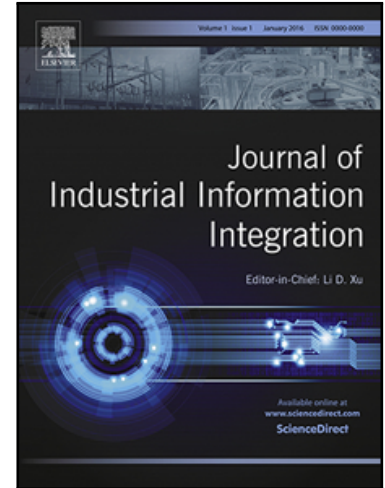


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# Mixed Time-triggered and Event-triggered Industrial Controller in IoT Environment

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*Abstract*—For industrial real-time controlling in IoT(Internet of-Things) environment, smart industrial controller can play a vital role in it. Nevertheless, in the IoT environment, each industrial controller is required to obtain the effective information from all kinds of sensors in real-time. The communication between the industrial controllers and the sensors should be lower time delay. Meanwhile, the software of industrial controller should make sure that each function module will be executed in time. To address these problems, this paper proposes a new design method of a mixed time-triggered and event-triggered industrial controller for industrial real-time control in IoT environment. This design adopts mixed time triggered and event triggered modes to manage multi-tasks, and utilizes RTX embedded operating system as the main scheduler. It provides an instance solution for industrial application. The performance of the proposed system was verified and achieved good effects in practical application of IoT for polycarboxylate superplasticizer manufacturing.

Index Terms—Internet of Thing, Industrial real-time control, mixed time-triggered and event-triggered mode.

## I. INTRODUCTION

IoT can be widely found in industry field and it has provided a promising opportunity to build powerful industrial systems and applications [3]. For purpose of greatly enhancing the efficiency of manufacturing, improving the quality of product and reducing the consumption of cost and resource, IoT consists of different kinds of terminals which have the ability to perceive the environment and to compute mode based on the ubiquitous technologies [6]. In result, it promoted the traditional industry into intelligent industry while constructing a new architecture of smart manufacture.

Nowadays, in the production line, industrial controllers are widely adopted for data collecting and analyzing. It is utilized to connect to various sensors, in order to obtain requisite data collected by the sensor. Moreover the controller is a key hub between the production line and the computer that forms a instant communication network, thus the manufacturer can effectively send and receive instructions for the purpose of controlling the whole production. Meanwhile the key components of the production equipment need to be connected to it to obtain the computer's instructions. However most industrial controllers not only have complex timing constrains but also have the flexibility for the requirement of reducing system resource consumption. For the purpose of reducing complexity as well as guarantying reliability, a mixed time-triggered and event-triggered industrial controller for industrial real-time control in IoT environment is provided in this paper.

Generally, in an embedded system, there are two scheduling modes which greatly vary with each other in essence: time-triggered mode and event-triggered mode [7, 8]. Multi-level interrupt is considered as the main source to

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