

We are the makers – IoT: Learning Scenario – Chainmail (by Edumotiva Team)

1. Title of the Scenario	<i>Chainmail Structures in 3D printing</i>
2. Target group	Secondary school and vocational school students between 14-17 years old
3. Duration	This scenario can be divided in 2 different sessions each lasting 3 teaching hours.
4. Learning needs	Chainmail structure, chainmail applications, 3D designing, try and error projects, support problems in 3D printing
5. Expected learning outcomes	<ul style="list-style-type: none"> • Understanding the concept of chainmail structure. • Understanding the properties of a chainmail object • Learn the different forms chain links. • Identify the several applications of a chainmail structure in every day life. • Learn the basic parameters that have to be considered in order to design a chainmail structure. • Execute connections in order to produce a successful 3d design. • Create unique 3D designs. • Understand the limitations of the materials and forms used for the final 3D print. • Learn to identify the errors after the first print and understand the changes that have to be made to lead to a successful print.
6. Methodologies	Lesson 1: Presentation of chainmail structure (given) from the teacher. Learning by doing, design a chain link Learning by doing, design a chain links' basic connections Lesson 2: Learning by doing, 3D designing and printing a whole chainmail structure
7. Place / Environment	3D printing Laboratory
8. Tools / Materials / Resources	Projector, Audio system, computer systems with cad designing programs, Papers, pencils. Digital Material: presentation "Chainmail"

<p>9. Step by step description of the activity / content</p>	<p>Lesson 1: Presentation of chainmail structure (given).</p> <ol style="list-style-type: none"> i. The teacher have to explain the concept of chainmail and the current applications in every day life . ii. Afterwards , the chainmail structure can be explained as it is made from a basic chain link. iii. At the point that different chain links and chainmail structures systems are presented, the students could find different ways of connections in order to produce a different output. They can design their ideas in a piece of paper. iv. The concept of connection points will be analyzed. v. The concept of support and how it can affect the final printing will be analyzed. vi. The students can start designed their own chainmail model using: <ol style="list-style-type: none"> a. Chain links that are given by the teacher (provided in the folder "Chain Links"). b. Chain links found in the Internet. c. Chain links designed by the student. <p>Lesson 2: 3D designing and printing</p> <ol style="list-style-type: none"> i. The students will finalize their designs and then they will print their chainmail structure. ii. The unnecessary support will be removed. iii. The structure will have to be tested to identify: <ol style="list-style-type: none"> a. Flexibility b. No broken points (all linked) c. Robustness d. Support issues (if any) that can destroy our structure. iv. The teacher will help the students to identify the errors of their designs (if any) and point out the parameters that have to be changed for a better final print. v. The students will print again (if needed)
<p>10. Feedback</p>	<p>Lesson 1: the first exercise is a feedback exercise to determine if our students have understand the concept of connection points in a chainmail structure. It also points out their understanding of different chain links and the final output they produce. The designing of their own chainmail provides a clear view of the chainmail concept understanding.</p> <p>Lesson 2: after the test of the first printed chainmail model, we can discuss with them, about what went wrong and how they can fix it. This is a way to figure out if our students have acknowledge of their projects.</p>
<p>11. Assessment & Evaluation</p>	<p>Lesson 1: observation in the classroom. We can assess our students understanding about complex 3D projects. We can evaluate their ability to understand a design and perform complex connections.</p> <p>Lesson 2: Assessment of the final printed project. We can evaluate how our students can improve their designs based on their ability to identify errors. Are they willing to try again?</p>