

# Evaluation of the LiDAR in the Apple iPhone 13 Pro for use in Inventory Works

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## SUMMARY

Traditional inventory measurements (architectural or as-built) require a lot of time or money. Currently, the techniques of angular-linear measurements, laser rangefinders, terrestrial laser scanners (TLS), or handheld laser scanners are used for inventory measurements. The use of laser scanning in the inventory works allowed to limit the measuring team to one person, increase the accuracy of the work performed by obtaining a quasi-continuous model of the object and accelerate the measurement directly on the object. Unfortunately, along with these arrangements, the cost of the works also increased, resulting mainly from the costs of the measuring equipment and software used and the personal costs of developing point clouds. An alternative that constitutes a compromise in terms of price and accuracy are typically photogrammetric solutions that use digital photos to build a model in the form of a point cloud. However, the disadvantage, in this case, is the complex staff training necessary for the correct taking of the pictures. In 2020, Apple Inc. produced the first telephone with innovative embedded sensors Light Detection And Ranging "(LiDAR) -based depth sensor and enhanced augmented reality (AR) application programming interface (API). Thus, the relatively inexpensive competition was introduced for the current hardware solutions used in inventory works requiring moderate accuracy of the study. Applied by Apple Inc. the solution is not a surface scan in the sense of TLS devices, but allows obtaining a colored point cloud on a 1: 1 scale. In the presented article, the basic technical capabilities of the iPhone 13 Pro Lidar were tested based on typical tasks in the field of inventory of buildings. The office room and examples of architectural details such as arches in lintels and vaults, cornices, as well as wall reliefs were scanned. The obtained results were confronted with precise measurements with a terrestrial laser scanner. The advantages and disadvantages of the applied solution were compared. The possibility of obtaining the accuracy of 1 cm, required in the inventory work, was assessed.