# Cloud Robotic for Development of Smart Telemedicine

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**Dear Editor,**

What the global healthcare improvement needs today is using smart systems based on Internet of Things (IoT). The smart health cares have been developed since telemedicine state to provide its services to people across the globe. The IoT deals with the collection of sensors' remote data, monitoring and communications. The main focus of the smart health care systems is remote monitoring of patients. Telemedicine robot concept is also based on IoT; it is a technology which facilitates telecommunication with patients. Challenges of a complete platform are usually competed through analyzing the following items:

1. How remote monitoring of patients and telemedicine can activate the new health care models.
2. How we can use machine learning to provide practical insights on patients at home.
3. How significant the patient's experience is.
4. What potential economic impact can it all have.

It also helps physicians to examine their patients using online interactions [1].

**Machine learning:**

Although both the Artificial Intelligence (AI) and machine learning have created new opportunities in the medicine, as a science, designing such precise systems is not easy. Machine Learning is a branch of AI, in which samples are determined which are able to learn and predict available data [2]. Certainly, robotics is a successful application of machine learning, which can be useful to automatic robot control system with the capability of learning during telesurgery.

Machine learning algorithms can be divided into three classes:

- Supervised learning
- Unsupervised learning
- Reinforcement learning

To the supervised learning, the computerized programs learn through a process of training analyzing the given samples by a supervisor (usually a human expert). When the samples are learnt, they can be used in order to predict next samples through the testing process.

To the unsupervised learning, the computerized programs learn the samples through data, without any external definition of samples; it usually is used for clustering.

To the reinforcement learning, an agent learns to behave in an environment by performing the actions and seeing the result of actions. The agent learns automatically using feedbacks without any labeled data, unlike supervised learning.

**Cloud Robotic:**

Robotics deals with producing actions and behaviors, which creates a successful perspective for the remote interactions when it is combined with the IoT [3]. IEEE's Robotics and Automation Society defines network robotic systems which are recognize using human-based instructions through a communication network or a collective robotic system, working in a distributional network. It suffers from the following problems: communication delay, limited capacity of memory, lack of intelligence and slower execution speed. To cope with the problems, cloud robotics was proposed, which includes cloud computation, analysis and storing to facilitate back-up. The internet of robotic things was developed through combining two technologies of IoT and cloud computation [4]. When these mobile robots, which already have been equipped with lightweight routing protocols, start to work, they impose less overload costs and also have high efficiency.

The main adaptability elements of a robotic system are:

• RFID Sensor user interface standardization
• WSN
• Cloud Robotics Platform
• Cloud Robotics Services of IoT
• Design of the self-configurable IoT gateway
• Big data

**Cloud Robotic Architecture [5]:**

This architecture is a combination of an ad-hoc cloud and an infrastructure cloud. The ad-hoc cloud is constituted of machine to machine (M2M) communications and participatory robots in the network; the infrastructure cloud is proposed by machine to cloud (M2C) communications. In fact, cloud robotics has been born through merging robotic services and cloud processes.

The advantages created by such systems are:

• Access to macro datasets.
• Open-source algorithms (Codes and programs).
• Parallel computation and/or powerful grid and sharing data among robots
• Less management overload.
• Quick access to a great deal of applied programs.

## Authors' Contribution

All authors drafted, revised, and approved the initial and final article.

## Conflict of Interest

None

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