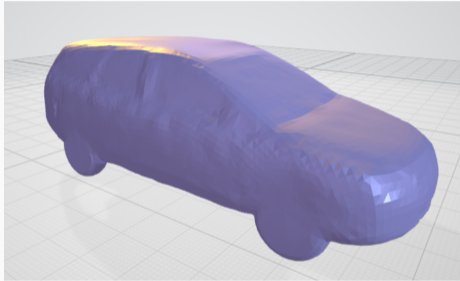


Cloud of points

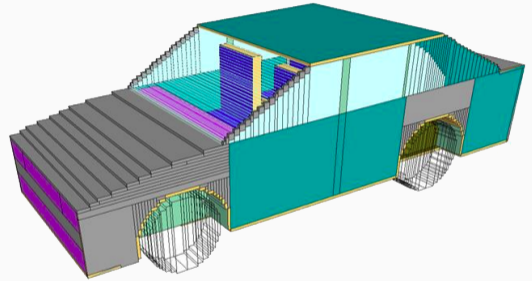


Textured mesh

3D reconstruction of a car for CFD fire simulation



Result



Old 3D model

Determining the bulk density of charred EWP

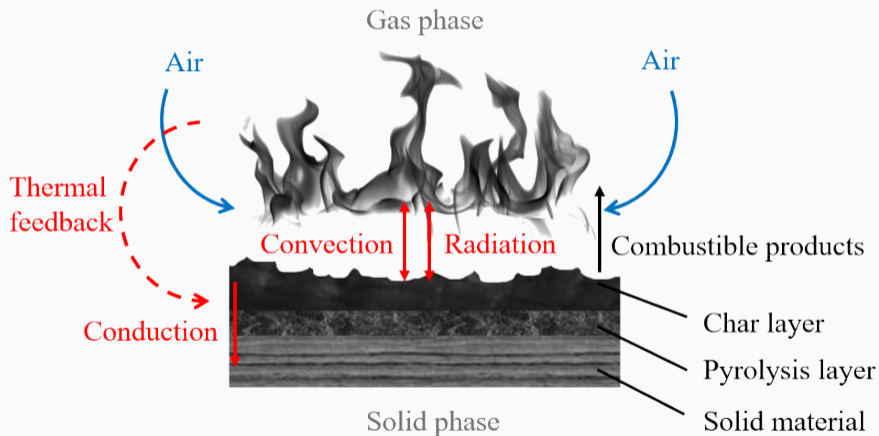
Bulk density = density of a material including the inner porosity.

EWP = Engineered Wood Products.

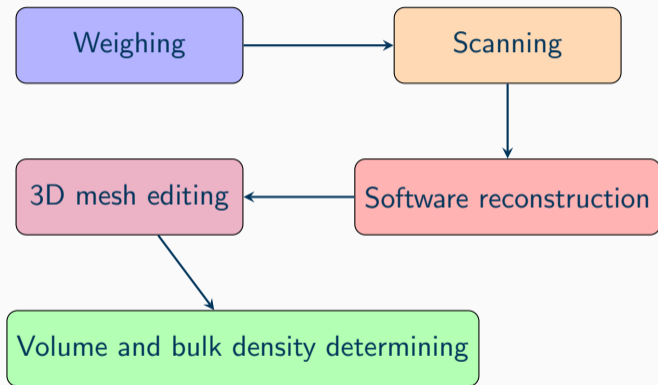
Objective: use bulk density values of various EWP chars as initial parameters in pyrolysis simulation.

Main obstacle: volume determining due to the fragile and porous structure of char.

Determining the bulk density of charred EWP

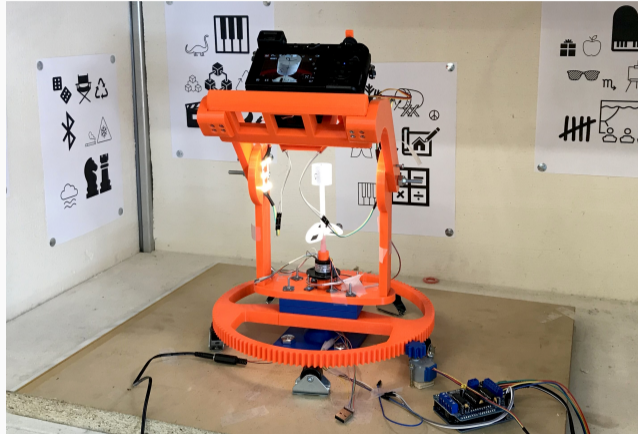


Determining the bulk density of charred EWP



Sample of charred MDF

Determining the bulk density of charred EWP



Automatized device for the scanning

Future goals

1. Finish the new bigger automatized device.

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2. Measure raw and abraded samples.

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3. Commercial 3D laser scanning to achieve a reference value.

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1. Finish the new bigger automatized device.
2. Measure raw and abraded samples.
3. Commercial 3D laser scanning to achieve a reference value.
4. Measure statistical values of various charred materials.

Thank you for your attention!

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