

# An edge-cloud collaborative computing platform for building AloT applications efficiently

Guoping Rong

Nanjing University

Yangchen Xu (✉ [xuyangchen1997@foxmail.com](mailto:xuyangchen1997@foxmail.com))

Nanjing University <https://orcid.org/0000-0002-6881-1809>

Xinxin Tong

Transwarp Inc.

Haojun Fan

Transwarp Inc.

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## Research Article

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# **Abstract**

The convergence of the Artificial Intelligence (AI) and the Internet of Things (IoT), i.e. the Artificial Intelligence of Things (AloT), is a very promising technology that redefines the way people interact with the surrounding devices. Practical AloT applications not only have high demands on computing and storage resources, but also desire for high responsiveness. Traditional cloud-based computing paradigm faces the great pressure on the network bandwidth and communication latency, hence the newly emerged edge computing paradigm gets involved. Consequently, AloT applications can be implemented in an edge-cloud collaborative manner, where the model building and model inferencing are offloaded to the cloud and the edge, respectively. However, developers still face challenges building AloT applications in practice due to the inherent heterogeneity of the IoT devices, the declining accuracy of once trained models, the security and privacy issues, etc. In this paper, we present the design of an industrial edge-cloud collaborative computing platform that aims to facilitate building AloT applications in practice. Furthermore, a real-world use case is presented in this paper, which proved the efficiency of building an AloT application on the platform.

