

**Quarterly Progress Report:**

**Project Number and Title:** 1.12, Improved UAV-Based Structural Inspection Techniques and Technologies for Northeast Bridges

**Research Area:**

**PI:** Eric Landis, University of Maine

**Co-PI(s):** Alex Friess, Ali Shirazi, University of Maine

**Reporting Period:** 1/1/21 – 3/31/21

**Submission Date:** 3/31/21

**Overview: (Please answer each question individually)**

- Completed preliminary literature review of current state-of-practice of drone utilization for bridge inspections among state DOTs. Formal presentation and discussion session with industry scheduled.
- Weekly meetings between two PhD students and advisors (Landis & Friess) have been focused on matching mission needs with different options for UAV hardware.
- Team of student engineers began building prototype hexacopter drone capable carrying synthetic aperture radar module for under-bridge inspections, contact with structure.

<b>Table 1: Task Progress</b>			
<b>Task Number</b>	<b>Start Date</b>	<b>End Date</b>	<b>% Complete</b>
Task 1: Review of Current Regional Practice	10/1/20	12/31/20 / 3/31/21	100%
Task 2: Survey of Commercially Available UAVs appropriate for Applications	10/1/20	12/31/20 / 4/30/21 (see below)	75%
Task 3: Prototype Development	10/1/20	5/31/21	70%
Task 4: Image array packages	1/1/21	9/30/22	5%
Task 5: Adv. Data interp.	1/1/21	9/30/22	5%
Task 6: Laboratory trials	3/1/21	9/30/22	0%
Task 7: Field trials	6/1/21	9/30/22	0%
Task 8: Field validation	TBD	TBD	0%
Overall Project:	10/1/20	9/30/22 (phase I)	
		9/30/23 (phase II)	

<b>Table 2: Budget Progress</b>		
<b>Project Budget</b>	<b>Spend – Project to Date</b>	<b>% Project to Date*</b>
\$566,743	(Vu?)	

\*Include the date the budget is current to.

*Describe any opportunities for training/professional development that have been provided*

A large student team has been assembled, including two PhD students (one supported by project), and a Mechanical Engineering senior capstone design team, who is developing custom drone designs for bridge inspections.

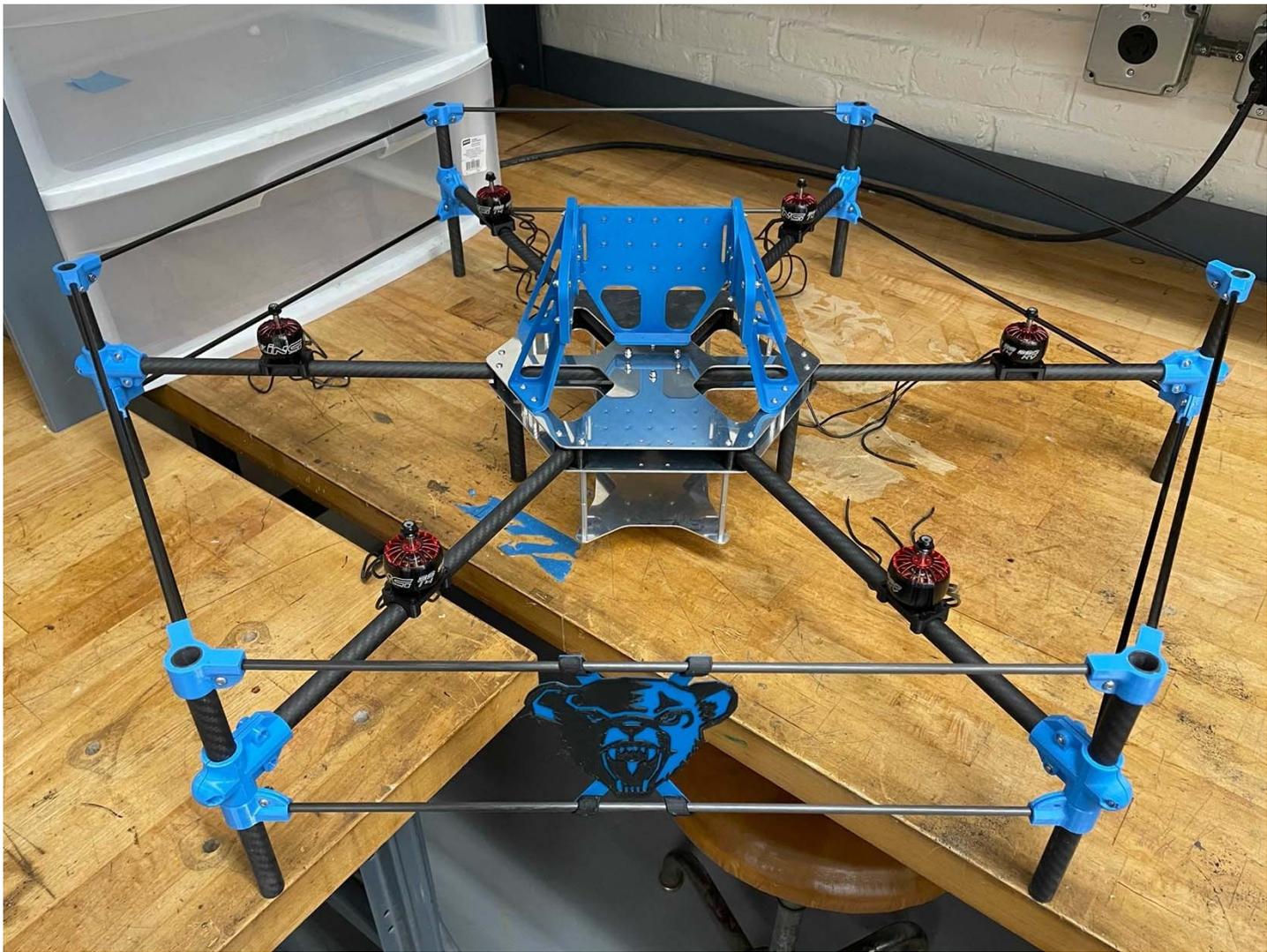
*Describe any activities involving the dissemination of research results*

