Meeting 10.3.2021

-First meeting

-introduction to the task

-context of the project: automatic design of gearboxes and whole systems

-make sure, the organization is understood

Tasks until next meeting:

-Find literature related to the project

Meeting 31.3.2021 (only group)

-Explaining topic to newest team-member

Meeting 7.4.2021

-First presentation will be mid of May

-discussion of literature review until now

-clarification on task: only addition and subtraction of cylinders, for inside-outside test: loops over green region, then over red region

Tasks until next meeting:

-Find different methods and literature, make a list of advantages and disadvantages

-continue literature research

-install all software, start practical algorithm

-flow-chart of Algorithm

-see, if following literature is useful: Packing Irregular Objects in 3D Space via Hybrid Optimization

-say if meeting-time is good during the lecture-period

(new time for meetings: Monday)

Meeting 19.4.2021

-idea to use standard optimization algorithms for the problem

-idea of circle-packing

-another packing algorithm program found

-idea to use FFT algorithm to draw shape/boundary

To do for the upcoming presentation:

-Video

-good quality of the video is important

Meeting 23.4.2021 (only group)

-Giovanni sent us some pictures and information for the presentation

Fixing tasks for the video-presentation:

-Benjamin: Introduction, Project Explanation

-Cristian: Method Circle-Packing

-Ahmad: Method packing in 3D

-Taimoor: Summary, Timetable

Meeting 26.4.2021

-discussion about the presentation

-Introduction should include more on automotive, more on background

-PowerPoint: use “slide master” to change some slides

-presentation should be not to complicated, easy to understand

-Last (third) presentation will be on 25.11.2021

Topics for the first presentation:

-Circle-packing

-Santa-Packing (No FFT included)

-Time table

First presentation sent to Giovanni 28.4.2021

Received feedback 29.4.2021

Meeting 3.5.2021

Cancelled, the video for the presentation already discussed via e-mail

Upload first presentation video on 6.5.2021

Meeting 10.5.2021

-grades for first presentation will be around 22-23rd of May

-discussion of the presentation

-some ideas on how to modify the circle-packing code

-next presentation around 12th of July

-some concrete results necessary for the next presentation

-example, start working in 2D and with the simple-cube-example from Giovanni

Meeting 17.5.2021

-modified circle packing code

To do until next meetings:

-discuss in the group, how to organize

-work on different algorithms

-try, which one works good

Meeting 17.5.2021 (only group)

-defined tasks for members

Cristian, Taimoor: Circle packing

Ahmad: Neural Networks

Benjamin: Organization, Documentation, another independent method

Meeting 24.5.2021

Holiday, rescheduled to 27.5.2021

Meeting 27.5.2021

For circle packing, result should be:

-less circles

-overlapping circles

-still not consistent

-control amount of circles

Different approaches:

-idea image processing toolbox

-box packing algorithm doesn't work for that code

-code implemented, that subtracts circles from the sides to approximate any convex polygons

Meeting 31.5.2021

Cancelled, too close to last meeting at 27.5.2021

Meeting 7.6.2021

Boundary-based approach:

-approximation by edges: good code, result needs improvement

-less circles, optimize

-idea: Recursive algorithm approximate shapes

Circle packing:

-More complex shapes with circle packing

-Still many holes/ parts of the geometry not covered

-Reduce number of circles

-Avoid circles inside other circles

Date for next presentation: ca. end of June/start of July

Meeting 14.6.2021

Meeting cancelled

Meeting 21.6.2021

-Box-packing-topic is a dead end

-boundary based approach: area computation implemented, try to reduce number of cylinders as goal

-small changes on circle-packing

Meeting 5.7.2021

-implemented code, that removes circle, based on area-condition

-circles also removed if they are closely together

-code works now using red and green circles

-must generalize the code to account for separate regions and holes

Meeting 12.7.2021

-code now works for separate regions and holes

Content for the Presentation:

-overview of the topic

-What we did, some results

-End: timetable

Discussion for 2nd presentation 17.7.2021

Suggestion for video:

-Introduction, overview topic

-2D problem, addition of circles

-Subtraction of circles, post-processing, removing of circles (close, area)

-plans for 3D, challenges, Timetable

Meeting 19.7.2021

-Presentation preparation

To do:

-send presentation slides to Giovanni

-Decide, which weeks in the summer should be holidays (which meetings to cancel)

Meeting 26.7.2021

-Presentation feedback, it was good

-Discussion on when we have break

-speed up the progress for the project

Plan for the 3D-code presented to the group 28.7.2021

Meeting 2.8.2021

Break

Meeting 9.8.2021

-Additional break

-there should be massive progress the next meeting after the break

Meeting 16.8.2021

Break

Task distribution fixed 22.8.2021

Part 1: Cristian

Part 2: Taimoor

Part 3: Benjamin

Part 4: Ahmad

Meeting 23.8.2021

-Separation of remaining parts, distribution complete

-Part 1 (create sections) and part 4 (plot) already started

Meeting 30.8.2021

-Part 1 (create sections) still some errors

-Part 3 (create cylinders) ready, finished

-Part 4 (plot) not yet ready

Meeting 6.9.2021

-Part 1 intersection points are found correctly

Meeting 13.9.2021

-Part 1 ready, slices of the stl-file are computed and “rings” are returned correctly

Meeting 20.9.2021

-Talked about marks of the 2nd presentation

-presented the beginning of part 2 (2D-polygons)

Meeting 27.9.2021

-The 2D-polygon, where we draw the cylinders inside the section can be found by taking the overlapping area of the “left” and “right” ends. This can be done by using the 2 contour lines, which are the lines defining the polygons in the 2 cutting planes.

-If the cuts are close enough (the thickness of the sections is small enough), we can assume, that this will lead to the correct 2D-polygons. (We won’t create cylinders, which lie outside of the Bauraum).

-Maybe we can do some cuts as a test, to decide, whether the geometry is smooth enough.

-We may assume the stl-files to be consistend. We can assume, that they have no missing parts. This question arose, as one example-stl-file showed strange behaviour.

Meeting 4.10.2021

-tried to improve the area computation for the circles using the PDE toolbox, but that would only increase the runtime)

-Problem of the triangles between the sections is solved by subtracting the triangles using the polyshape functionality.

-That means, now, only the polygone resulting from the cut is needed.

-Found suitable code:

https://de.mathworks.com/matlabcentral/fileexchange/62113-slice_stl_create_path-triangles-slice_height

Meeting 11.10.2021

-First version of the 3D-code works (also part 2 and part 4)

-stl-file “Bauraum example complex” can’t be read

Meeting 18.10.2021

-Now, file can be read

-Algorithm for complex example takes very long, works only until define_2D_polygones

Meeting 25.10.2021

-Bugs fixed

-changed 2D-algorithm, such that it also works effectively for complicated example

Meeting 1.11.2021

Holliday

Meeting 8.11.2021

-Adaptive definition of the sections

-better definition of the geometry at y-planes

-corresponds to task: find relevant edges

Meeting 17.11.2021

-update of the visualization

-Comparison original and approximated volume

-Put convergence plot (number of cylinders and time) over error include in poster

-Poster

-Documentation

-Send Giovanni results (poster and presentation) until 26.11.2021

Meeting 22.11.2021

-Discussed details about final steps

-Question: Give our sources, which sources?

Questions in email:

-Documentation, can be until end of january (Deadline for the grades) (freedom from Giovanni)

-Meeting Protocols, Time of meeting, brief description of tasks, who did what
Upload as PDF to Github.

-Documentation, more elaborate than the poster

-Include convergence plots in the poster

Meeting 29.11.2021 (only group)

-practice the presentation and modify it