Multi-disciplinary Project Groups: 'Eco-human Smart Campus'

Working solo   Collaborating   Relaxing   Teaming up

A multi-disciplinary collaboration between 3 Major Academic Units

Sciences

Electric & Electronics Engineering

Design
A Clinique Course

Students & lecturers involvement in Project Groups:

o Involved work in small teams – 4-6 students with a Professor.

o The projects are concrete and respond to real challenges regarding sustainable Public-Spaces in urban context through the usage of smart technologies.

o The current project: A Micro-Climatic Smart Place to meet & work on Campus

What if we use the Campus grounds as an Urban-Sustainability Open Air Lab? And as Public Grounds?

What if we implement radio wave smart technologies in urban context, and, for what purpose?

How should we implement smart technologies in the city to <u>connect</u> between people and people, and their places?

How should we apply smart tech systems in the Public Grounds to encourage sustainable behavior? / to save energy? / to address global heating?

Low cost   Long range   Low power   Secure

Internet of Things data transmission technologies:
Zigbee, Sigfox, NB-IoT, LoRaWAN.

ZigBee®
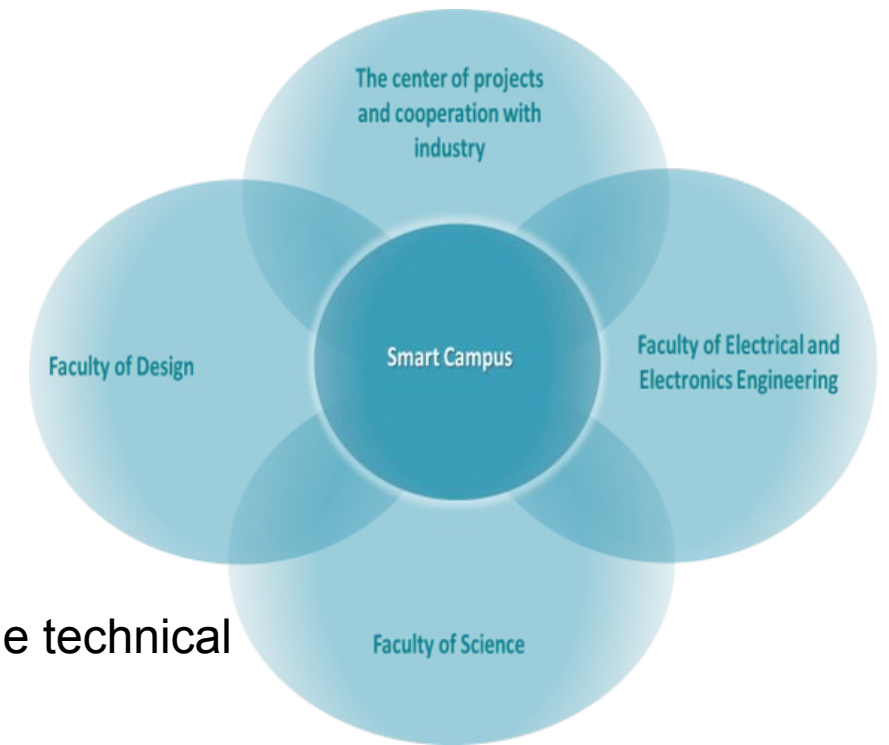
sigfox

LoRaWAN™

3GPP

NB-IoT

Mission & purpose:
The Campus is a Living-Lab for Innovation

- **The Academic Campus is our Living Lab for 1:1 interventions examining Sustainable & Smart Places development in Public Spaces. Through the project we aspire to influence and change perceptions and habits in the context of local sustainability and climate change.**
- **The project's main objective is to create an external smart place for collaboration, connecting, working & learning.**
- **The project's primary challenge is to create climatic comfort in micro scale by using smart technologies and vegetation as generating materials.**
- **The place will thus be created through the implementation of a 'Smart micro-climatic spatial device'.**
- **The design will be open-ended allowing connection to additional unit(s) in order to create an exterior environmental system.**

Eco-human Smart Campus:
Areas of Responsibility According to Organizational Structure

- Project planning: design, content, scope of time, procurement, regulation, etc. - **The center of projects and cooperation with industry**

- Compatibility, installation and running of the components - **Electrical and Electronics Engineering**.

