

## Identifying quadcopter behaviour using a camera system

**In order to control a quadcopter it is necessary to know how it will react based on what input signals it will be fed. Experiments utilising cameras may provide information regarding the complex behaviour of quadcopters.**

Unmanned aerial vehicles such as quadcopters have gained a lot of popularity in recent years. They have quickly gone from being large military projects to something you can pick up cheap at a small electronics store. Behaviour of a certain quadcopter depends on several variables such as mass, design and motor dynamics. The goal of this thesis is to estimate some of these parameters in order to get a better view of the dynamics of the system. This may be used to construct regulators anywhere from making the quadcopter easier to fly, to making it fully autonomous. The first step is to construct a regulator that makes the quadcopter somewhat stable during flight. This in order to collect more flight data, which in turn can be used to evaluate unknown variables of the system. Data in flight is collected using a camera system, an accelerometer and a gyroscope. For the camera system to be able to detect an object, it must be equipped with something reflective, e.g. the silvery balls that can be seen in the figure.



*A quadcopter equipped with reflective balls for camera detection.*

A mathematical model of how the system should behave given a certain input signal is compared to the measurements, and a number of algorithms ran on a computer then tries to minimise differences between the prediction and the measurements as much as possible, this by trying different values for the earlier mentioned unknown parameters.

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Thesis title: Evaluating motion capture as a means of system identification of a quadcopter

Year: 2018