Report Date: 09/23/2022

To: ematson@purdue.edu, ahsmith@purdue.edu and lee3450@purdue.edu

From: C.C

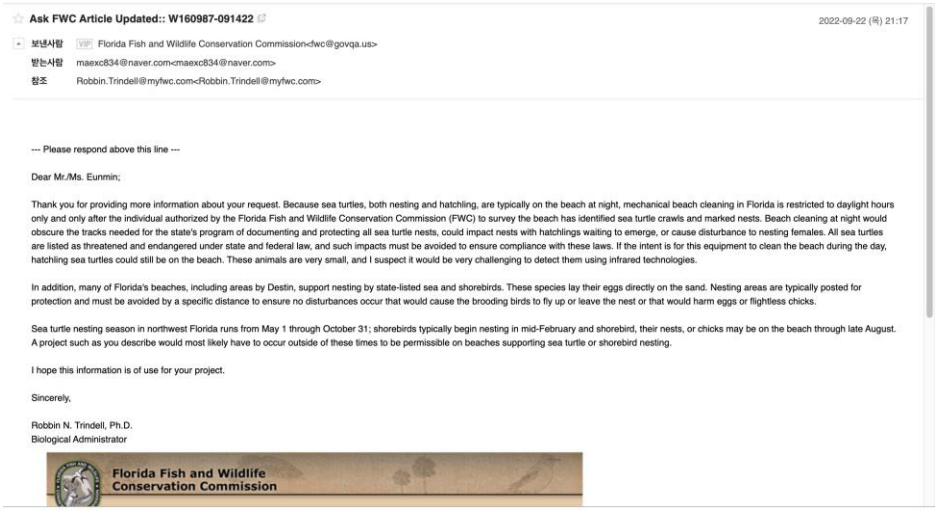
- Eunmin Kim (32200928@dankook.ac.kr)
- Booyong Lee (201810909@sangmyung.kr)
- Hanbyeol Lee (yhb1834@cau.ac.kr)
- Jeeyoung Oh (jeeyoung9907@cau.ac.kr)
- Seoyeong Lee (lsyoung66@cu.ac.kr)

Summary

The abstract and introduction were written and revised. Related studies were reviewed and summarized. Jeeyoung kept studying Raspberry Pi. In addition, Hanbyeol kept studying VoxelNet.

What C.C completed this week:

- Wrote and revised the abstract and the introduction of the paper; Caleb reviewed it
- Reviewed previous products and studies related to a beach cleaning robot
- Received an email that this project cannot execute any robot at night from Florida Fish and Wildlife Conservation Commission (FWC)



Ask FWC Article Updated:: W160987-091422 2022-09-22 (목) 21:17

보낸사람 Florida Fish and Wildlife Conservation Commission<fwc@govqa.us>
받는사람 maexc834@naver.com<maexc834@naver.com>
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--- Please respond above this line ---

Dear Mr./Ms. Eunmin;

Thank you for providing more information about your request. Because sea turtles, both nesting and hatchling, are typically on the beach at night, mechanical beach cleaning in Florida is restricted to daylight hours only and only after the individual authorized by the Florida Fish and Wildlife Conservation Commission (FWC) to survey the beach has identified sea turtle crawls and marked nests. Beach cleaning at night would obscure the tracks needed for the state's program of documenting and protecting all sea turtle nests, could impact nests with hatchlings waiting to emerge, or cause disturbance to nesting females. All sea turtles are listed as threatened and endangered under state and federal law, and such impacts must be avoided to ensure compliance with these laws. If the intent is for this equipment to clean the beach during the day, hatchling sea turtles could still be on the beach. These animals are very small, and I suspect it would be very challenging to detect them using infrared technologies.

In addition, many of Florida's beaches, including areas by Destin, support nesting by state-listed sea and shorebirds. These species lay their eggs directly on the sand. Nesting areas are typically posted for protection and must be avoided by a specific distance to ensure no disturbances occur that would cause the brooding birds to fly up or leave the nest or that would harm eggs or flightless chicks.

Sea turtle nesting season in northwest Florida runs from May 1 through October 31; shorebirds typically begin nesting in mid-February and shorebird, their nests, or chicks may be on the beach through late August. A project such as you describe would most likely have to occur outside of these times to be permissible on beaches supporting sea turtle or shorebird nesting.

I hope this information is of use for your project.