- Integration of technology in the environment - **Faculty of Design**

- Definition of use, accessibility of information for users, information security - **Computer Science**

- Interface design and user experience - **The center of projects and cooperation with industry**

- Relationships, signal stability and information transmission, integration into the technical environment - **Electrical and Electronics Engineering**

- Receiving information, extracting information, processing and storing information in databases - **Computer Science**

- Forecasts modeling based on the information obtained – **Applied Mathematics**

The center of projects and cooperation with industry

Faculty of Design

Smart Campus

Faculty of Electrical and Electronics Engineering

Faculty of Science

HiT
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Eco-human Smart Campus:
Areas of Responsibility According to Organizational Structure

HIT Faculty
Aharon Cohen – Science Faculty. Head of The Center of Projects and Cooperation with Industry – HIT.
Mark Israel, M.Sc. – Science Faculty. Director of Development, Center of Projects and Cooperation with Industry Initiative, Coordination & Overall Management of Project Groups – HIT.
• **Braha Kunda** – Architect & Environmental Designer for Sustainability, Design Faculty, HIT.
Semion Roitman – Engineer, head of Laboratory of advanced Communication specialist – HIT.

Experts
Prof. Oded Potcher – Climate expert – Tel Aviv University.
Grant Linscott – Industrial Designer - An International Collaboration between the HIT Design Faculty and BESIGN, The Sustainable Design School in Nice, France.
Gennady Fedorenko Ph.D. – IoT expert, KhaI - National Aerospace University «Kharkiv Aviation Institute»
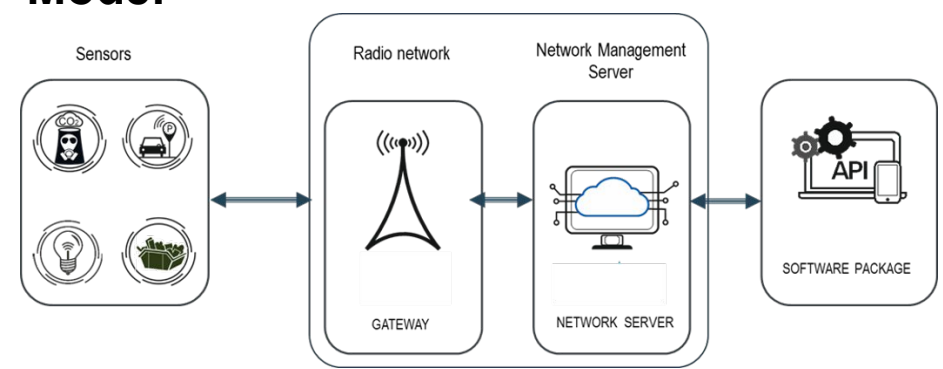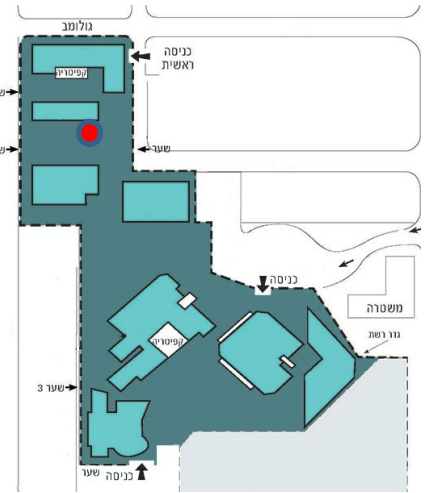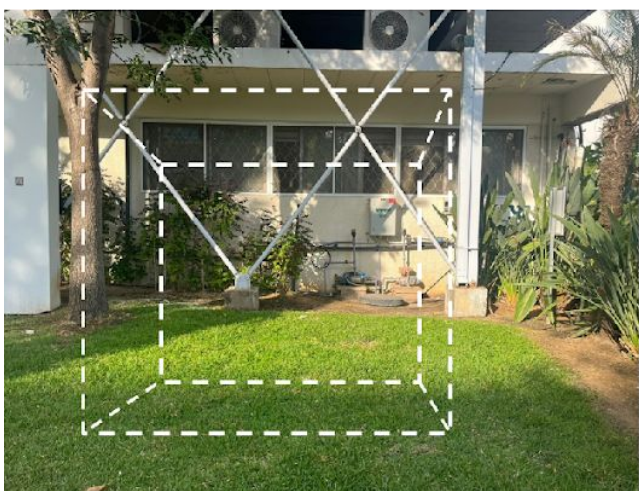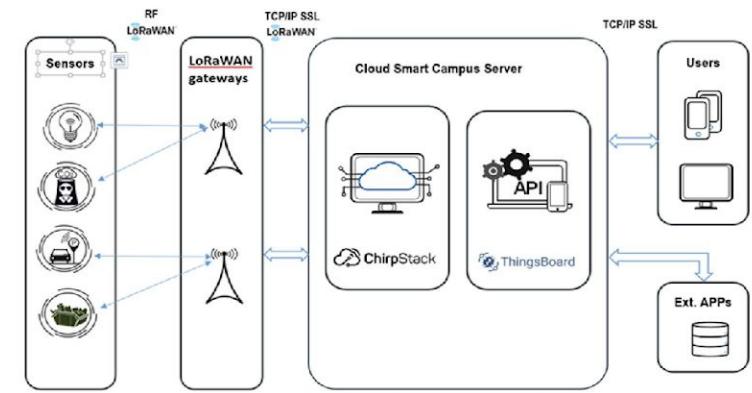
Partners
Aluma Fund
MGM company

