Good afternoon, teachers.

My name is Du Sicong. And my title is A Semantic Annotation System for Web of Things.

First, I would like to introduce the concept of Web of Things with the help of the OSI seven layers model. Just like what the Web in the application layer is to the Internet which is at the network layer, Web of things provides an Application Layer to simplify the creation of Internet of Things applications. Instead of introduce brand new standards, Web of Things reuses existing web patterns and protocols to make things in real world part of the World Wide Web. Thus, we can identify and manage the devices more easily.

Then, I need to introduce the concept of semantic annotation. Semantic annotation aims at generating necessary metadata to describe the data in WoT applications. Of course, the metadata is valuable only if it is machine understandable and can be exchanged as knowledge on the Web. So, actually, the purpose of semantic annotation is to construct a knowledge graph which can extract the semantics in WoT applications in a common data format such as Resource Description Framework. And then, based on the target networked knowledge graph, we can do the searching and the reasoning work according the business demand.

Based on the WoT and the semantic techniques, there exists many WoT applications and thus emerges many knowledge bases. But, they are domain specific which means that they adopt different ontology model according to different demands from different application scenes. For instances, this may be a knowledge base in the scene of smart building, and that may be a knowledge base in the scene of data analysis in car management and those may be in other application scenes. They work in different WoT applications and they are isolated. The computers can not understand the relations among data from different knowledge bases.

In another way, there may be ambiguities among different schemas or domain specific knowledge graphs. For example, the sensor has a location as one of its properties. But every WoT application developer will not call this property “location”. In this ontology, the developer may name it as “location”. In another ontology, the developer may call it “deploy”. The developers know what they mean, but the computers do not.

So, the initial motivation of my project is to connect the domain specific knowledge bases together. We wants to construct a large networked global knowledge graph with a growing body. But, just as what I mentioned above, there is a ambiguity problem. One concept may have different definitions or names in different application schema. So, my solution is to take a global domain independent knowledge base as medium. That is to say, connect the different entities in different schemas to the same entity in the global domain independent knowledge base. Then the computer can understand that the two different entities in different schemas actually refer to a same concept.

Now, let me introduce my semantic annotation system to you. The whole system consists of two main parts: the manual annotation tool and the automatic annotation tool. We can use this this system to generate a networked knowledge infrastructure.

To construct a knowledge graph with better usability, the concept of ontology must be introduced to make the knowledge graph structural. Because the ontology extracts the general concept model for the applications of Web of Things. In an ontology design for applications of WoT, the basic classes are sensor and actuator. And the devices have properties such as spot. The feature of interest defines the CPS scenario which is composed of related sensors or actuators. The Anomaly is used to