Sincerely,

Robbin N. Trindell, Ph.D.
Biological Administrator

Florida Fish and Wildlife Conservation Commission

Fig 1. An email from FWC if the robot can detect sea turtles using infrared camera or not.

- Asked for Professor Eric's opinion about the robot's function which detects sea turtles and decided to put aside it
- Completed an equipment list
- Studied VoxelNet algorithm [1]
- Installed Ubuntu and ROS onto Raspberry Pi
- Tested a proximity sensor onto Raspberry Pi 4b Ubuntu [2]

- Studied Raspberry pi; tested DC motor and executed two DC motors simultaneously [3], [4], [5]

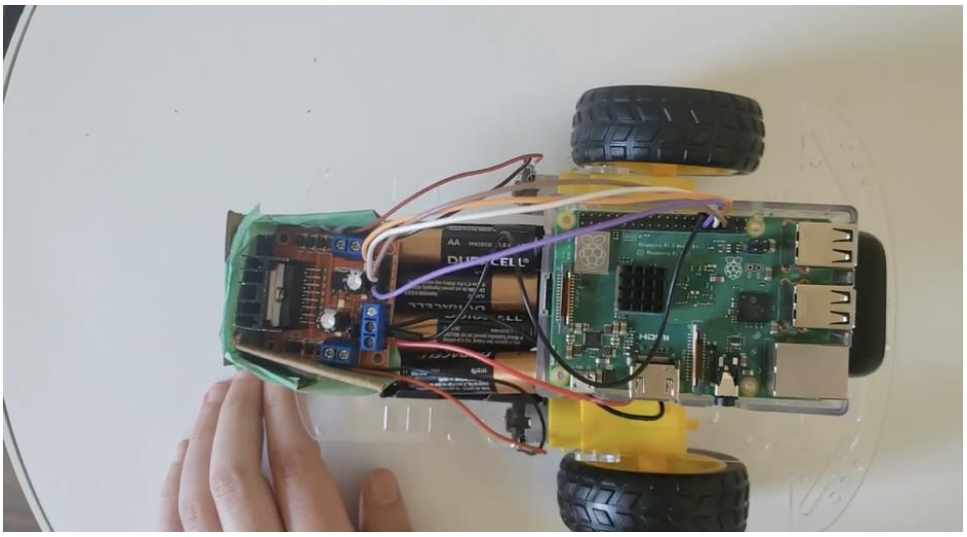

Fig 2. A robot that has DC motor for testing

- Studied computer network basic via online lecture [6]

Things to do by next week

- Will check LiDAR and test it
- Will study VoxelNet code and Complexer-YOLO
- Will control the robot to change direction and move back and forth
- Will be modeling the robot
- Will finish study networking

Problems or challenges:

- There are several poor papers with duplicated or unstructured contents.
- The order of cable was confusing, so it was hard to run two motors simultaneously.
- Ubuntu and Raspbian operating system do not contain /dev/ttyUSB0 that cannot execute LiDAR onto Raspberry Pi.
- The email from FWC made the team so confused that the team discussed it for an hour.

References

[1] Y. Zhou and O. Tuzel, “VoxelNet: End-to-end learning for point cloud based 3D object detection,” 2018IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2018, pp. 4490-4499

[2] Gus. “Raspberry Pi Distance Sensor using the HC-SR04.” PiMyLifeUp. https://pimylifeup.com/raspberry-pi-distance-sensor/ (accessed Sept. 20, 2022).

[3] D.Staple, “Building Robot Basics - Wheels, Power, And Wiring” in Learn Robotics Programming, G. George, A. Jethani, P. Deshpande, M. Hassija, S. Editing. Eds., Birmingham, U.K.: Packt Publishing Ltd, 2018.

[4] D.Staple, “Drive And Turn - Moving Motors With Python” in Learn Robotics Programming, G. George, A. Jethani, P. Deshpande, M. Hassija, S. Editing. Eds., Birmingham, U.K.: Packt Publishing Ltd, 2018.

[5] P. Eichel, How to Build Your First Robot With a Raspberry Pi and Program it in Python - Step by Step Tutorial. (May. 11, 2020). Accessed: Sept. 23, 2022. [Online Video]. Available: https://www.youtube.com/watch?v=Bp9r9TGpWOk

[6] Hanyang University ERICA Campus. (2015). Computer Network. [Online]. Available: http://www.kocw.net/home/cview.do?cid=6166c077e545b736