Eco-human Smart Campus:
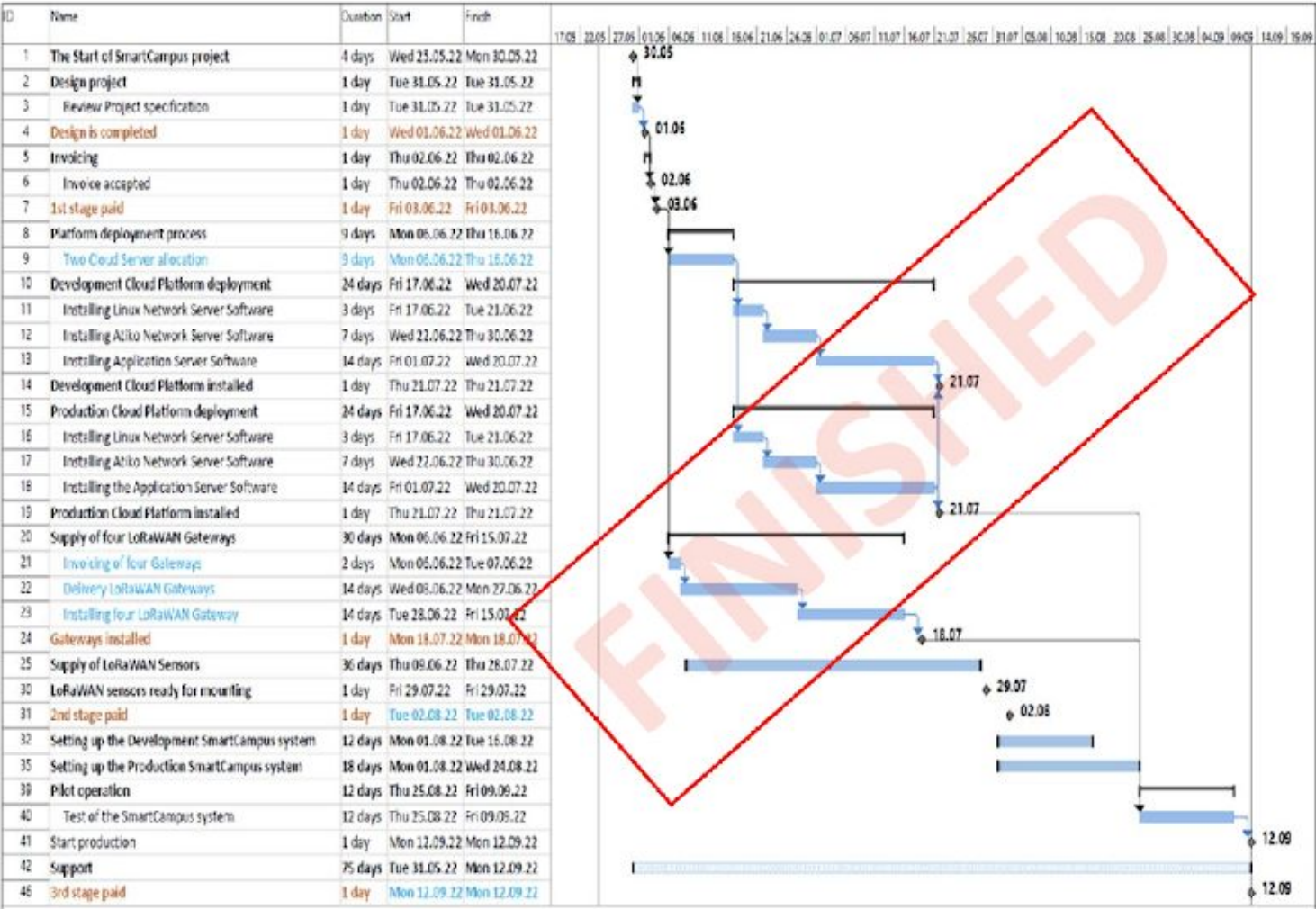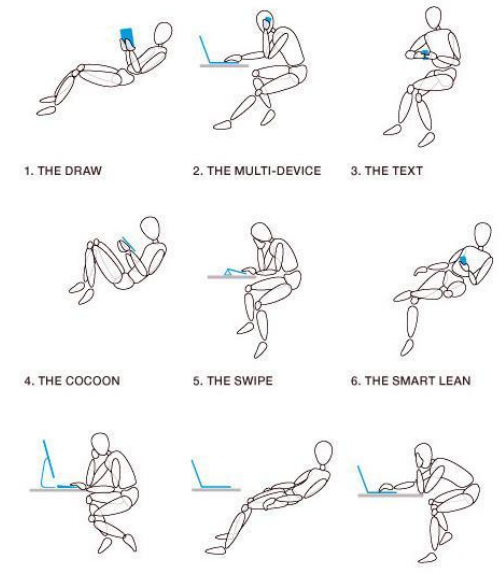# Smart Campus System Design