# **Full Text**

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

# **Figures**

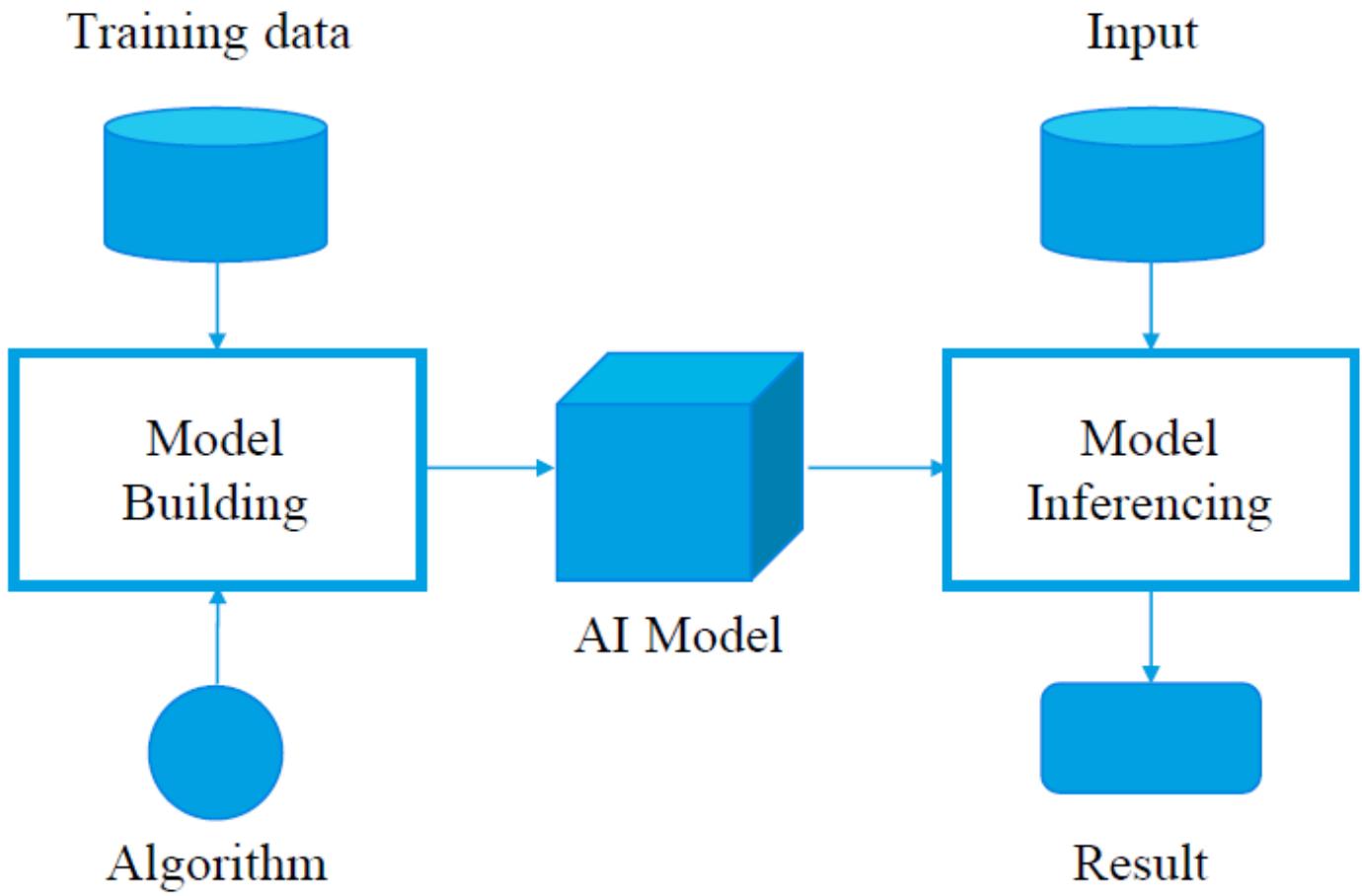
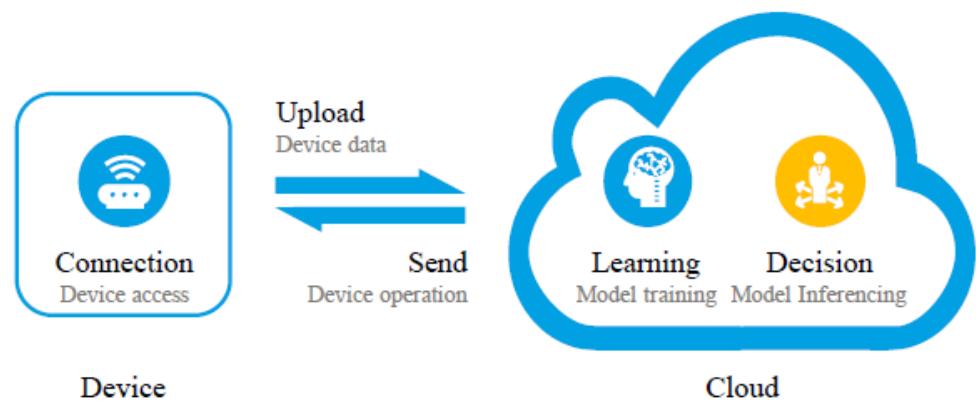
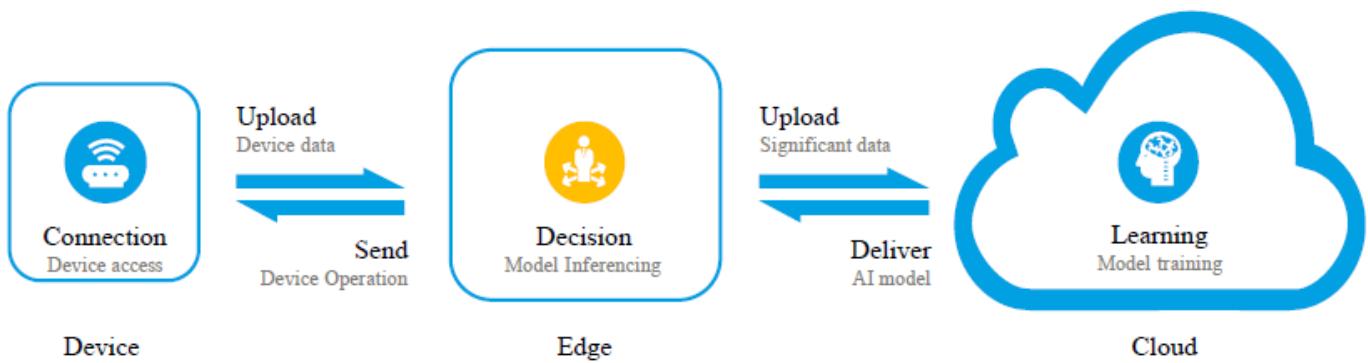


