

# **MECHATRONICS BOOK SERIES SYSTEM DESIGN AND SIGNAL PROCESSING VOLUME 1**

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## **Editors**

**Asan G. A. Muthalif  
Amir Akramin Shafie  
Siti Fauziah Toha  
Iskandar Al-Thani Mahmood**



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SYSTEM DESIGN AND SIGNAL  
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# CHAPTER 16

## Development of a Jet Powered Floating Platform (In Air)

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### 16.1 Introduction

From the history of the flying object or specifically refer to the helicopters, it started since 400 BC, the Chinese have had a bamboo flying top that is used as a children's toy. Eventually, this flying top toy made it to Europe and is depicted in European painting [1]. Pao Phu Tau was a 4th-century book in China describing some of the ideas inherent to rotary wing aircraft [2]. In 1493, Leonardo da Vinci first sketched a semi-practical machine, named in his "Codice Atlántico" that could be described as an "aerial screw". He wrote that he made small flying models but could not stop the rotor from making the whole craft rotate. Mikhail Lomonosov showed to the Russian Academy of Sciences a small coaxial rotor powered by a wound-up spring, intended to lift meteorological instruments [3]. Launoy and his mechanic Bienvenu, made a model pair of counter-rotating rotors (not coaxial) using turkey's flight feathers as rotor blades [4-6]. The word "helicopter" (hélicoptère) was coined by Gustave de Ponton d'Amécourt a French inventor who demonstrated a small steam-powered model [7].

### 16.2 System Development

**16.2.1 Tools and Components Used.** The main tools and components used in conducting this project are as follows: Analog Controller, Transmitter, Receiver, Servo, Accelerometer Sensor, Motor, 6V Li-MH Battery 650 mA, Propeller, Polystyrene.

**16.2.2 Transmitter.** For this project, a 3-channels transmitter that are for rudder, motor and servo. When an input is made by the source, by moving a stick or flicking a switch on the transmitter, a radio signal is sent out via the transmitter's antenna and picked up by the antenna of the receiver, which is located within the model. That signal passes from the receiver directly to the servos, and the end result is a proportional movement of the airplane's control surface, throttle or whatever. By proportional, we mean that the movement of the control surface (or throttle) is a direct representation of how much movement was applied to the stick of the transmitter - a small stick movement will mean little movement of the control surface, while throwing the stick to its maximum position will mean full deflection of the control surface.

**16.2.3 Receiver (abbrev. 'Rx').** In exactly the same way as a normal radio or TV receives the signal from the broadcasting station (for example, when we watch the CNN news), a radio control receiver receives the signal that is sent out by the transmitter when you move the stick or flick a switch. The receiver is located inside the model and is directly connected to the servos by small cables. It consists of 3 channels. A wire antenna extends from within the receiver to outside of the model, typically this is 2 to 3 feet long and should never be cut or looped up to reduce its length. By doing so, its ability to receive the signal from the transmitter is drastically reduced which can result in disastrous consequences by way of the model flying out of radio range too early, and you losing control. The important message here is that not to try to cut the antenna! All radio control systems require a minimum length of antenna to operate successfully.