Authors' Response to Reviewers' Comments

Dear Editorial Office and Reviewers,

Thank you very much for your excellent comments and feedback!

We have studied them very carefully and improved our manuscript according to them.

All comments of ours have been marked with red text in our manuscript.

Kindly,

Anwar & co-authors

Reviews comments

Reviewer 3:

Open Review

(x) I would not like to sign my review report
( ) I would like to sign my review report

Quality of English Language

( ) I am not qualified to assess the quality of English in this paper
( ) English very difficult to understand/incomprehensible
( ) Extensive editing of English language required
( ) Moderate editing of English language required
( ) Minor editing of English language required
(x) English language fine. No issues detected

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	( )	(x)	( )
Are all the cited references relevant to the research?	( )	( )	(x)	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors

Find my comments in the pdf file. It is an interesting paper, methodology and statistics are fine. However, I have some minor comments/suggestions to improve the overall status of the paper.

peer-review-36364623.v1.pdf

Submission Date

26 March 2024

Date of this review

17 Apr 2024 11:06:13

Comments from the pdf file.

1. You need to enlarge your introduction (it is very small) and mention more studies not necessarily related to mobile lidar. For example, you can mention how it was so far by extracting log segments (using lidar in general) and assess the quality or volume and then what is your suggestion and why it is more practical/ergonomic. Here is my suggestion. You may also need the following reference for discussion in the section of discussion.

• • Panagiotidis, D.; Abdollahnejad, A. Reliable Estimates of Merchantable Timber Volume from Terrestrial Laser Scanning. *Remote Sens.* **2021**, *13*, 3610. https://doi.org/10.3390/rs13183610

Done. Thank you very much for the nice suggestion. In response to feedback from another reviewer (4), we have expanded our introduction by incorporating the state-of-the-art section into it page 2 line 98. Additionally, we have introduced the following content to enhance the Introduction chapter on page 2 lines 75 - 88.

“We have seen advancements in utilizing LiDAR for extracting log segments and assessing their quality or volume. Traditionally, this process involved manual methods or less precise technologies. LiDAR offers a more efficient and accurate alternative. By employing LiDAR, we can precisely measure log dimensions and assess quality without the need for physical intervention or invasive measurements.
Leveraging LiDAR technology for log segment extraction and quality assessment offers practicality and ergonomic benefits. LiDAR enables rapid data collection over large areas, facilitating comprehensive assessments in shorter timeframes. Additionally, it re-duces the need for manual labor and physical measurements, minimizing operational costs and labor-intensive processes.
Moreover, the non-invasive characteristic of LiDAR preserves forest ecosystems' integrity and reduces disturbances during data collection. Utilizing LiDAR for log segment extraction and quality assessment improves efficiency, accuracy, and sustainability in forest operations.”

We have also added the following to our Discussion chapter pages 14 -15 lines 541 - 544
Panagiotidis and Abdollahnejad [41] employed the random sampling consensus method (RANSAC) method for Terrestrial laser scanner (TLS) point cloud data, which achieved a notable degree of accuracy in estimating tree height and diameter, resulting in high merchantable volume estimations (97.7% for deciduous and 96.1% for conifer) trees.

2. Lines 96-100 Together with Morgan et al. I would recommend adding a pioneering study for the comparison between photogrammetry and lidar along stem reconstruction. You are going to need this reference also for the discussion section. Here is the paper:

• • Panagiotidis, D.; Surový, P.; Kuželka, K. Accuracy of Structure from Motion models in comparison with terrestrial laser scanner for the analysis of DBH and height influence on error behaviour. J. For. Sci. 2016; 62(8), 357-365. doi: 10.17221/92/2015-JFS.

Done. Added the following content to the Introduction, specifically to the “Literature Review on the State of the Art in Forest Operations” subsection on page 3 lines 125 – 131

“Panagiotidis et al. [15] Explored the feasibility of using a low-cost handheld camera for stem accuracy assessment by comparing data from two point clouds: one from a digital camera and the other from a FARO® Focus3D S120 laser scanner. Euclidean distances were calculated for corresponding points, revealing that points with errors less than 11 cm were mainly located on the ground. Regression analysis demonstrated a significant relationship between height above ground and error, with higher points on the stems exhibiting increased error.”

3. Subsection 4.1.2. How the laser sensor ensures the efficiency of point in upper parts of the stem for log quality estimation and assessment? Considering the limitation that this can only work in single story monocultural stands?

Done. Thank you for posing such an insightful question! To address it, we have incorporated the following content into the Discussion section, specifically between lines 640 and 657 on pages 16 - 17

“The efficiency of the laser sensor in assessing log quality in the upper parts of the stem primarily relies on its ability to accurately capture and analyze key attributes such as diameter, taper, and defects. By emitting laser pulses and measuring the time it takes for the light to return, the sensor can precisely determine the distance to various points on the stem, even in challenging upper regions. This enables the generation of detailed 3D models of the stem, facilitating thorough quality assessment.
It is acknowledged that the efficacy of the laser sensor may be influenced by forest stand characteristics. Monocultural stands with uniform tree spacing and canopy structure provide optimal conditions for laser-based measurements, as they minimize interference and ensure consistent data acquisition. In such stands, the laser sensor can effectively penetrate the canopy and capture accurate measurements throughout the stem. However, in more complex stand structures or mixed-species forests, the performance of the sensor may be compromised due to increased variability and occlusion. Addressing this limitation, future research could explore adaptations or enhancements to the sensor technology to accommodate a broader range of forest stand types and configurations. By refining the sensor's capabilities and expanding its applicability beyond single-story monocultural stands, we can enhance its utility and contribute to more comprehensive forestry assessment practices.”