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OpenDroneMap360, an affordable DIY open-source hardware and software workflow for 3D point clouds and terrain models

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The state of the art in terrain data generation is Light Detection And Ranging (LiDAR). LiDAR is usually deployed through manned or unmanned aerial vehicles. As typical payloads are high, an aircraft with LiDAR needs to be significant in size. Therefore, LiDAR is currently only done by specialized companies with expensive equipment, and cannot be deployed by local service providers in low income countries, despite the plethora of use cases for its data.

A promising avenue to replace LiDAR is photogrammetry. It can be applied with much lighter and more affordable aircrafts and its use to provide extensive terrain datasets is steadily increasing. The scalable open-source software OpenDroneMap allows for extending datasets to very large amounts. Photogrammetry however, cannot penetrate vegetation, and (as is the case with LiDAR) does not resolve ground terrain in obscured areas such as dense urban areas with narrow alleys.

That is why we are developing OpenDroneMap360, a free and open-source DIY hardware-software camera-ball platform for collection of high quality photos with any carrier you can think of. This can be a self-built drone, a backpack rig or another setup we haven't considered yet, equipped with enough lenses to discover any ground that you can think of. Our current hardware offers a backpack rig with a total of 7 lenses and contains a parts list, 3D-printable hull, connection scheme, software deployment and a Sphinx manual how to build, deploy and operate the rig. The technology contains raspberry pi cameras connected to raspberry pi zeros for each lens, a Arduisimple u-blox ZED-F9P GNSS chipset, a raspberry pi4 to instruct the cameras, collect GPS positions, and perform file and data management, and a LiPo battery solution. The entire setup is available on <https://github.com/localdevices/odm360>