Figure 1

Two-stage process of an AI approach based on [6]



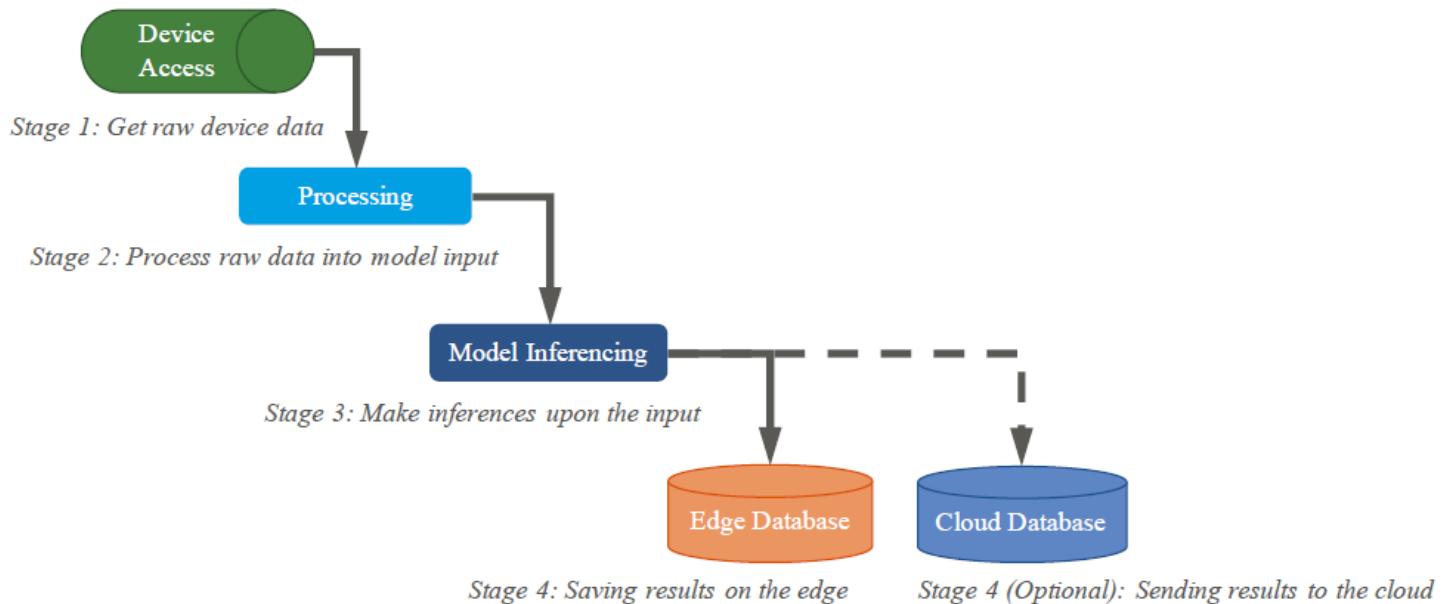
(a) Cloud-based AIoT



