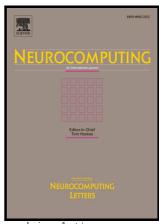
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#### **ACCEPTED MANUSCRIPT**

# Leader-following consensus of multi-agent system with a smart leader

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#### Abstract

In line of the research on leader-following consensus, this paper studies the consensus problem for the first-order multi-agent system with a smart leader. Different from previous works where the leader is independent of all the other agents, a kind of leader, called smart leader, is proposed, which can gain and utilize its neighboring followers' position information. Whether such information will be used in adjusting the control algorithm for the smart leader is decided by an event-trigger function. The theory and simulation results show that the proposed model can gain advantage in robustness and fault-tolerance ability with the traditional one. Moreover, a sufficient condition is provided, which can ensure that the position-tracking error and velocity-tracking error are bounded when some actuator faults occur on some of the followers in the framework of the fixed topology. In addition, similar results are also given under switching topology. Finally, some simulation examples are presented for illustration.

Keywords: Leader-following consensus, Multi-agent system, Smart leader, Actuator fault, Event-trigger function.

#### 1. Introduction

There is growing recognition in both science and engineering applications that how the members of the multi-agent system (MAS) can realize the leader-

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