DroneCharge

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Abstract

(Something about drones and their usage), however, (something about battery life insufficient for many tasks). Our solution to the problem (the 'new' stuff, the framework), (something about what value this brings and how it could impact drone usage)

Add keywords

1 Introduction

Aerial Drones have a lot of potential use, but the use of commercially available drones are limited by the short amount of time they can stay airborne before requiring a recharge. Many applications could be considered where a drone would need to stay airborne for long periods of time to do various tasks. For instance, monitoring areas using various sensors or spreading pesticide on a field of crops.

Although battery life will increase as technology advances, there is a current need for alternatives. If drones could recharge themselves or somehow become sustainable this would increase the usage scenarios of drones significantly. Our idea is not to have drones stay airborne indefinitely, but to have the tasks that the drones are performing continue in spite of the need for a recharge. This could either be done by having other fully-charged drones take over the task or by allowing the drone to resume its task after it has been recharged. In this report, we outline a framework aimed at simplifying this functionality for drone-application developers.

2 Related Work

Bürkle et. al proposed the idea of a swarm of drones fulfilling a task rather than a single drone in their article *Towards Autonomous Micro UAV Swarms*[1]. They suggested a system for inter-drone cooperation to seamlessly orchestrate several drones with different types of sensors in an environment. They also utilized simulation to test their system.

Sima Mitra presented an Autonomous Quadcopter Docking System[2] that allowed drones to return to a charging station using computer vision for locating the docking station. In it, she showed that autonomously returning to a charging station is fully possible without a locationing system.

Both Altug et al.[3] and Ducard et. al.[4] demonstrated the use of visual feedback for positioning and autonomous control of a drone. This is useful for the practical part of this project in which a kinect will be used to track drones in order to autonomously perform tasks.

Also relevant is the work of The Intelligent Mechatronics Lab at Boston University, in which a conductive surface is used to charge a drone without human interaction[5].

Something about what we're doing different.

3 Background & Methodology

In this chapter we iterate over the background of the project, why it's relevant and what we're producing. We also iterate our methodology – how we're doing it and in what order.

Use some of the project proposal's methodology

4 Solution

4.1 The framework

In this we explain the overall framework and how it is meant to be used.

4.2 The experiment / Usage example

Here, we explain our Kinect+Crazyflie application to show an example usage of the system.

5 Results & Evaluation

Here we'll iterate over the design of the framework through the experiences gained in the sample usage, as well as note the knowledge gained from the questionnaires posted on online drone-forums. We'll look at what we did but leave discussion of what could have been done differently/better to the discussion section.

6 Discussion

Here, we'll discuss what could have been done differently to improve upon the design. If we experience any major setbacks that are not alleviated in time, this is the section in which we explain what it would require to produce the desired results – such as using other type of drones for the usage example.

7 Conclusions

Here, we conclude upon the results and suggest future work.

8 Acknowledgements

Here, we acknowledge the work and assistance that we utilized in order to write this project.

References

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[4] Guillaume Ducard, Raffaello D'Andrea, *Autonomous Quadrotor Flight Using a vision System And Accomodating Frames Misalignment.* `http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=05196224`, 2009 (Accessed Oct. 2013).

[5] Boston University Intelligent Mechatronics Lab, *Autonomous Quadcopter Charging Station.* `http://www.bu.edu/iml/2012/08/02/221/`, 2012 (Accessed Oct. 2013).