

## A workshop on the design of canopy structures

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### Suggested Citation:

Ozturk, N., (2016). A workshop on the design of canopy structures, *Global Journal on Humanities & Social Sciences*. [Online]. 03, pp 478-485. Available from: <http://sproc.org/ojs/index.php/pntsbs>

Received January 05, 2015; revised March 07, 2015; accepted May 18, 2016.

Selection and peer review under responsibility of Prof. Dr. Milan Matijevic.

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### Abstract

This paper is related to a workshop implemented in Anadolu University, Faculty of Architecture and Design. The “Canopy Structure Design Workshop” lasts 4 weeks. The mentioned workshop was done with a group of 70 2nd year undergraduate students. 14 teams of 5 were made out of these students. They were asked to develop their projects with models. At the end of the process, the students made 14 canopy structures of wood with a 1:1 scale. Some of these are called Flexible Structure, Armadillo and Tensegrity. This study comprises the photographs and evaluations of the designs obtained at the end of the “Canopy Structure Design Workshop”. In the assertion is explained the positive and negative properties of these designs.

Keywords: structural design, canopy structure design, design education, evaluation of students projects

## 1. Canopy for Ecovillages as a Structure Design Problem

### 1.1. The Location of the Project

“Ecovillages are cores of little, rich and intense activity and transform everything around them, just like a yoghurt yeast.”(Dawson, 2006).

Many ecovillages have been set up around the world by conscious communities in order to present concrete solutions for ecological problems, create a self-sufficient and ideal community life that is in peace with nature and serve as an example, even of small scale. “Ecovillages are centers of research, exhibition and in most cases, education. Each ecovillage functions in unique spaces and their main function is to develop new ideas, technologies, models and share these with wider audiences (42 Ecovillages).

An example of ecovillages from Turkey is the GÜneşKöy Cooperative that was set up in 2000. It is in a field within the border of Hisarköy in Balaban Valley that is 60 km from Ankara and 10 km from Elmadağ. The fields of study and aims of GÜneşKöy are as follows:

- Does ecological agriculture and promotes it, uses local seeds and makes sure it is shared.
- Does studies for the use of renewable energy resources.
- Does nature friendly and ecological architectural designs and applications.
- Works to restore the deteriorated natural structures.
- Does the necessary work to rebuild the deteriorated natural balance.
- Develops recycling systems and works for the efficient use of resources (GÜneşKöy website).

BayramiC Yeniköy group in Canakkale is an “initiative to establish a self-sufficient village by making designs and implementing them in accordance with the permaculture philosophy, does organic agriculture by protecting our local seeds and sharing what they have learnt and produced (BayramiC Yeniköy website).

This workshop aimed to design canopies to design for various uses in ecovillages such as GÜneşKöy and Yeniköy.

### 1.2. Project Description

A canopy design that works with compression and tension, is installed and removed easily, made up of local-ecological-economic materials, may serve as an example and applicable to the needs of GÜneşKöy and similar ecovillages.

- a. Function: A canopy design to sit beneath, eat, have a meeting, prepare to dry the harvested vegetables and separate seeds.
- b. Constructive Properties: Attachable-detachable, easily installed and removed, temporary structure.

Groups of 5 students will be formed for teamwork. You are expected to work as a team by experiencing. Solidarity, sharing and division of labor, are key in teamwork.

All information, research reports, documents, scenarios, mockups etc. That respond to the problem are taken into consideration during evaluation. The estimated time for this project is 4 weeks.

### 1.3. Process

This design problem was handed out to the students on 21.05.2013. A seminar on Structure and Construction was held by Nazmiye OztUrk on 22.05.2013. Deniz DinCel, an expert on ecovillages held a seminar on 24.05.2013. A Field Trip to GUnes̄kOy Ecovillage was conducted between 25 ~ 30.05.2013. The first stage of the project was completed on 28.05.2013 and the students submitted and presented their Posters. The preliminary jury for the mock-ups was held on 07.06.2013 and constructions that fail to stand on their own were guided by the jury. On 18.06.2013, constructions were set up on the green area in front of Anadolu University, Faculty of Architecture and Design and jury was held.