Model

Implementation

Proposed Location on campus:
Between Buildings #2 & #3

Eco-human Smart Campus:
Estimated schedual

Integrative Design Process:
Micro-climatic Place Device

Timeline:

March 2022

1. **Preliminary Research**
2. **Design Concepts**

November 2022

3. **Brief**
4. **Smart scenarios**
5. **Site consideration**
6. **Climatic measurement**

February 2023

7. **Preliminary design**
8. Budget estimation
9. Detailed Design

April 2023

10. Construction Drawings
11. Construction & systems implementation

What if?

Smart tech solutions - Micro climate control

Creating climate controlled environment using vegetation as a cooling partition, while adding mounted fans to move the air in the area to help the cooling effect

Using wind sensor to activate the fans in the required speed

A Place to Collaborate - Components:

Vegetation

Structure

Resistant wood

Solar panels

What if?

A Place to Collaborate

Outdoor work area using vegetation to create controlled microclimate. Creating a space to collaborate, share, and breathe.

- Design research leading to vision & concepts for eco-human smart interventions in urban context.
- From concepts to Detailed Design for the concrete construction of a 1:1 eco-human smart intervention

HIT 50 YEARS
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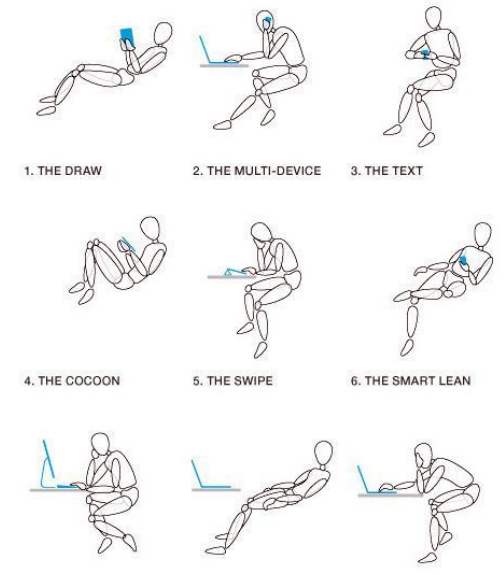# UX - Scripts & systems for the Smart Sustainable Spatial intervention:

1. **Light:** The system will detect that it is getting dark by a smart sensor and turn on – fade in the lights
2. **Information:** Transmitting the existing climatic conditions in the place: temperature, humidity etc. to arouse awareness & curiosity
3. **Occupancy:** monitoring human presence and adjust relevant systems for more comfort, such as light and ventilation.
4. **Weather monitoring:** temperature, humidity, and wind.
5. **Turning fans on and off** - the system will detect changes in the weather and activate the ventilation systems to suit micro-climatic conditions when the place is used by people.
6. **Regulating blinds** - in the partition according to the movement of the sun
7. **Monitoring Agriculture:** smart irrigation & fertilizing system.
8. **A solar system** for generating electricity for the various usages

1. THE DRAW   2. THE MULTI-DEVICE   3. THE TEXT

4. THE COCOON   5. THE SWIPE   6. THE SMART LEAN

HiT
50 YEARS

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Micro-climatic principles & guiding lines:

Prof. Oded Pochter TA University:

1. Semi-open structure > similar to 'Gasibu', or an independent pergola structure
2. South elevation:
3. West & East elevations:
4. Vegetation:
5. Adjustable roof system for further research
6. Measuring temperature & humidity at humans' eye-level: 1.50 m
7.