### (b) Edge-cloud collaborative AIoT

**Figure 2**

## Two different paradigms of AIoT



**Figure 3**

## A typical AIoT pipeline

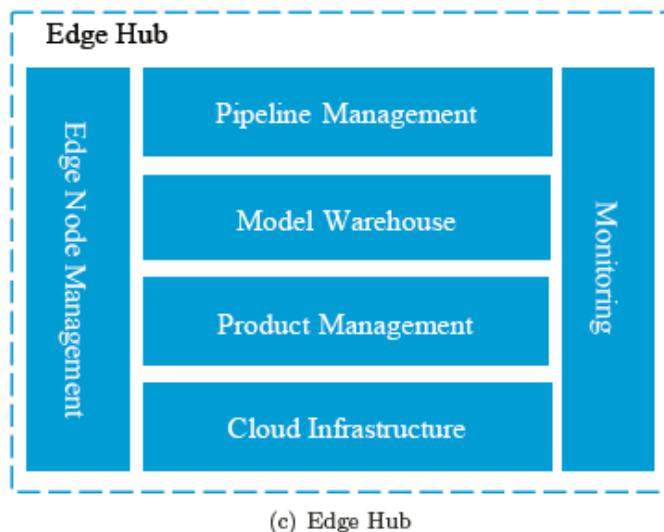