#### 1.3.1. Project Stage 1

A research poster (Fig-1) has been made comprising the following:

- Life and needs in ecovillages, structural elements used in ecovillages
- Structures that work with compression-tension, canopy and similar structural designs used outdoors
- Local-ecological-economic materials

#### 1.3.2. Project Stage 2

a. Canopy/rain shield design for people (and their bikes if wanted) for GUnes̄kOy and similar ecovillages (to sit beneath, eat, have a meeting, prepare to dry the harvested vegetables and separate seeds, attachable-detachable, easily installed and removed, temporary structure)

or

b. Canopy design for protection from excessive sun and wind from the south and west for plants in GUnes̄kOy and similar ecovillages in organic/natural agriculture (seasonal, semi-permeable, light, attachable-detachable, easily installed and removed, temporary structure)

## 2. Evaluation Criteria

A working product model with a scale of 1:1 was required upon submission of the Project.

The measurable criteria of evaluation are as follows:

1. The construction should stand on its own
2. The construction should preserve its stability against moving forces such as compression and tension applied by hand
3. The installation and detachment time of the construction

The hermeneutical design criteria of evaluation are as follows:

1. Relationship between function and form
2. Different usage possibilities
3. Visual effect

## 2.1. Grading

The average of the grades given out by 3 project supervisors is taken for the evaluation of the project. Each member of the group gets the same grade.

## 2.2. Evaluation

The three dimensional models were set up outdoors on the date of the evaluation. The jury members observed the installation processes of the final 14 constructions by the students (Fig-1).

The installation-detachment times of the constructions were between 2-30 minutes.

All of the constructions were able to stand on their own. The products designed by 14 groups were evaluated with regards to easy installation-detachment, maintaining stability in face of moving forces, the relationship of function and form, different opportunities for use and visual effects as follows:

1. Group aimed to form a wide shade area by using the minimum.

a) The single touch point of the construction to the ground was found positive. This construction became the one which interfered with the ground the least due to this aspect.

b) This construction may cause a sail effect in face of the wind. The cover material of the construction must be permeable so it can sustain its stability against the wind. More refined solutions need to be proposed for details and the starting and endpoints of the carrier components.

2. Group aimed to add another function to the function of a canopy. This construction's second function is to dry vegetables on its top.

a) The vegetable drying function was found positive for a second purpose.

b) The arbitrary form of the geometry of the construction in general was negatively criticized. The fact that triangles of different ratios were used on top of and underneath the object was negatively criticized. In order to maintain consistency in form language, a ratio-proportion study needs to be done for all components of the form. It was stressed that the location and size of the shade, which is the main function, need to be chosen wisely.

3. Group aimed for a construction that was integrated with a tree in both meaning and function-wise. They said that the tree was one of the group members and that they designed the construction so they could sit in the shade all together.

a) Their different point of view towards the tree was found positive. This construction is useful in collecting the fruits of the trees.

b) The problems in the elements making up the construction and the joining of these elements were pointed out. The detail resolutions and the moving pieces need to be refined.

4. Group aimed to make a canopy construction inspired from the armadillo.

a) The details in the bringing together in the pieces and the workmanship were found positive.

b) The direct copying of the design of the construction was negatively criticized. Despite its structure, the unidirectional use and the fixing point to the ground were found erroneous. A two-way use with regards to the receiving angle of the sun rays by fixing to the ground from the junction points was suggested.

5. Group proposed a social tent that could hold meetings of 10-15 people.

a) Sociability and access to the tent from every direction were found positive.

b) The oversized cross sections of the pieces were negatively criticized. One of the most important elements of structure is hierarchy and the thicknesses of the cross sections of pieces change according to load.

6. Group aimed for users to make their own canopies by providing brochures of the canopy construction to ecovillages. They proposed two different scenarios for use.

a) The brochures and graphic works were positive.

b) The construction they proposed was monotonous and what everyone could think of first. It was stressed that they had to be encouraged for their search of diversity. The instructions for construction were inadequate. A stronger bond can be formed between the two different construction possibilities in terms of design language and continuity.

