You're about to start an assignment. This is looking nice. Okay, you are about to start an assignment involving a simulation of co-evolutionary design processes.

The method to iteratively optimize and design building spatial design based on the performance of structural design. Therefore, you will create a structural model and consequently change the building spatial design. I will create a spatial design.

Okay, you will in total complete two iterations of a simulation of co-evolutionary. Yes, your assignment will start with a building spatial design from the villa depicted on the left. Okay, as part of this assignment, we ask you to think out loud.

This means we want you to say everything you are thinking at each step of the process as if you were explaining your thoughts to someone else. This helps us make the process better. Please remember to keep verbalizing your thoughts as you work throughout the screen.

Okay, I am ready. Okay, this is the building spatial design of the villa. I just looked at this screen to display your current spatial design.

Use the mouse to rotate to more familiar each uniquely numbered space. The counter at the top left indicates your current iteration. If you already clicked continue to proceed.

Okay, and let's see. Okay, the first step is the creation of structural model. You will assign one of three possible structural types to each rectangle of a spatial model.

The available types are beam, truss, and a flat shell. Okay, in the next, I'm just going to look at these exact elements again. Beams seem to have free rotation and free movement still.

I'm unsure what all these images indicate in the corners. Okay, in the next screen you have to assign a structural type to each rectangle by clicking on the corresponding option in the table. Choose the type you believe is best suited for each rectangle.

All horizontal floors and roofs are assigned to a flat shell by default and cannot be changed. First step. That's fine.

Okay, click continue to think aloud if you assign structure. Describe your choices and the reasoning behind them. Okay, I'm going to create a structure.

Oh, this is looking nice. Oh, it's upside down. This is going to be what is going to disturb me the most.

Okay, so if I click on a certain face. Oh god, okay, I need to know now. Oh my god, everything is changing all the time.

Okay, I'm looking at space one. Or trying to. I'm not entirely sure if space one was the front one or the back one.

Okay, there's a lot of states in it, so I'm going to go with the beam structure. Yeah. Wait, is it? Okay, yes.

Okay, so what I'm going to do is I'm just going to first click beam everywhere and then. Wait, these are the same. Wait, ah.

Okay. Okay, this interface is quite vague. Okay, but I do not actually need these.

Can I have nothing? No, I cannot have nothing. Okay, so then I feel like I'm placing double structural elements at some points. I'm also very confused about where I am and every time I rotate the thingy, it's confusing me more.

Okay, so. Oh god, okay, this villa. The image of the villa next to each would have been nice, such that I can.

Ah, it's upside down again. Such that I can actually see what I'm designing again, but I feel like I managed at some point. Why did my entire structure now move? Just because I clicked one thingy.

Okay, that one I want to be a flat shell. This one I want to be beams. Beams, beams.

Yeah, that's my question as well. How do you know which square corresponds to which plane? Just click? Yeah. Okay.

Yeah, we don't have any indications, so just click. Just try it. It doesn't matter if you want to click it.

Okay, I'm sorry on error it is. Yes. It's okay.

Okay, that was a slight distraction because somebody asked a question that seems irrelevant. I am trying to make this stable by assigning something to each rectangle. Okay, I don't remember the exact design, but I'm just going to click through it.

Okay, let's see. What are we doing here? This feels like a bit more of an indoor space, so that's why I'm going to go with a flat shell. These other rooms feel like they should be separated and I'm not entirely sure why.

This flat shell seems okay over here. What is the next one? A flat shell on the other side of the building. No, I want trusses there and I'm not entirely sure because I do not have the reference picture still fresh in my mind.

I want to have more beams. I'm just going to go with beams for most spaces. I'm placing double beams at many spots, I think.

So, beams, beams. No, you can actually be a flat shell. I feel like this was a space dividing.

No, beams. Oh, we are at the top now somehow. Yeah, most of these should be beams because I want nice views.

Those are my main considerations and then sometimes indoor can be flat shells. Wait, where are you placing the beams now? Truss. Okay, where is this truss now? Okay, I want stability in two directions though, so I'm gonna, you know, you don't know.

It is jumping all around and it is very distracting. I did not want you to be that. No.

Okay, the fact that it jumps every time is very not nice. Okay, I do want some stability walls in here, so I'm just gonna click a bunch of those. Where did this wall get placed? Why is there? Which one? Okay, I do not like this interface.

Why are you now? No, you can. Okay. Okay, I am gonna find the ones that I need.

Okay, this interface is not nice. I do not like this. What I'm trying to do is to create some inner walls that can be flat shells, but in order to find those, I need to know where they are and you can barely make this very hard for yourself.

What I want is to look at the inner wall that I want. Yes, and then I'm just gonna click truss on a bunch of stuff and see if it's the ones. Ah, I'm getting slightly frustrated by this interface.

