# Projects related to selected goals.

After selecting the goals, we want to achieve or address, It’s time to start to find the projects related to. There are three projects which are suitable for our targets.

## Precision Agriculture and Unmanned Aerial Vehicles

One of the most important things to address the hunger problem all over the world is to make full use of the arable land. From 1980s to 2020s, the reason of the improve of the production of rice is due to the hybrid rice yield increases rather than increase of the arable land.[1] In India, approximately 80% of the nation's total agricultural land is segmented into parcels smaller than 5 acres each. A significant portion of the agricultural produce relies on rainfall, with close to 45% of farming land receiving irrigation. This scenario reveals that about 55% of India's population is engaged in agriculture that predominantly depends on monsoon rains.[3] The way to increase area of arable is to use the Unmanned Aerial Vehicles, which not only can water some hard-to-reach farmland to improve the utility of the land, but also can use the machine learning algorithms to optimizing crop output.[2]

图片包含 草, 户外, 山, 水

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figure 1 Picture of drones working in terraced fields (left) and drones performing image recognition of farmland through machine learning (right), reproduced from [2]

For example, Pena et al. [4] scored up to 91% efficiency in sunflower fields with the help of a UAV. They using images collected by drones, combined with object-based image analysis (OBIA) processing, weeds can be accurately identified at an early stage. Weeding at this time can effectively prevent the occurrence and spread of weeds, thereby reducing crop competition pressure and indirectly improving Crop yield.

## Using muscle sensors in rehabilitation devices.

The health of the human body improved a lot in the recent year. While there still have a lot of Vulnerable Groups we ignored, such as the Stroke people. Most of the people have stroke since the age. At the same time, the world is gradually entering an aging society, thus the number of people getting stroke increases sharply.[5] And consequently, the recover is becoming more and more important. Previous research on home rehabilitation processes has shown improvements in facilitating human motor recovery. However, existing rehabilitation devices are expensive and require the supervision of a physical therapist. Due to their large size and complex systems, some devices are not very efficient for use at home. Portable and simple home rehabilitation devices can aid patients in improving their daily rehabilitation activities.[6]

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figure 2 An image of an EMG sensor detecting muscle electrical signals, reproduced from [6].

[1] Gerlach, C., 2024. How the World Hunger Problem Was not Solved.

[2]Sabir, R.M., Sarwar, A., Safdar, M. and Al Ansari, M.S., 2024. Precision Agriculture and Unmanned Aerial Vehicles (UAVs). In Agriculture and Aquaculture Applications of Biosensors and Bioelectronics (pp. 83-105). IGI Global.

[3] Gupta, S.K., Kumar, R., Limbalkar, O.M., Palaparthi, D. and Divte, P.R., 2019. Drones for future agriculture. AGRICULTURE & FOOD: e-newsletter, 16.

[4] Peña, José M., et al. "Quantifying efficacy and limits of unmanned aerial vehicle (UAV) technology for weed seedling detection as affected by sensor resolution." Sensors 15.3 (2015): 5609-5626.

[5] Ambar, Radzi Bin, et al. "Multi-sensor arm rehabilitation monitoring device." 2012 International Conference on Biomedical Engineering (ICoBE). IEEE, 2012.

[6] Li, Raymond C., et al. "The development, validity, and reliability of a manual muscle testing device with integrated limb position sensors." Archives of physical medicine and rehabilitation 87.3 (2006): 411-417.