7. Group aimed for a stable construction. They advocated that they could have sun control due to different uses of the cover of the construction.

a) The connection detail and sensitivity at the locking point was found positive.

b).The monumental form of the pyramid and the excessive height of the construction that contributes to this monumental form were negatively criticized. The fact that the cover was cut off from the ground was not found positive. Despite enough height to stand inside, the lack of an efficient geometry to allow for standing was negatively criticized. Also, the need for design sensitivity at the ending of the top cover and the point where the carrier elements touched the ground were stressed.

8.Group aimed to make a canopy by using Tensegrity.

a) The fact that a rigid structure was made without the pieces touching each other and obtaining a surprising construction this way were found positive. The jury suggested to move the tension rods in the middle to the sides. They were warned that a part of the created space was rendered unusable because of this.

b) It was pointed out that more defined design ideas had to be proposed in order to prevent randomness in connections and connection details. Although rendering the canopy mobile from the center was found positive, the lessening of stability against the wind was negatively criticized.

9. Group aimed for an easy-to-use construction that would maintain its function as a canopy in various positions.

a) Providing diversity despite minimum use of materials is one of the positive aspects of this design. Their meticulous attention to some details was found positive.

b) The jury negatively criticized the lack of meticulousity regarding the details of nodes and endpoint connections.

10. Group aimed tent-like, adjustable canopy units that can multiply side by side.

a) The module for one was designed in such a way that it can be folded and carried on the back. The flexibility of the construction, its easy attachability-detachability and the consideration for most of the details was found positive. The form and function were compatible. The sensitivity of the relationship between the clamping elements and the wind was liked.

b) The failure to form a module when set up side by side and the obligation to use the same piece were negatively criticized. For a modular design, the units must fit each other geometrically and by ensuring saving on materials.

11. Group aimed for a movable, light and modular canopy for one that would also serve meeting purposes.

a) The group was successful in meeting goals. The effort to keep the size at minimum was positive but it was commented that the size could be a little bigger. The practical and economic solutions for joint details were complimented.

b) The choice of fabric was negatively criticized due to its weight and texture.

12. Group aimed for a small scale green house that collects rain water in its tank in the middle.

a) The usefulness of the design aim and the product idea was positive.

b) It took negative criticism due to lack of practical solutions in joint details and not meeting the easy attachment-detachment criterion. Although a side-by-side modular structure was aimed, the jury criticized the fact that detailed solutions were not worked out for this purpose.

13. Group aimed for a canopy that is light, flexible due to its polyhedral geometry and easily modified in size.

a) The diversity potential is positive in this construction due to the choice of geometry.

b) The construction fails to display the aimed flexibility due to a mistake in the joints. Double profile use on the edges due to the implementation of an equilateral triangle module was criticized. The need for specialized design resolutions rather than free fastening on joint points was pointed out.

14. Group aimed to design a moving construction that could be shaped in accordance with the sun:

a) Positive properties: They worked to make the two-dimensional rectangle surface into a three-dimensional one. The fact that the construction could be made into 3 different shapes was evaluated positively by the jury.

b) Negative properties: The stability solution against wind was insufficient. The installation-detachment can be made easier. A more durable material for the outdoors can be recommended instead of the material used in the joints.

### 3. Conclusion

At the end of evaluation, the students' gains are as follows:

1. I observed that most students comprehended the intuitive dimension of structural design. Mathematical calculations are not enough to design a structure. As Pier Luigi Nervi puts it, "a structure cannot be designed starting from the formulas of the structures theorem or mathematical developments. These formulas and developments will be necessary in the realization of design, which is the second stage. Intuitively feeling a structure, its volume ratios or color relations is a matter of capacity and constitutes an integral foundation for the structural design (Mimarlık, <http://dergi.mo.org.tr/dergiler/2/173/2192.pdf>).
2. At the end of the workshop process, students learned about teamwork. They improved on resolving divergences of ideas in a group, division of labor and doing result oriented work.
3. All of the students learned that a Structure cannot be designed by mere drawings but that modeling is necessary. They experienced how the connections between the elements that make up the whole make a difference in the design. They discovered the relationship between the rigidity and flexibility of the elements and the compression and tension forces.
4. I observed that the students were confused about the concepts of structure and construction. Students learned the difference between the two by the end of this workshop. The concept of structure is very closely related to the concept of a system. As is known, the system is a set of items which interact with each other and act for a single purpose. Structure is the set of relations that preserves the form of all constituents of a whole against gravity and other forces and is an abstract concept by nature. Construction is everything that makes up the structure