1. THE DRAW   2. THE MULTI-DEVICE   3. THE TEXT

4. THE COCOON   5. THE SWIPE   6. THE SMART LEAN

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An Eco-Human Smart Place on Campus:

A research facility for the implementation of smart technologies targeted at **creating micro-climatic** conditions in Public spaces.

The facility offers a **place to collaborate**, meet, learn and work.

It allows **climatic comfort conditions** even on hot summer days in and around Holon primarily by using vegetation.

The systems integrated in the facility will be **autonomous** and will be operated by **using advanced technology.**

The plants to be applied in the project

The plants were carefully selected with vegetation that stimulates the senses, stimulates the sense of smell and creates a pleasant and relaxed atmosphere.

spice plants:
-Peppermint
-nana
-Linalool

fragrant plants:
-Lavender
-Jasmine
-rose
-Orange tree
-lemon tree

Spice plants
eastern front

Fragrant plants
west front

north south
front

north south
front

-golden futus

Components
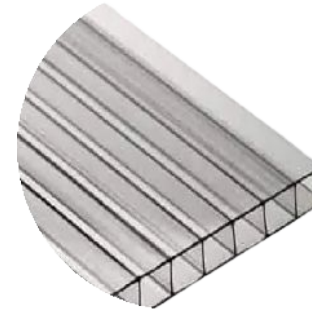
polygal roof cover

solar panels

Modular aluminum profiles

aluminum net

Terracotta planters

fans

Stepping stones

pine tree seats

oak tree deck

views
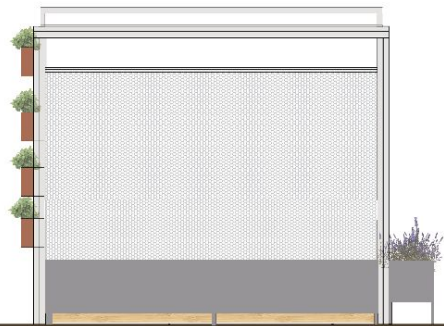
north   east   south   west
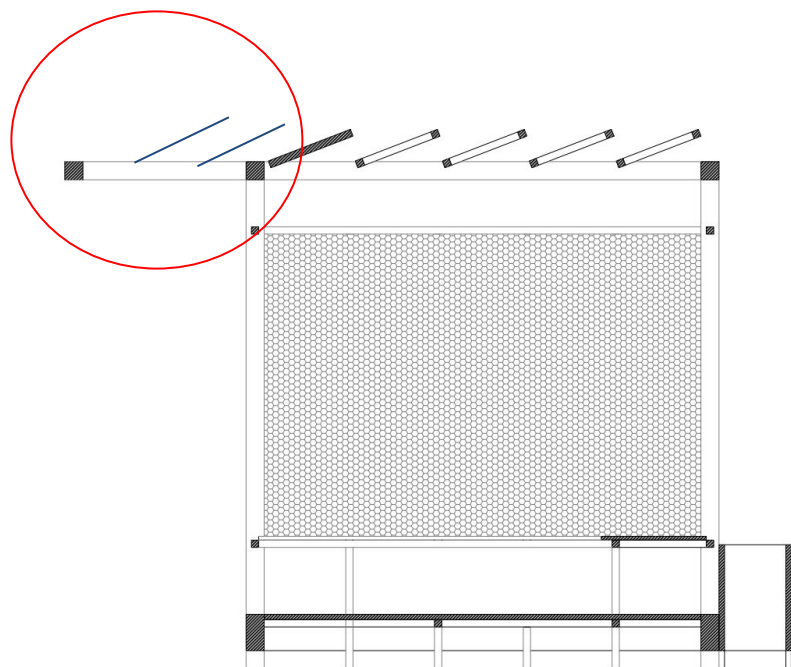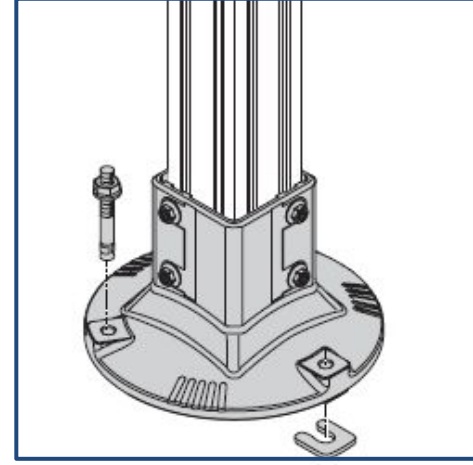
B.B
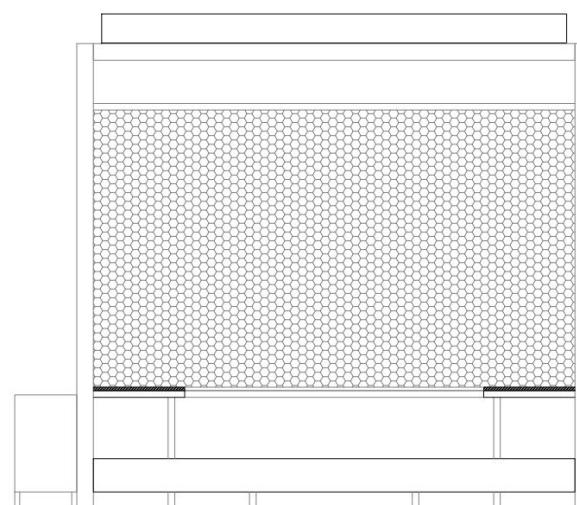
A.A

