

CAAP Quarterly Report

Date of Report: July 20, 2020

Prepared for: *U.S. DOT Pipeline and Hazardous Materials Safety Administration*

Contract Number: 693JK31950006CAAP

Project Title:

AN AUTONOMOUS UAS INSPECTION PLATFORM FOR HIGH-EFFICIENCY 3D PIPELINE /ROUTE MODELING /CHANGE-DETECTION AND GAS LEAK DETECTION-LOCALIZATION

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For quarterly period ending: **6/30/2020**

Business and Activity Section

(a) Contract Activity

Contract modifications:

No contract modification is expected at this point.

Discussion about materials purchased:

An Intel RealSense L515 camera was acquired to assist the evaluation of the 3D model reconstruction

(b) Cost share activity

The PI dedicated 0.2 FTE in this quarter to the project.

(c) Status Update of Past Quarter Activities

Task 1: Develop a prototype of pipeline/tank inspection data management and the integration module (PIDMIM). (50% completion)

Subtask 1.1. Design and implement the proposed PIDMIM, which utilizes Google Maps as user interface to access, retrieve, and visualize inspection data (in image, point cloud, and text data formats). (75% completion)

Subtask 1.2. Test and evaluate the proposed PIDMIM. Hypothetical georeferenced

pipeline/tank models will be used for the purpose of functional testing and evaluation.

(0% completion)

Task 2. Develop the quality-based 3D coverage path planning (CPP) algorithm.

~~**Subtask 2.1.** Identify and investigate the appropriate parameters and their value ranges to balance the UAS inspection efficiency and photogrammetry model quality. Identify appropriate optimization algorithms for pipeline/tank 3D coverage path planning (CPP).~~

~~**(100% completion)**~~

Subtask 2.2. Implement and test the developed 3D CPP algorithm through simulations and indoor/outdoor flight tests.

(50% completion)

Task 3. Develop a 3D profile change identification and quantification (PCIQ) module

Subtask 3.1. Identify and evaluate the out-of-the-box photogrammetry software in terms of its capability and accuracy in processing a large inspection pipeline dataset and create demonstrative before-and-after 3D pipeline/route models.

(50% completion)

Subtask 3.2. Develop a 3D profile change identification and quantification (PCIQ) module to allow automatic before-and-after event comparisons of 3D models to identify the change locations and change quantities. The changes can include land movement, third-party excavation, pipe displacement, scour erosion, etc.

(0% completion)

(d) Scheduled work in the Next Quarter

The focuses of the Quarter 4 work are Subtask 1.1, Subtask1.2, and Subtask 2.2

References

N/A