ABSTRAK

Keberadaan model AR Drone sangat diperlukan dalam menguji berbagai algoritma kontrol terbang AR Drone. Implementasi algoritma terbang secara *trial and error* berpotensi pada tidak terkontrolnya AR Drone saat terbang sehingga rentan pada kerusakan *hardware*. Pemodelan AR Drone di Jurusan Teknik Elektro Universitas Surabaya telah dimulai dengan menggunakan pendekatan sistem fisik AR Drone namun hasilnya belum memuaskan. Pada Tugas Akhir ini dirancang model AR Drone dengan menggunakan pendekatan *data modelling*. Struktur model AR Drone akan dicari parameter modelnya dengan menggunakan *least square method*. Proses pengambilan data dilakukan dengan menerbangkan AR Drone dengan menggunakan program yang dibuat pada pada *ground station*. Secara umum, prosedur pengambilan data untuk pemodelan dan validasi dilakukan dengan menerbangkan AR Drone hingga stabil pada ketinggian 1 meter kemudian diberikan *step input* tertentu sesuai dengan model yang akan dicari. Pada Tugas Akhir ini model yang akan dicari adalah relasi *input output* antara *pitch*-v_x-*x*, relasi *input output* antara *roll*-v_y-*y*, relasi *input output* antara *yaw rate-yaw* dan relasi *input output* antara *vertical rate-height*. Setelah dilakukan validasi maka didapatkan parameter model AR Drone terbaik untuk pemakaian di *indoor* dengan menggunakan *indoor hull* adalah p0 = 11.181, p1 = 0.538, p2 =-0.0179, p3 = 0.9639, r0 = 8.3805, r1 = 0.6613, r2 = 0.0199, r3 = 0.929, y0 = 54.1473, y1 =0.3892, s0 = 0.2016, s1 = 0.791, dan dengan menggunakan *outdoor hull* adalah p0 = 6.4692, p1= 0.7162, p2 = -0.0173, p3 = 0.9728, r0 = 9.7204, r1 = 0.604, r2 = 0.021, r3 = 0.941, y0 = 59.957, y1 = 0.3239, s0 = 0.2958, s1 = 0.6764. Model AR Drone untuk pemakaian *outdoor* tidak layak digunakan karena potensi *disturbance* angin yang selalu berubah-ubah antara saat pemodelan dan validasi.

Kata kunci : AR Drone, *pitch*, *roll*, *yaw rate*, *vertical rate*, parameter model

ABSTRACT

The existence from AR Drone's model is indispensable to test various control algorithms on it. Implementation of the algorithm for flying based on trial and error made the drone's flight aren't controllable so it's vulnerable to damage its hardware. AR Drone's modeling in the Department of Electrical Engineering at University of Surabaya has begun using the approach of physical systems from the drone but the result has not been satisfactory. In this final project, the AR Drone's modeling is designed by using data modelling approach. AR Drone's structre model will be searched its model parameters by using least square method. The process to record the data is performed by flying the drone with a program which made with LabVIEW software. In general, the data collection procedures for modeling and validation is performed by flying the drone and let it stable at an altitude of 1 meter, and then gave step input according to the model that would be searched. In this final project, the model is the relation of input output between pitch-v_x-x, relation input output between roll-v_y-y, relation of input output between yaw rate-yaw and relation of input output between vertical rate-height. After the validation has been performed, the AR Drone's model parameter is obtained at the best for indoor use using the indoor hull is p0 = 11.181, p1 = 0.538, p2 =-0.0179, p3 = 0.9639, r0 = 8.3805, r1 = 0.6613, r2 = 0.0199, r3 = 0.929, y0 = 54.1473, y1 =0.3892, s0 = 0.2016, s1 = 0.791, and using the outdoor hull is p0 = 6.4692, p1= 0.7162, p2 = -0.0173, p3 = 0.9728, r0 = 9.7204, r1 = 0.604, r2 = 0.021, r3 = 0.941, y0 = 59.957, y1 = 0.3239, s0 = 0.2958, s1 = 0.6764. AR Drone's model for outdoor use is not feasible because of the wind disturbance potential are always changing, when the drone is used for modelling and also validation.

Key words: AR Drone, pitch, roll, yaw rate, vertical rate, model parameter.