such as material, components, pieces and parts and is concrete rather than abstract. Structure is like the human's character and construction is his/her body.

## A Workshop on the Design of Canopy Structures

This poster presentation is related to a workshop implemented in Anadolu University, Faculty of Architecture and Design. The "Canopy Structure Design Workshop" lasts 4 weeks. The supervisors of the project group are Namiye Öztürk, Dilek Üst and Erdem Akın. The mentioned workshop was done with a group of 70 2nd year undergraduate students. 14 teams of 5 were made out of these students. They were asked to develop their projects with models. At the end of the process, the students made 14 canopy structures of wood with a 1:1 scale. Some of these are called "Flexible Structures, Armadillo and Tenacity".

This study comprises the photographs and evaluations of the designs obtained at the end of the "Canopy Structure Design Workshop". In the assertion it explained the positive and negative properties of those designs.

by **namiyeye Öztürk**

### Canopy for EcoVillages as a Structure Design Problem

**The Location of the Project:**  
The project is located in the Gökçeada Island in the Marmara Sea. The island is 100 km long and 15 km wide. It is a part of the Gökçeada National Park. The island is a part of the Gökçeada National Park. The island is a part of the Gökçeada National Park.

**Project Description:**  
A canopy design that works with compression and tension, is installed and removed easily, made up of local ecological-economic materials, may serve as an example and applicable to the needs of eco-villages and similar structures.

**1. Positive Properties:** A canopy design to sit beneath, eat, have a meeting, to dry the harvested vegetables and separate seeds.

**2. Constructive Properties:** Attachable-detachable, easily installed and removed, temporary structure.

**Group of 5 students will be formed for teamwork. You are expected to work as a team by experimenting, solidarity, sharing and division of labor; are key to teamwork.**

**Project Stage 1:**  
A research poster (10 x 100 cm) has been made comprising the following:  
• Life and needs in eco-villages, structural elements used in eco-villages  
• Structures that work with compression-tension, canopy and similar structural designs used outdoors  
• Local-ecological-economic materials

**Project Stage 2:**  
1. A canopy should design for people (and their likes if wanted) for Gökçeada and similar eco-villages (1st sit beneath, eat, have a meeting, prepare to dry the harvested vegetables and separate seeds, attachable-detachable, easily installed and removed, temporary structure)  
2. A canopy design for protection from excessive sun and wind from the south and west for plants in Gökçeada and similar eco-villages in organic/natural replicable (seasonal, semi-permeable, light, attachable-detachable, easily installed and removed, temporary structure)  
3. The installation, research reports, documents, scenarios, mockups etc. that respond to the problem are taken into consideration during evaluation. Estimated time for this project is 4 weeks.

**Process:** This design problem was handed out to the students on 21.05.2013. A seminar on Structure and Construction was held by Namiye Öztürk on 21.05.2013. Dilek Üst, an expert on eco-villages held a seminar on 24.05.2013. A Field Trip to Gökçeada EcoVillage was conducted between 28 - 30.05.2013. The first stage of the project was completed on 29.05.2013 and the students submitted and presented their Posters. The preliminary Jury for the mock-ups was held on 07.06.2013 and constructions that fail to stand on their own were guided by the Jury. On 18.06.2013, constructions were set up on the green area in front of Anadolu University, Faculty of Architecture and Design and Jury was held. **Jury Evaluation Criteria (Required):** A working product model with a scale of 1:1 was required upon submission of the Project. The measurable criteria of evaluation are as follows:  
1. The construction should stand on its own 2. The construction should preserve its stability against moving forces such as compression and tension applied by wind 3. The installation and detachment time of the construction  
The hierarchical design criteria of evaluation are as follows:  
1. Relationship between function and form 2. Different usage possibilities 3. Visual effect  
**Grading:** The average of the grades given out by 3 project supervisors is taken for the position of the project. Each member of the group gets the same grade.  
**Evaluation:** The three-dimensional models were set up outdoors on the date of the evaluation. The jury members observed the installation processes of the final 14 constructions by the students. The installation-detachment times of the constructions were between 2-30 minutes. All of the constructions were able to stand on their own. The products designed by 14 groups were evaluated with regards to many installation-detachment, maintaining stability in face of moving forces, the relationship of function and form, different opportunities for use and visual effects as follows.

