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We are the makers – Smart home II

Activity proposed by Gabriel State, Physics teacher, and WeMakers RO team

1. Title of the Scenario	**Smart home –** Making a model of a house that has some of the functions of a smart house
2. Target group	13 - 18 ani
3. Duration	min. 3 hours
4. Learning needs	- Basic electronics knowledge - Basic programming knowledge
5. Expected learning outcomes	- Developing design skills starting from general features - Creating teamwork skills - Developing practical skills (assembling, performing simple operations such as gluing, drilling) - Understanding the concept of smart home - Forming an algorithmic way of thinking - Developing skills for using and understanding the operation of electronic circuits and making connections between them - Familiarization with Arduino Ide programming environment
6. Methodologies	- Project based learning - Inquiry based learning - Cooperative learning - Heuristic conversation
7. Place / Environment	Computer/Physics Lab
8. Tools / Materials / Resources	- projector; - ARDUINO IDE - Arduino board; breadboard and connection wires; - sensors: methane gas, radiation, atmospheric (pressure, humidity, temperature), motion sensor, distance, electric current intensity (or electric power); buzzer; Bluetooth module for Arduino; servomotor; solar charger; - printed instructions; - LED USB lamp;

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9. Step by step description of the activity / content	Lesson 1 a) Presentation of the project and the features of the intelligent house b) Realization of the project sketch c) Identification of the role of each material made available and its characteristics d) Creating teams and establishing tasks; teams: ***constructors (6-8 students):*** they will build the house model starting from the dedicated kit and exterior elements – support – using the materials made available (plexiglass plate, wooden bars); they will make also the holes necessary to secure the actuator and the LED lamp; ***electronics students (4-6 students):*** they will identify the connection pins of the Arduino board and each module, will make the necessary connections and the power supply; ***programmers (4-6 students):*** will be divided into 2 groups: those who will create / import the Arduino application and those who will create / import the Android application running on the smartphone for Bluetooth data communication between the two systems; both teams will make the logical scheme of the program, if they want to create their own program, or they will adapt existing programs on the Internet; Lesson 2 a) Each team accomplish the tasks set at the previous hour b) Assembling the modules created separately: inserting the electronic part into the house layout, installing the sensors, the external LED and the actuator (for a barrier); c) Uploading the applications and check their running Lesson 3 a) Verifying the functionality of the whole project; b) Achieving the energy balance; c) Each team will present the activities carried out and the problems that have arisen. Ideas and impressions sharing d) General conclusions regarding the functionality of the system and the possibility of its actual implementation in a real home.
10. Feedback	The teacher collects feedback from students during the project; the teams communicate with each other during the course of the project in order to inform each other about the stage of the achievement or the problems encountered
11. Assessment & Evaluation	Students self-assess their own project comparing to the requirements originally set. The teacher appreciates the validity of students' self-assessment and formulates his / her own evaluation in few words, indicating solutions to address communication problems at group level or between the group and the teacher.