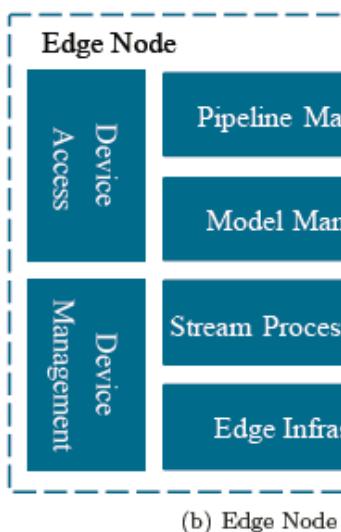
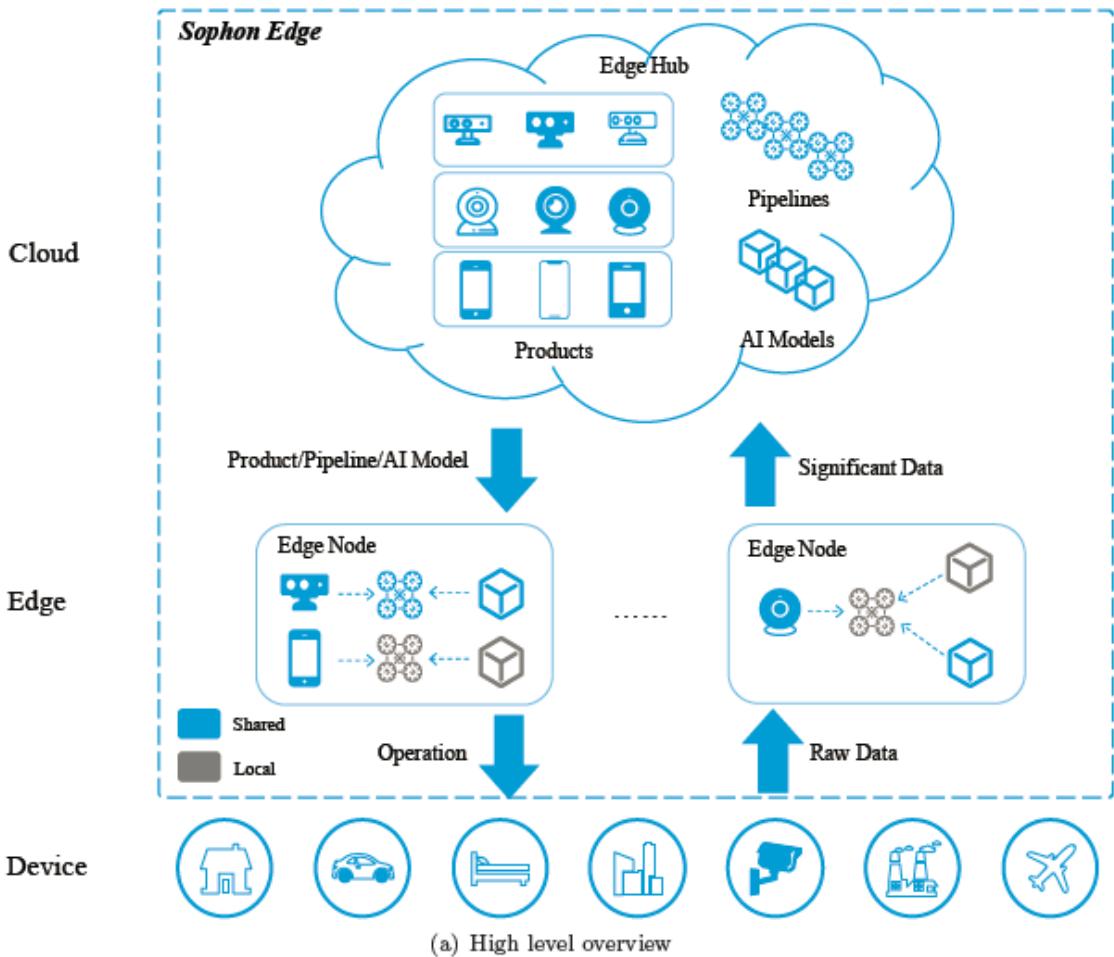
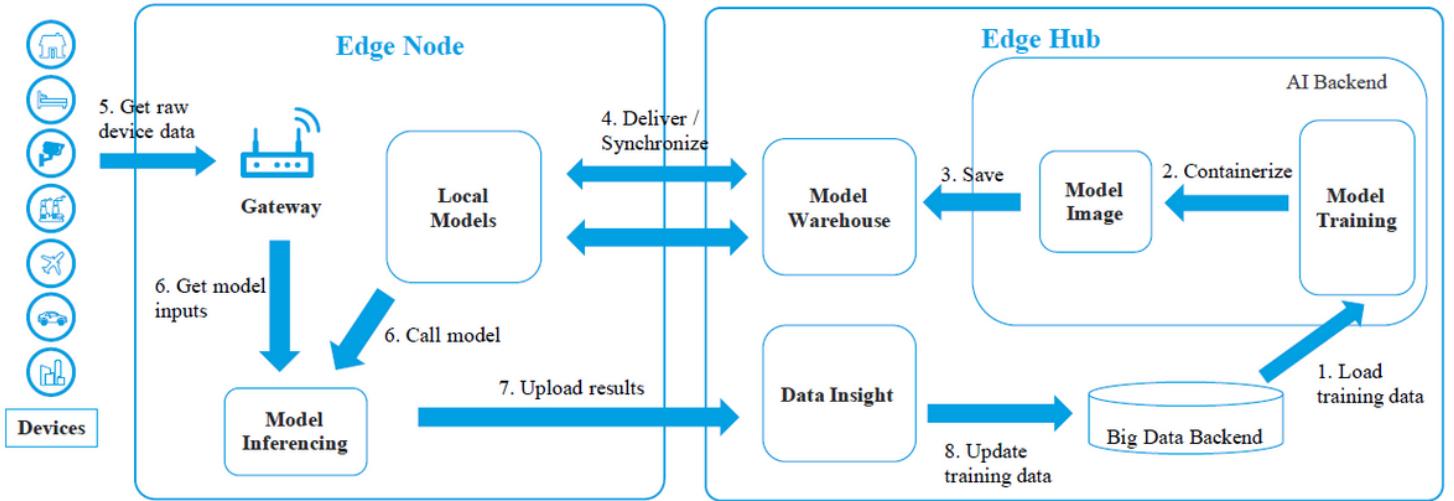