Meeting with industrial collaborator and MDOT scheduled for 4/8/21 to discuss results of Tasks 1, get feedback on Task 2.

<b>Table 3: Presentations at Conferences, Workshops, Seminars, and Other Events</b>				
<b>Title</b>	<b>Event</b>	<b>Type</b>	<b>Location</b>	<b>Date(s)</b>

<b>Table 4: Publications and Submitted Papers and Reports</b>				
<b>Type</b>	<b>Title</b>	<b>Citation</b>	<b>Date</b>	<b>Status</b>

*Encouraged to add figures that may be useful (especially for the website)...*



Prototype Inspection Drone Under Construction

**Participants and Collaborators:**

Use the table below to list all individuals who have worked on the project.

<b>Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members</b>			
<b>Individual Name</b>	<b>Email Address</b>	<b>Department</b>	<b>Role in Research</b>
Eric Landis	landis@maine.edu	CIE	PI
Alex Friess	Wilhelm.friess@maine.edu	MEE	Co-PI, Capstone Design Leader

Use the table below to list all students who have participated in the project during the reporting. (This includes all paid, unpaid, intern, independent study, or any other student that participated in this project.)

<b>Table 6: Student Participants during the reporting period</b>				
<b>Student Name</b>	<b>Email Address</b>	<b>Class</b>	<b>Major</b>	<b>Role in research</b>
Zahra Ameli		PhD	Civil Eng.	Grad. Research Asst.
Yugandhar Aremanda		PhD	Mech Eng.	Grad. Research Asst.
Drew Bennett		Sr	Mech Eng.	Capstone Design Team
Dominic Dangelo		Sr	Mech Eng.	Capstone Design Team
Nathan Godbout		Sr	Mech Eng.	Capstone Design Team
Jack Leopold		Sr	Mech Eng.	Capstone Design Team
Nicolas Michaud		Sr	Mech Eng.	Capstone Design Team
Peter Rohrbacher		Sr	Mech Eng.	Capstone Design Team

Use the table below to list any students who worked on this project and graduated during this reporting period.

<b>Table 7: Student Graduates</b>			
<b>Student Name</b>	<b>Role in Research</b>	<b>Degree</b>	<b>Graduation Date</b>

Use the table below to list organizations have been involved as partners on this project and their contribution to the project.

<b>Table 8: Research Project Collaborators during the reporting period</b>						
<b>Organization</b>	<b>Location</b>	<b>Contribution to the Project</b>				
		<b>Financial Support</b>	<b>In-Kind Support</b>	<b>Facilities</b>	<b>Collaborative Research</b>	<b>Personnel Exchanges</b>
VHB	Augusta, ME (and others)				X	

List all other outputs, outcomes, and impacts here (i.e. patent applications, technologies, techniques, licenses issued, and/or website addresses used to disseminate research findings). Please be sure to provide detailed information about each item as with the tables above.

Have other collaborators or contacts been involved? If so, who and how? (This would include collaborations with others within the lead or partner universities; especially interdepartmental or interdisciplinary collaborations.)

<b>Table 9: Other Collaborators</b>
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Collaborator Name and Title	Contact Information	Organization and Department	Contribution to Research
Dale Peabody, Director, Research & Innovation	dale.peabody@maine.gov	Maine DOT	Technical champion

*Who is the Technical Champion for this project?*

Name: Dale Peabody

Title: Director, Research & Innovation

Organization: Maine Department of Transportation

Location (City & State): Augusta, ME

Email Address: dale.peabody@maine.gov

**Changes:**

*COVID-related visa issues have made some tasks slightly more difficult. We have pushed back the purchase of a UAV until campus (and the Composites Center) can operate at full capacity.*

**Planned Activities:**

*Over the next reporting period we plan to focus on Tasks 3, 4, and 5 in conjunction with industry partners. In particular, we plan to prep for field work this summer.*