ENPM673 Perception for Autonomous Robots (Spring 2024)

Homework 1

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Submission guidelines:

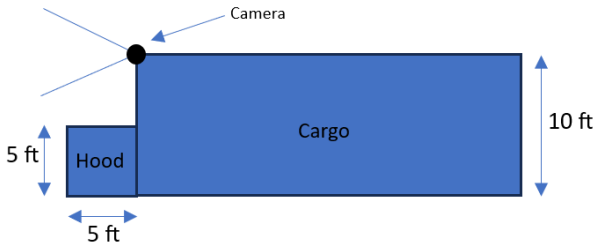
- This homework is to be done and submitted individually.
- Your submission on ELMS/Canvas must be a pdf file, following the naming convention ***YourDirectoryID_hw1.pdf***.
- If your email ID is **abc@umd.edu** or **abc@terpmail.umd.edu**, then your Directory ID is **abc**. Remember, this is your directory ID and NOT your UID.
- For each section of the homework, explain briefly what you did, with detailed calculation and units.

Problem 1: Answer the questions on the "**Student Introduction**" discussion portal of Canvas. **[15]**

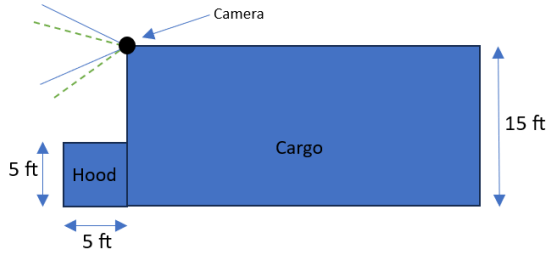
Problem 2: Assume that you have a camera with a resolution of 10MP where the camera sensor board has dimensions of a width of 14mm and height of 10mm. It is also given that the focal length of the lens of the camera is 4mm.

(A) Compute the Field of View of the camera in horizontal and vertical directions. **[15]**

(B) Given a truck with specific dimensions and a camera mounted at the highest front corner of its cargo, ascertain whether the truck's hood blocks the camera's field of view. If there is obstruction, determine the horizontal distance by which the camera needs to be extended to prevent the hood from appearing in its view. Note that the camera's horizontal position can be adjusted, but the height of its mounting cannot be altered. (Note: No tilt of the camera angle is allowed in this case.) **[30]**



(C) Imagine the truck again, now with a cargo height of 15 feet and the same hood size. This time, the camera is fixed in place and can't be moved up, down, left, or right. The only adjustment available is to tilt the camera either up or down. What's the maximum angle the camera can tilt while still capturing most of the road without the hood obstructing its view? **[40]**



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