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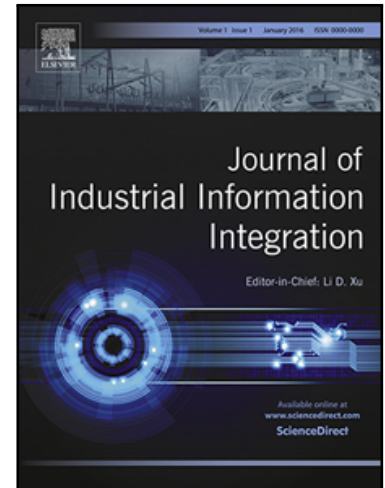
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# An Internet-of-Things Solution for Food Safety and Quality Control: A Pilot Project in China

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**Abstract**—Several shaking-world food safety incidents happened in China recently shows that Chinese are facing with a serious problem of food safety, happened in China recently. Because food supplies are decentralized in many regions and agencies, it is very hard for the Chinese government to supervise these supplies' businesses. Fortunately, with the help of the technologies of the Internet of Things, the food supplies can become more transparent and safer than before. Hence, on the basis of the Internet of Things, this paper introduces a pilot project in China: the Internet of Agricultural Things (AIoT for short), which integrates state-of-the-art technologies to provide a method to easily track and trace the supply processes of foods. So that, AIoT can counter the food safety problem. In AIoT, we leverage the enhanced technologies of service oriented architecture, global identification and parsing, and electronic pedigree. **Especially, AIoT may fuse the sensed data from the supply chains of fresh vegetables to show an intuitive view for users, including end customers. These fusion may help the users make decisions more easily when they are buying foods or supervising the food supplies.** In addition, we deploy AIoT in several application scenarios, including Lushang Ltd., the biggest food supplier in Shangdong Province. According to the deployment and evaluation of the whole platform, the enhanced technologies for the Internet of Agricultural Things are proved to be efficient and effective in improving the safety of food supplies.

**Index Terms**—Internet of Things, Food Safety, Service Oriented Architecture, Object Naming Service, Internet of Agricultural Things (AIoT)

## I. INTRODUCTION

Since 2008, the food safety problem has become a hot topic in China than before [1] due to several serious food safety incidents. In 2008, the scandal of *Sanlu melamine milk powder* occurred and drew the attention of the whole world. As a result, tens of thousands of babies were affected and several even died. In 2011, the meat from Shuanghui Group, the China's largest meat supplier, was detected containing clenbuterol hydrochloride, a chemical forbidden by China in foods. One of the reasons causing those scandals is the non-transparency of food supplies. Hence, how to offer transparent

even trustworthy food supplies is a significant issue for both academic and industrial communities in China.

The Internet of Things (IoT for short) may help in resolving the food safety problem because IoT can offer more agile and more convenient management of merchandise, including foods [2][3]. After integrating IoT into traditional supply chains, food suppliers can conveniently track and trace the movement of foods. As a result, the food supplies will become transparent to users, including customers and supervisors.

Although a few architectures and applications in IoT have been proposed [4][5], we still face with several practical and engineering issues about how we can leverage the technologies of IoT to protect the food safety. (1) *Architecture*: For the natural characteristics of decentralized and heterogenous food supplies, we are required to define a suitable architecture; (2) *Global coding and parsing*: Massive and diverse items in food supplies require a global identification mechanism and a high-performance parsing service; (3) *Data trustworthiness*: When sensed data transmitted from foods and their suppliers, the trustworthiness is a cornerstone to ensure the food safety, because it is easier to modify data than to counterfeit foods.

To counter the above issues, this paper introduces a pilot project in China: AIoT, whose deployment is a big boost to the development of the Internet of Things in China. The technical contributions in AIoT are as follows:

- AIoT proposes an architecture where a central application service support platform to hold the big volume data storage and handle information processing for the agriculture industry. **Especially, AIoT may fuse the sensed data from the supply chains of fresh vegetables to show an intuitive view for users, including end customers. These fusion may help the users make decisions more easily when they are buying foods or supervising the supplies of foods.**
- AIoT offers a global identification service and a high-performance parsing service based on the hierarchy framework of Domain Name Service (DNS for short).

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