**Result:** At the end of the evaluation, the students' gains are as follows:  
1. I observed that most students comprehended the intuitive design of structural design. Mechanical calculations were not enough to design a structure. As Pir Sıltı Harvi puts it, "A structure cannot be designed starting from mathematical models or structures theorem or mathematical developments. These formalisms and developments will be necessary in the realization of design, which is the second stage. Intuitively feeling a structure, its volume ratios or color relations is a matter of capacity and confidence, an internal foundation for the structural design (architecture magazine, <http://design-ism.org.tr/dergisi/2/13732193.pdf>)"  
2. At the end of the workshop process, students learned about teamwork. They improved on resolving divergences of ideas in a group, division of labor and doing result oriented work.  
3. All of the students learned that a structure cannot be designed by mere drawings but that modelling is necessary. They recognized how the connections between the elements that make up the whole make a difference in the design. They discovered the relationship between the rigidity and flexibility of the elements and the compression and tension forces.  
4. I observed that the students were confused about the concepts of structure and construction. Students learned the difference between the two by the end of this workshop. The concept of structure is very closely related to the concept of a system. As I know, the system is a set of items which act together and set for a single purpose. Structure is the set of relations that preserves the form of an object against other forces and is an abstract concept by nature. Construction is everything that is made up of material, components, pieces and parts and is concrete rather than abstract. Structure is like the human's character and construction is his/her body.

**1**

This group aimed to form a wide shade area by using the minimum.

**1. Positive properties:** The single touch point of the construction in the ground was found positive. This construction became the one which interfered with the ground the least due to this intent.

**2. Negative properties:** The construction could cause a well effect in face of the wind. The cover material of the construction was not permeable so it can't sustain the wind. More refined solutions need to be proposed for details like the starting and ending points of the structure components.

**2**

This group aimed to add another function to the function of a canopy. This construction's second function is to dry vegetables on its top.

**1. Positive properties:** The vegetable drying function was found positive for a second purpose.

**2. The arbitrary form of the canopy of the construction is general and negatively criticized. The fact that triangles of different colors were used on top of and underneath the canopy was negatively criticized. In order to maintain the balance of the construction, a ratio-proportion study needs to be made for the construction. It was stated that the location and size of the elements of the main function, need to be designed.**

**3**

This group aimed for a construction that was integrated with a tree in both meaning and functionally. They said that the tree was one of the group members and that they designed the construction as they thought it in the shade all together.

**1. Positive properties:** Their different point of view towards the tree was found positive. This construction is useful in including the fruits of the trees.

**2. Negative properties:** The problem in the elements of the construction and the joining of these elements were not found positive. The detail and the moving pieces need to be refined.

**4**

This group aimed to make a canopy construction inspired from an armadillo.

**1. Positive properties:** The details in the bringing together in the piece and the workmanship were found positive.

**2. Negative properties:** The direct copying of the design of the construction was negatively criticized. Despite its structure, the construction was not the fitting point to the ground even though it was made up with regards to the revolving angle of the roof rays by fixing the ground from the junction points was suggested.

**5**

This group proposed a social tent that could hold meetings of 100 people.

**1. Positive properties:** Accessibility and access to the tent from every direction were found positive.

**2. Negative properties:** The overlaid cross sections of the pieces were negatively criticized. One of the most important elements of structure is hierarchy and the thicknesses of the cross sections of pieces change according to load.

