AgroforestAR: A mobile app for visualizing Agroforestry systems in Augmented Reality

Marie Gosme, Laëtitia Lemière, Marc Jaeger, Gérard Subsol, Charles Moskowicz, Christian Dupraz

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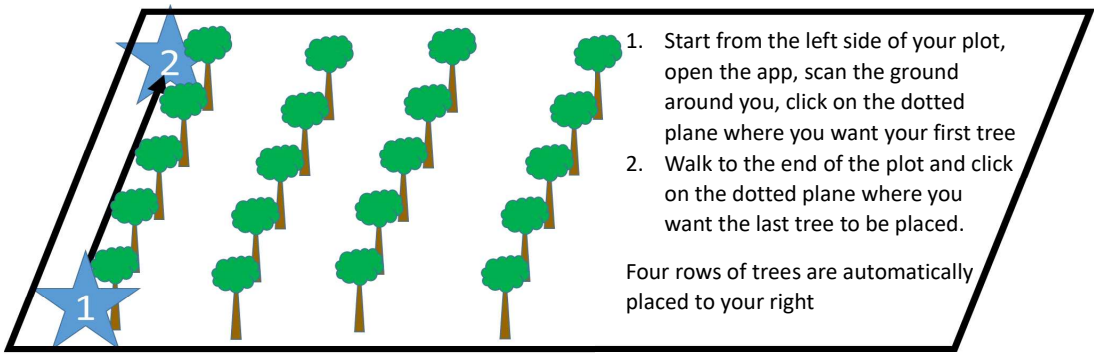
- AgroforestAR allows visualizing what an agroforestry system could look like on a given piece of land.
- It uses the augmented reality capabilities already available in most smartphones, you can download it for free here:

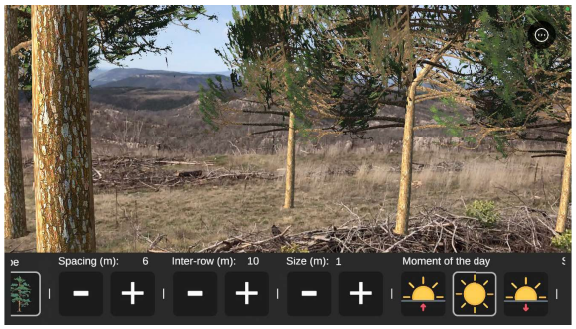
Android phone

iOS (iPhone)



1. Start from the left side of your plot, open the app, scan the ground around you, click on the dotted plane where you want your first tree
2. Walk to the end of the plot and click on the dotted plane where you want the last tree to be placed.

Four rows of trees are automatically placed to your right



- In the future, it will be used to help farmers decide between several possible options for their agroforestry project

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Agroforestry is gaining more and more attention from researchers and practitioners in temperate areas, but it remains a vague concept for most of the public. This is because the renewal of interest for agroforestry systems is quite recent, demonstration sites are rare, and trees are still young, and therefore not very visible. The aim of AgroforestAR is to allow visualizing what an agroforestry system could look like on a given piece of land (including in your garden!). It uses the augmented reality capabilities already available in most smartphones, to superimpose, on the view seen by the phone's or tablet's camera, trees aligned along a line defined by the user by walking from one side of the piece of land to the other side. The user can then choose the tree species (among 5 available species currently) and size, as well as different distances between tree lines and different distances between trees along the line. The user can choose between four seasons, which will affect sun elevation, and for deciduous species also canopy leafiness, in order to visualize tree shade projection at different times of day. The app is freely available on Apple (https://eneo.fr/agroforestAR_ios) and Android (https://eneo.fr/agroforestAR_android) app stores. To use it, stand at the bottom-left corner of the plot, open the app, "scan" the ground around you to detect the soil surface, and click on the dotted area where you want to plant the first tree. Then walk to the top-left corner of the plot, and click where you want to plant the last tree in the row. Four rows of trees are automatically placed to your right. Beyond the use as an awareness-raising tool for the public, this app could be used in the future to help farmers decide between several possible options for their agroforestry project. Therefore, in the future, we intend to add the possibility to download more complex agroforestry patterns, using the ESSU concept (Rafflegeau et al. 2023) and combinatorial maps (Lemiere et al. 2023) to represent complex agroforestry systems. Thus, an advisor could design one or several alternative systems, send a download code to the farmer, who could then visualize the different options directly in their own fields. The following step will then to link this tool with prediction models to visualize the production of ecosystem services.

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References:

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Rafflegeau S, Gosme M, Barkaoui K, et al (2023) The ESSU concept for designing, modeling and auditing ecosystem service provision in intercropping and agroforestry systems. A review. Agron Sustain Dev 43:43. https://doi.org/10.1007/s13593-023-00894-9

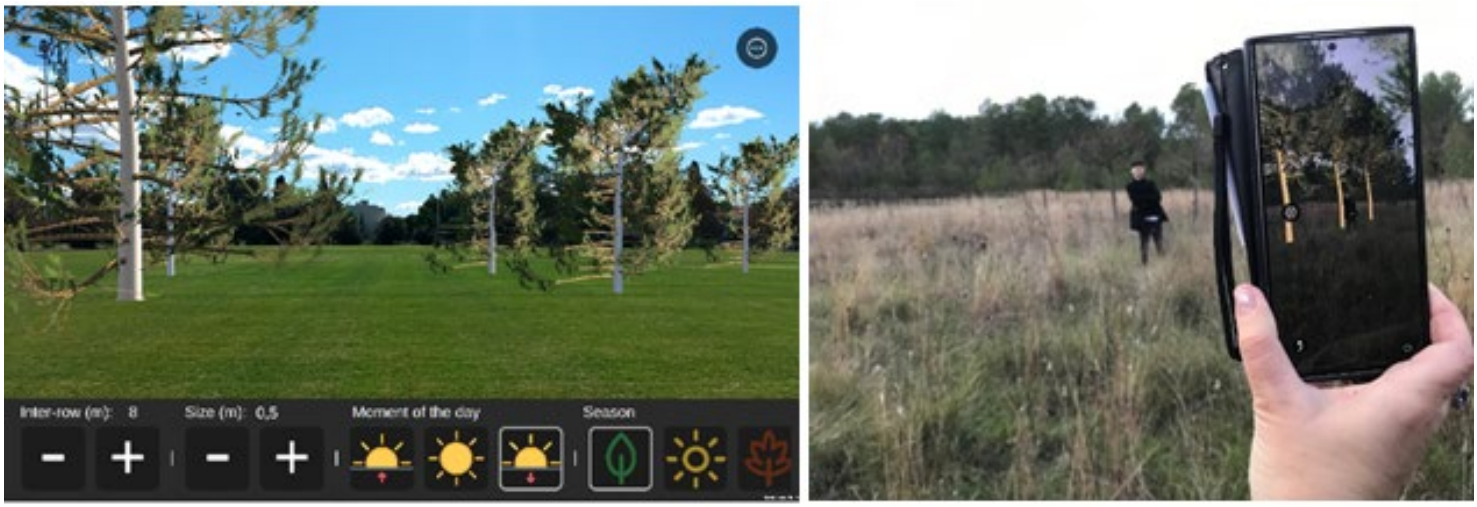

Figure 1 : AgroforestAR app for visualizing Agroforestry systems in Augmented Reality: (A) Screenshot of the app on a tablet showing the options menu, which includes tree species, within row distance, between-row distance, tree size, hour in the day, season; (B) treeless plot and visualization of a possible agroforestry system through the app on smartphone.