Mikhail Samsonov - 8.2

Legal, ethical and environmental limitations of the three unmanned systems will be presented in the maritime, aerial, and ground environments. Although three systems are designed to save our fragile environment on Earth, there are few limitation that are considered. Seabin is making a difference in cleaning the seas of plastic waste by having an engineered suction cup that whirls water inward and sieves it out while keeping trash-like items like trash bags inside, thereby cleaning the oceans from floatable debris at the rate of 1.4 ton per year; however, the environmental limitation of this device is that if it is not emptied every 4-8 weeks, it will overflow. There needs to be a constant monthly human supervision of the Seabin maritime system.

Aerial unmanned system, Hexacopter (UGSS), with the on-board gas sampling system which examines various gases in the atmosphere to aide scientists in quantifying toxins in the air, has a legal limitation in terms of flying in low altitude over restricted areas, like airports where it collect exhaust fumes data that are associated with the airplanes take off and landings, the drone may be sucked into a jet engine which may cause catastrophic accident that will lead to legal actions. Such legal limitations are also possible elsewhere in the aerial environments, like over smoke stacks, drones of this type may collect for an overwhelming toxic fumes data that the owner of the coal burning plant may file for chapter 8, which will lead to further appeals and other legal proceedings.

Warthog collects trash bags via an autonomous robotic controlled arm which collects street trash items and drops them into the carry-on bag. By having a camera on board, which is

used for object recognition to differentiate between trash-like items and non trash-like items, the camera also records nearby people's conversations which is an ethical limitation. People who are caught in this process, unaware that they are being recorded, will find that their privacy is being breached which is highly unethical for a ground unmanned system which is trying to clean the sidewalks from debris.

All three systems are autonomous, designed to control themselves in the open-world environments with little human intervention; however intervention is needed to alleviate various legal, environmental and ethical limitations as introduced above.

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