Construction details
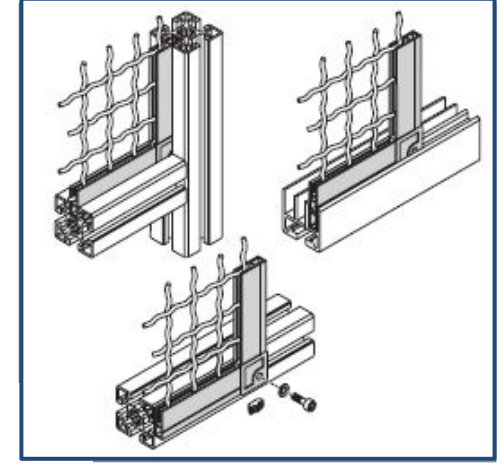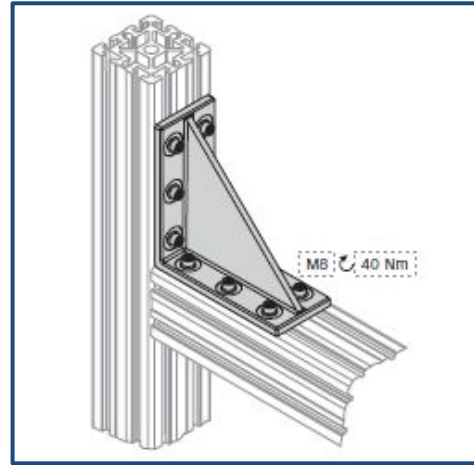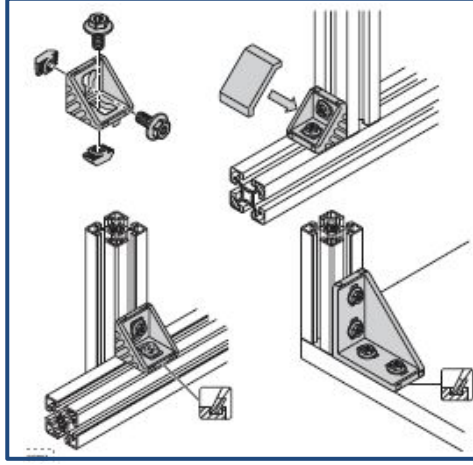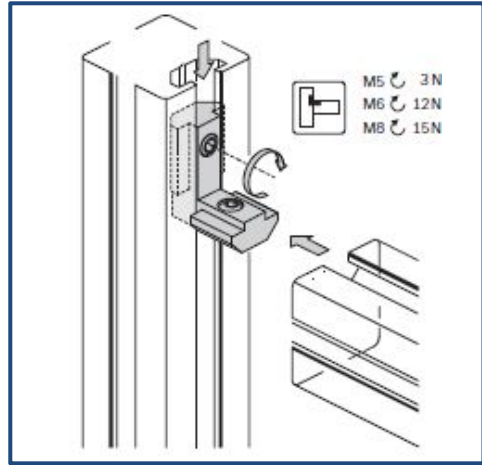
אדניות ‧ רשת של צמח מטפס

H=270

אדניות מטפריות
27cm
מעקם

Thank you!

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