**6**

They aimed for a canopy by providing brochures of the canopy construction to eco-villages. They proposed two different scenarios for use.

**1. Positive properties:** The brochure and graphic works were positive.

**2. Negative properties:** The construction they proposed was not notations and what everyone could think of first. It was criticized that they had to be encouraged to think of search of diversity. The instructions for construction were not found positive. A bond can be formed between the cross sections of pieces and the abilities in terms of design language and continuity.

**7**

They aimed for a stable construction. They advocated that they could have sun control, due to different uses of the cover of the construction.

**1. Positive properties:** The construction detail and assembly at the linking point was found positive.

**2. Negative properties:** The non-use of the pyramid and the excessive height of the construction that contributes to this non-useful form were negatively criticized. The fact that the cover was not cut off from the ground was not found positive. Despite enough height to stand inside, the lack of an efficient manner to allow for standing was negatively criticized.

**8**

They aimed to make a canopy by using Tenacity.

**1. Positive properties:** The fact that a rigid structure was made without the pieces touching each other and obtaining supporting construction this way were found positive. The jury suggested to move the tent-like part in the middle to the side. They were wanted that a part of the created space was rendered unusable because of this.

**2. Negative properties:** It was pointed out that more refined design ideas had to be proposed in order to prevent randomness in connections and connection details. Although a side-by-side modular structure was aimed, the jury criticized the fact that the structure was not worked out for this purpose.

**9**

They aimed for an easy-to-use construction that would maintain its function as a canopy in various positions.

**1. Positive properties:** Providing diversity despite minimum use of materials is one of the positive aspects of this design. Their solutions attention to same details was found positive.

**2. Negative properties:** The jury negatively criticized the lack of methodology regarding the details of nodes and windproof connections.

**10**

They aimed tent-like, adjustable canopy that can be used by side by side.

**1. Positive properties:** The module for use was designed in such a way that it can be folded and carried on the back. The flexibility of the construction made easy attachment and detachment and the consideration for most of the details was found positive. The form and function were compatible. The sensitivity of the relationship between the slanting elements and how the wind was lifted.

**2. Negative properties:** The failure to form a module when set up side by side and the obligation to use the same piece were negatively criticized. For a modular design, the units must fit each other geometrically and by creating saving on materials.

**11**

This group aimed for a movable, light and modular canopy for use that would also serve meeting purposes.

**1. Positive properties:** The group was successful in meeting goals. The effort to keep the size of the unit was positive but it was commented that the size could be a little bigger. The practical and economic solutions for joint details were complimented.

**2. Negative properties:** The texture of fabric was negatively criticized due to its weight and ductility.

**12**

This group aimed for a small scale green that collects rain water in its task in the middle.

**1. Positive properties:** The combination of the design aim and the product idea was positive.

**2. Negative properties:** It took negative criticism due to lack of practical solutions in joint details and not meeting the easy attachment-detachment criteria. Although a side-by-side modular structure was aimed, the jury criticized the fact that the structure was not worked out for this purpose.

**13**

This group aimed for a canopy that is light, flexible due to its polyhedral geometry and easily modified in size.

**1. Positive properties:** The diversity potential is positive in this construction due to the use of geometry.

**2. Negative properties:** The construction fails to display the design flexibility due to a mistake in the joints. Double profile was used on the edges due to the implementation of an equivalent. The need for specialized design resolution rather than focusing on joint points was pointed out.

**14**

This group aimed to design a moving construction that could be changed in accordance with the sun elevation of the jury.

**1. Positive properties:** They wanted to make the two-dimensional rectangle surface into a three-dimensional one. The fact that the construction could be made into 3 different shapes was evaluated positively by the jury.

**2. Negative properties:** The stability solution against wind was insufficient. The installation of the material used in the joints was not found positive. A more durable material for the outer cover should be considered instead of the material used in the joints (spandex).

