

# **MECHATRONICS**

# **BOOK SERIES**

**SYSTEM DESIGN AND SIGNAL PROCESSING**

**VOLUME 2**

---

**Editors**

**Md. Raisuddin Khan**

**Md. Mozasser Rahman**

**Muhammad Mahbubur Rashid**

**Shahrul Na'im Sidek**



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## CHAPTER 27

### TRAJECTORY PLANNING USING GPS FOR UNMANNED AERIAL VEHICLE WITH MICROCONTROLLER BASED SYSTEM

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#### 27.1 Introduction

The merits of Unmanned Aerial Vehicles (UAVs) are well documented [1]. Impetus for research in early UAV development programs were quite certainly driven by military demands and while the UAV form a key element in intelligence, surveillance, and reconnaissance (ISR) type missions, today's UAV usage cover other mission types such as agricultural and traffic control missions. Driven by the growing economics of the UAV market, several research institutions have started indigenous research and educational programs related to UAV systems and technologies [2]. The UAV is an integrated system and its development is an interdisciplinary effort. A lot of focus in research are given to the autonomous control of the UAV where trajectory generation, sensor fusion, motion planning, communication, task allocation and cooperative system as the main categories of research in this area. An unmanned aerial vehicle can be classed into many categories based on size, based on performance and based on mission [3].

The autonomy of an aerial vehicle broadly rests on the guidance, navigation and control abilities of the vehicle. Farrell and Barth [4] define navigation as “to accurately determine position and velocity relative to a known reference” while guidance refers to the route or path planning task. (Flight) control means the regulation of the vehicle's control surfaces in a manner that enables the vehicle to proceed along the intended route or path is shown in Fig. 27.1.

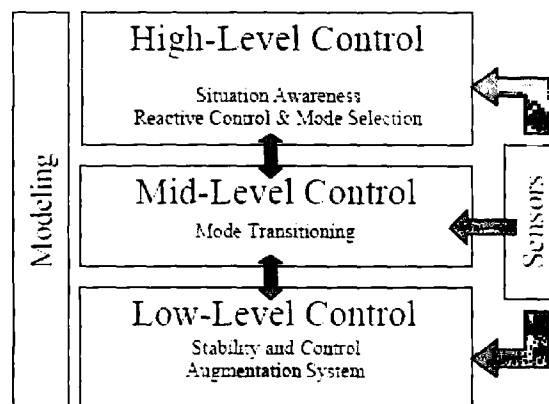


Figure 27.12: Level of UAV on board guidance

The long term objective of this research is the development of a mid-level onboard guidance, navigation and control (GNC) system based on GPS sensor as primary receiver,