**Locating Excavators and Truck in the World Coordinate System**

The perspective transformation method is used in order to locate the excavators and trucks on the construction site. The proposed method requires camera calibration parameters, which are not always available for the test videos. The Qtcalib software [1] is used to get the camera calibration parameters of the test videos without using the checkboard camera calibration and Matlab toolbox [2]. Camera calibration parameters are extracted by having dimensions of one known object in the scene. Finally, Equation 1 is used to localize the excavators and trucks in a real-world coordinate system, and Equation 2 is used to calculate the distance between them.

A single frame is extracted from the test video and is used to get camera calibration parameters. Excavators and trucks are located in the real-world coordinate system and, distances between excavators and trucks are calculated, as shown in Figure 1.

|  |  |  |
| --- | --- | --- |
|  |  | 1 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
|  |  | 2 |

A picture containing outdoor, truck, person, snow

Description automatically generated

Figure 1 CV based locating excavators and trucks

References

[1] “QtCalib Help.” http://w3.impa.br/~zang/qtcalib/ (accessed Aug. 19, 2020).

[2] J.-Y. Bouguet, “Camera calibration toolbox for matlab,” 2001.