I'm just gonna go with a lot of beams for now. Oh, where did it jump? Just gonna click beam everywhere for now and then try and find the ones that I want to change, but it's somehow upside down again and I do not like it and also I feel like it's changing shit on me. No, wait, I did put the flat shell over there.

Right, yeah, new beams. Okay. Okay, now I'm gonna ask the question about what a flat shell was, which is okay, so that was just a slight interruption in Dutch.

I am still looking for the damned ones. This one can be a flat shell, um, I am still looking for the ones that I think could be, could in fact be. Oh yeah, maybe I want to trust there.

I'm just looking what everything is now and hoping that I do not change my point of view and so far so good. I do think some indoor trusses could be good and only larger spans in the overhangs, some trusses can be good as well. Um, oh yes, that one I wanted to be a truss.

This one does not need to be a truss. One can be a truss. No, you do not need to be a truss.

You do not need to be a truss. Yes. No.

Ah, I changed it again. I want cross-bracing in the overhangs. Um, no.

Where are you? Okay, maybe I should make sure that I can actually see the overhangs in the correct things. Okay, I am still looking for the overhang situations. Aha, I found one.

This order is not entirely logical. I want a lot of beams because I prefer beams as they allow for an unobstructed view to the outside. I'm still looking for trusses.

Yes, okay, I am happy. I have trusses in the overhang. I'm looking at the whole building upside down.

I have nice views to the outside and I have some observables in a bunch of directions. Although, I am going to change these two to trusses. And there is one that I want to replace now, but I have no clue where they are.

Um, there's no underwood in here, so I'm just going to guess that both of these were supposed to be beams. Beam, beam. Oh wait, why are we here again? Okay, I'll just go with this and I'll see what it's going to do.

Okay, so I see a bunch of options currently. I went on to the next thing. Okay, so my own model is this one and there's a structural compliance of 4.7 million.

Okay, so this fully shareable one is going to be super stiff. Yeah, that makes sense. And AI generated.

I'm going to read the text first. Okay, so besides this model, underneath each model, the option and total strain energy are shown. Strain energy, energy observed by structural energy forms.

Please select one of the models to proceed with. It can be your own structural design or one of the AI generated. Okay, so let's see.

The AI with only shareable seems to be very stiff, so we're going to move on for that one because we want to use. Then we have the one option three that is 2.3 million. And oh no, what's up, what's down? It does block some of the very nice views, so I'm going to say that that one is not a preferred option, although these can create some privacy of course.

And then the fourth option has a lot of structural openness, but it is a little compliance. So actually, I'm going to choose my own one because I like it the most in terms of that the view is there and structural compliance is not seemingly too high when I compare it to the others. Okay, I can remove maximum one space.

Strain energy for each space is displayed in the table below, which you cannot use as a basis for your design. However, you are also free to make your own choice. Okay, so yeah, I know that some of these overhang spaces are probably going to have higher thingies.

Wait, why are they all there twice? Are they even the same number? Oh, they seem to be the same number. Okay, they're all there twice. Okay, this space seven, which has the overhangs in it, probably has fairly high strain energy, but I do not really want to delete it.

I cannot align it. So based on the fact that that one is the highest contributor, but it also contributes a lot to the design, I think I am going to look at the space numbering and what the actual spaces are. I quite like this design of the building.

Actually, it doesn't feel like I want to delete anything. Can I not remove a space? Note that the structural design model is not updated after spatial modification. I don't really want to delete anything, so considering that, I'll delete nine.

Can I not explain anything? Okay, I cannot not delete anything. Okay, I'm going to delete nine, because I like the tower of the villa and I like that it has two nice, I think, single bedrooms. I'm going to associate room five and six with bedrooms.

And then I'll delete floor nine, because it won't have a new structural influence. Every room will be reachable and room seven will be kept, so that is my entire reason. Yes, I want to submit this.

Space deleted successfully. Continue. Okay, you're asked to split a maximum of one space.

Okay, split maximum of one space. Why would I want to split something? This table is sort of unreadable currently for me, which is okay, because I can change it this way. Yeah, okay, space five.

Yeah, you have a very low strain energy. Can I split? I'm gonna split room one for some reason. And what is my reason? My reason is that I'm assuming it to be a nice sort of living room.

No, I'm going to split for five, room five, and it's going to be because I feel like it is a bedroom and it needs a separate bathroom. So, floor five is going to be split, yes. Click continue.

Let's proceed. Okay, now that we have a new spatial design, this is the iteration one. At the top left, you can see the building spatial design you just created.

Three different spatial designs are shown. For each option, a different space is removed and split. Underneath each design, the diversity score is visualized.

Your own building spatial design is based on a baseline, and therefore, the other values indicate how diverse they are compared to your design. Okay, higher percentage indicates a greater deviation from your original design, where over a larger and lower percentage. So, yeah, you're asked to select an option to continue.