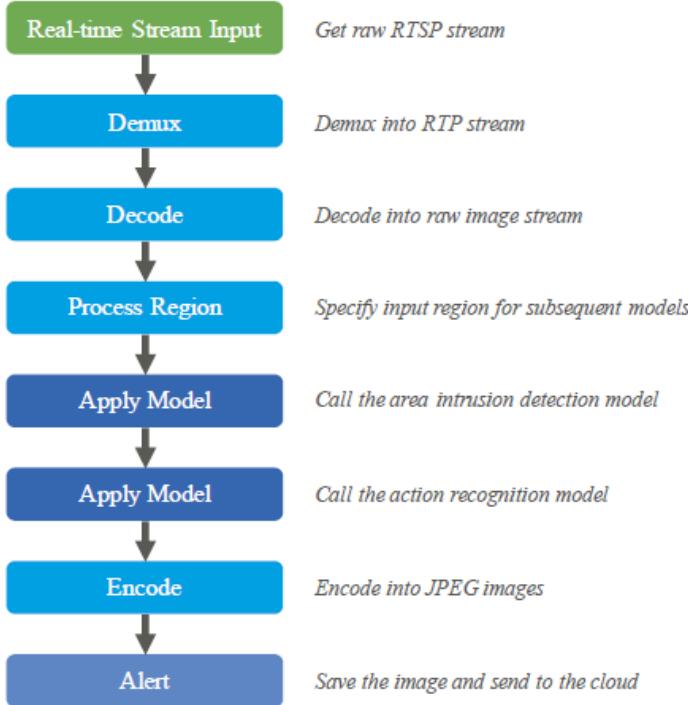
Figure 4

Platform architecture

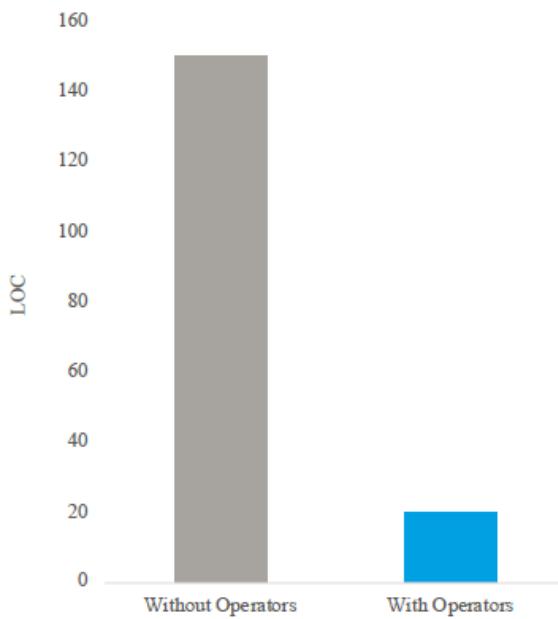


**Figure 5**

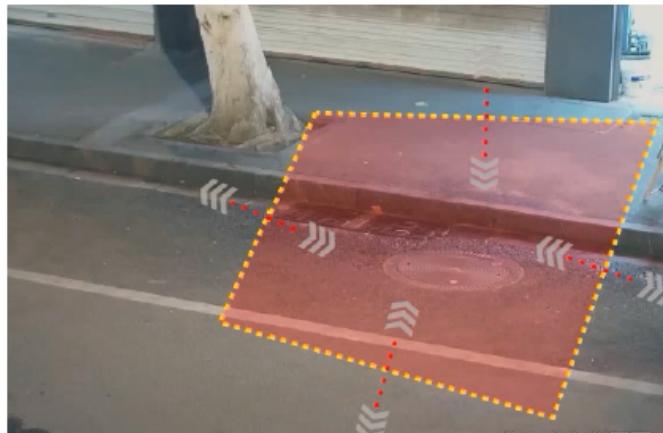
The process of model iteration



(a) The pipeline for sewage dumping behavior detection



(b) Lines of Code (LOC) required to build the pipeline



(c) Illustration of the “Process Region” operator



(d) A detected sewage dumping behavior

## Figure 6

A use case of AloT in Smart City