

F-Roof: a single-layer multifunction roof

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Roofs usually have a single purpose: to protect the house from rain. Here I describe a special roof (named *F-Roof*) that has multiple functions:

- Protect the house from rain and snow.
- Provide solar energy to the house.
- Provide food (vegetables) for the inhabitants of the house.
- The materials used for construction have a dual purpose: structural and functional. For instance, solar panels and plant pots protect the house from rain but also provide energy or food.

The idea of installing solar tiles is not new, but existing solutions are complicated [1]. Additionally, roof gardens have been built since ancient times, but they are usually cumbersome due to multiple layers used to protect the house from water.

The *F-Roof* was built with the following ideas in mind:

- Most roofs have a single function: to protect the house from rain and snow. But roofs, being such large structures, should offer more than protection from bad weather.
- Ground-level soil should be used to grow trees, not vegetables. Vegetables have small roots that require a tiny amount of soil.
- Existing roof gardens have too many unnecessary layers, thus being expensive. Due to advances in materials science, one layer should be enough.
- Soil on the roof provides thermal insulation, so the attic becomes less hot during summer.
- The air behind solar panels could be circulated (with a fan) to reduce the panels' temperature and increase their efficiency.
- Wood should not be used for construction purposes. Trees are more important than cutting them down for building houses!

The *F-Roof* project is open source and is available at: <https://github.com/f-roof>. The website also contains detailed information about the materials, tools, and techniques used in building the *F-Roof*.

References

- [1] Tesla Solar Roof, <https://www.tesla.com/solarroof>, last accessed on 2025.05.31