**STUDENTS**

1. İzzet Kaan Şahin, İsmail Can Yiğitler, Elif Kurt, Lale Köksal Yılmaz, Merve F. Çoban, İzzet Kaan Şahin  
2. Volkan Doğan, Levant Gülleryay, Aydin Akpinar, Barış Ural, İzzet Kaan Şahin  
3. Şakir Eren, Hilal Bekarçelebi, Gülşire Tay, Semih Bilgin, Deniz Çelikkaya  
4. Burcu Öz, Ömer F. Aydoğmuş, Ömer Deniztaş, Elif Kurt, Merve Elvan Çiçek  
5. Buket Genç, Merve Bozkuş, Tuğba Bulut, Ozan Güllü, Berkcan İzzet Kaan Şahin  
6. Şiye Balkant, Gülşire Balkant, İzzet Kaan Şahin, Merve Aydoğmuş, Burcu Öz  
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10. Taprak Deniz Yurt, Ayça Yılmaz, Erkan Feridun, Mustafa Kay, Elif Kurt, Merve Aydoğmuş, İzzet Kaan Şahin, Elif Kurt, Merve Aydoğmuş  
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14. Elif Kurt, Merve Aydoğmuş, İzzet Kaan Şahin, Elif Kurt, Merve Aydoğmuş

Figure 1. Poster "Canopy for EcoVillages as a Structure Design Problem"

## Project Team

Supervisors: N.Ozturk, D.Ozer, E.Akan.

- 1.Emre Kaan Şahan, İsmail Can YiğitgOr, Elif Kurt, Lale KUbra Tanrıku, Menekşe Ozbey,Ayberk KOLE
- 2.Volkan Doğan,Levent GULeryUz,Aydın Algan,Hazal Urlu,İrem ErdOI
- 3.GOkCe Erem,Hilal Beşkardeşler,GULbiye Taş, Semih Bilgin, Ece Cetin
- 4.Burcu Ors,Omer F. Aydoğmuş,Omer Demirtaş,Didem İşyapar,Merve Gizem CiCek
- 5.Buket GenC,Merve Bozik,Tuğba Bulut,Okan GULLU, Berivan Atik
- 6.Simge Nalbant, GULserah Şarkbay, İzel AltınOren,Ramazan Seyhan,Seray Akkoyun
- 7.Funda GOkmen,Şansın TUtengil, Gizem Cırakman, Gizem Saray, İrem Berkant
- 8.Gizem Severoğlu, Beyza Yılmaz, EylUI Danışman, Altan Artuk, Yunus Renkligil
- 9.Elif Selek,Deniz Erkut,GULdem Teksoy,ErinC Başer,Osman Can
- 10.Yaprak Deniz Yurt,AyCa Yılmaz,Erdem FerdOnmez,Mustafa Eray Ozdil,Elif Kadayıf
- 11.Gizem Bodur,Rumeysa GUI Ersoy,Fulden TUnGUr,GULter Yıldız,Merve. G GULayan
- 12.BetUI Yaylalı,İlayda Varlı,Dursiye KılıC,Yasemin Avcı,A. Dilruba GUneySu
- 13.Ece GOktaY,Derya Eren,Ercan COrtle,Fatma Altınay,Didem OzsUmbUI
- 14.Eren GOren,Selin Bilgenoğlu,Gizem Ercan,Nisan Talazoğlu,KUbra Mutlu

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- GUneshKoy Kooperatifi website: <http://guneskoy.org.tr/>
- MarmariC Ekolojik Yaşam Derneği website:<http://marmaric.org/>
- Auroville EkokOyU website: <http://www.auroville.org/>
- Crystal Waters EkokOyU website: <http://crystalwaters.org.au/>
- Damanhur EkokOyU website: <http://www.damanhur.org/>
- Findhorn EkokOyU website: <http://www.findhorn.org/>
- Sieben Linden EkokOyU website: <http://www.siebenlinden.de/index.php?id=1&L=2>
- Solheimar EkokOyU website: <http://solheimar.is/index.php?msl=english>
- Tamera EkokOyU website: <http://www.tamera.org/index.php?id=1&L=0>
- Mimarlık Dergisi: <http://dergi.mo.org.tr/dergiler/2/173/2192.pdf>