Okay, so I'm going to look at all these designs, and my eye is grabbed by ones that still have space nine, because I like space nine. So, looking at that one, I'm going to look at the fourth option. I like that it's deleted the space from below, and also split one of rooms five or six.

Yeah, I like that this design aesthetically still has a nice number, so I'm just going to go with that one. Yes, the first iteration is complete. The building spatial model has been adjusted to recover the initial floor area.

Review all previous steps on the screen to your left. Yes, I make spatial design, then I make structural design, I make my own, and then I chose the AI generator one. The design will now surface starting point for the second iteration.

Okay, yes, this is looking good. Okay, I know something about this. Yeah, we are currently at the second iteration.

I'm going to take a bit longer now to look at these things. Yeah, okay. I am going to create a new structural design for this one.

Okay, I'm going to start again by making a lot of beams, and just seeing, ah, flipped a lot. Okay, maybe I'll add a bit more trusses and shear walls this time, but I'll just first start by clicking beams basically everywhere. Apart from the overhang, there are no main parts where I have considered that I need to place trusses yet.

The fact that this table is somehow in my screen is kind of annoying to me, because that means that I feel like I am always going to be clicking inside of it. Okay, I'm just clicking, clicking, clicking, getting slightly distracted by people leaving, okay. I'm going with beams everywhere first, and then just if I already see the one that is going to be in need of a truss, I am going to click that truss.

Ah! You need to be a truss. You need to be a truss. No, you do not need to be a truss.

Beam. I'm just randomly clicking stuff first, so that I have something everywhere. Okay, no, I'm not happy yet.

Okay, let's look. This is now the bottom, so I'm gonna look. Flesh shell.

No, beam. Flesh shell. No, you can actually be a truss.

Oh, I don't know why this is bothering me so much. No, I do not need this one at the bottom floor. No, I do not need that one over there.

No, I do not need that one over there. No, I want this part to be open. Yeah, that one can be a flesh shell.

Why is this not in a logical order? I quite dislike the order of this. I do not see you, so you're blocking those relevance. Oh, wait a second.

There is of course something happening down there. Yes, okay, you were in fact irrelevant. Okay, I am just looking at everything and my main plan is to create a stiff structure at a place where I know it will deflect a lot, so the overhangs and the, yeah, the overhangs mainly.

Then for the rest, I'm just mainly gonna create a very open structure. So I'm just clicking all these flesh shell elements one by one. Okay, I'll make you a truss.

No, I didn't want to make you a truss. Ah, now I clicked somewhere where I wasn't supposed to click. To listen to all this, still trying to find out where I want stuff to go.

Yes, yes. Okay, I'm just looking. Oh, you want to be a truss, yes.

Just looking at all the places and trying to find where I need to change the things. I'm still going with a bunch of beam elements mainly, and then in the overhang areas and the indoor, some of the indoor areas, I want to place some flesh shells, mainly because I want to create open views to the outdoor. I feel like I should see something, but I'm not seeing it.

Okay, so I'm just going to continue. Somewhere now I need to read which one it is. Hello, isn't that one? I want a truss over there.

Okay, I'll make you a truss. Okay, yeah, we are going a bit more flesh shells around, and a bit more trusses as well. I think this should create a nice balance between these loaves, these beam trusses.

Why would I make you? Well, trusses are a bit more lightweight, and I would like that as well. I have a bunch of flesh shells. I should have stability in all directions, and I am happy with it currently.

So yeah, I'm going to continue. Okay, now we're going to compare it again with the original ones. Of course, this whole closed structure is going to be a lot more closed.

Then I want somewhere in between is actually higher strain energy, so I'm going to say that mine is better, because it has better views and all this. Yeah, I'm going to go with my own design, because the views are there in most of the cases, and there's barely no strain energy now, so we're going to go with that one. Answer yes.

Oh god, I got to remove more spaces. Which space do I want to remove now? Can I just remove space 12? Yeah, I'll just remove space 12. My decision is based on aesthetics.

Then I want to split a space. Oh god, I'm gonna split space 10 at the top, I think, because then you have two nice rooms to have different functions with a nice view. Yes, looking at these other designs, I see that the how can it be negative or has lower percentage than my original one.

Okay, this first design just deleted space 10. I don't know, I want the tower in there. The second one has deleted space... I don't know.

Oh, it has made space 7 a floaty one, which is kind of cool, but structurally really hard to accomplish, especially if you're not allowed to place structural elements within a room. So I'm going to choose to not pick that one. And then this other one has deleted space 7. It's a nice orange, but I also really like space 7, so I'm not going to pick that one either, which is why we are going to choose my option.

Yep, assignment complete. Congratulations. You may now stop verbalizing your results.

Yes, nice. This remains remaining on the left. You can view your entire assignment progression from the initial.

Please proceed to vote survey.