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# Robotics and Automation

Sahil Kamleshwar[1], Satyender Singh[2], Mrs. Shefali Singhal[3]
[1, 2, 3]Manav Rachna International Institute of Research and Studies, India

***Abstract: Cloud infrastructure and its extensive set of Internet-enabled resources have the potential to provide significant benefits to robots and flexible systems. We look for robots and data-switching programs or code from the network to support their performance, that is, when not all sense, calculation, and memory are integrated into the standalone system. This survey is designed for four possible Cloud benefits: 1) Big Data: access to photo libraries, maps, trajectories, and descriptive data; 2) Cloud Computing: access to the same grid computer with the demand for mathematical analysis, reading, and movement planning; 3) Integrated Robots Learning: robots that share tracking, control policies, and results; and 4) Census: use of crowdourcing to tap people's skills for image and video analysis, classification, reading, and error retrieval. The cloud can also improve robots and flexible systems by providing access to: a) data sets, publications, models, measurements, and simulation tools; b) open competitions for designs and programs; and c) open source software.***

## I. INTRODUCTION

As shown in Fig. 1, the cloud has the ability to develop a wide range of robots and flexible systems. The National Institute of Standards and Technology (NIST) defines the cloud as "an example of enabling universal access, simplicity, and demand for a shared pool of configurable resources (e.g., servers, storage, networks, systems, and services) that can be quickly and efficiently deployed minor management or service provider communication ". For example the ability to process online words provided by Google Docs. One can send Microsoft Word documents over the Internet, but Google Docs differs in that the document and the software are not localized. Data and code are stored in the Cloud using remote server farms with shared processors and memory. This is useful because one does not have to worry about fixing, uninstalling, and updating software or hardware. The cloud also provides an economy of scale and facilitates the distribution of data to applications and users

Cloud Robot and Automation systems can be described in more detail as follows: Any automated robot or system that relies on any data or code from a network to support its functionality, that is, when not all sense, computation, and memory are integrated into a single standalone system. This definition aims to include future systems and many existing systems that include network communication or connected groups of mobile robots such as UAVs or storage robots as well as advanced assembly lines, plant processing, and flexible systems. home applications, as well as man-made computer programs. Due to network delays, flexible service quality, and downtime, Cloud Robots and Automation systems often include local processing capacity for low-level responses and times when network access is unavailable or unreliable. This is not a binary definition; there are degrees where any program will fall under this definition.

Google's self-driving car is an example of that. Identifies maps and images collected and updated via satellite, Streetview, and human connections from the Cloud to facilitate precise localization. Another example is the Kiva Systems robot pallet for storage. These robots are wirelessly communicating with a local central server to route a route and share updates on changes found in the environment.

Fig. 1.

The cloud has potential to enable a new generation of robots and automation systems to use wireless networking, big data, cloud computing, statistical machine learning, open-source, and other shared resources to improve performance in a wide variety of applications including assembly, inspection, driving, warehouse logistics, caregiving, package delivery, housekeeping, and surgery.

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## II. A BRIEF HISTORY

The number of network connections in automated systems was made more than 30 years ago. In the 1980s, General Motors developed the Manufacturing Automation Protocol (MAP). A variety of proprietary proprietary protocols were offered to merchants until they began to change in the early 1990s when World Wide Web made HTTP more than IP protocols.

In 1994, the first industrial robot was connected to the Web via a graphical user interface that allows visitors to use the robot using an Internet browser . In the mid-late 1990s, researchers developed a series of web-based communication platforms for robots and devices to test issues such as user interface and robustness which started under "Networked Robotics" .

In 1997, work by Inaba et al. for “remote-generated robots” the advantages of remote computer control robots.

In May 2001, the IEEE Robotics and Automation Society established a Technical Committee on Networked Robots that organized workshops. The chapters of the Springer Handbook on Robotics focused on Networked Tele-robots (where robots work remotely by people using global networks) and Networked Robots (where robots communicate through local networks), respectively

In 2009, the RoboEarth project was announced. It has the concept of "The World Wide Web for Robots: a large network and database where robots can share information and learn from each other about their behavior and environment" as shown in Fig. 2. Under a great European Union grant, a team of RoboEarch researchers has developed a series of system robots for service robots developed a cloud network and computer equipment to produce 3D space models, recognition speech, facial expressions

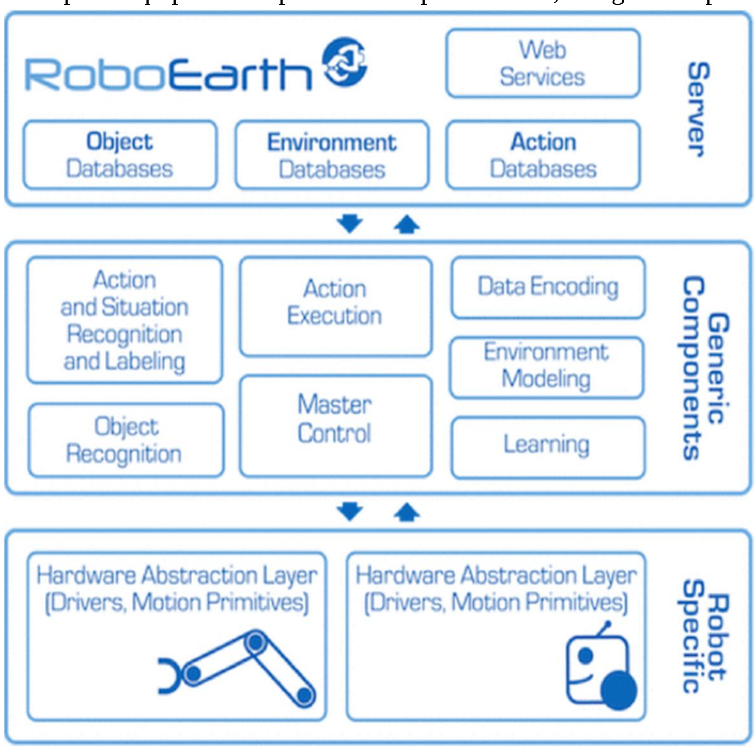


Fig.2 The robo earth systems architecture designed to allow robot to share their data from each other.

## III. BIG DATA

The cloud can provide robots and flexible systems with access to many data resources that are impossible to store in internal memory. "Big data" defines "data beyond the capacity of standard database systems" [54] including photographs, video, maps, real-time network and financial transactions [102], as well as large sensor networks [159].

The latest US National Academy of Engineering Report summarizes the many research opportunities and challenges posed by Big Data [41] and other challenges summarized in [29] and [165]. For example, sample algorithms may provide moderate qualitative qualifications for large databases to keep working times under control [38], but these estimates can be significantly affected by "contaminated data" [58].

Hunter et al. [77] introduces algorithms for a cloud-based transport system called Mobile Millennium, which uses GPS on mobile phones to collect traffic data, process it, distribute and collect and share information about sound levels and air quality (see Figure (3).

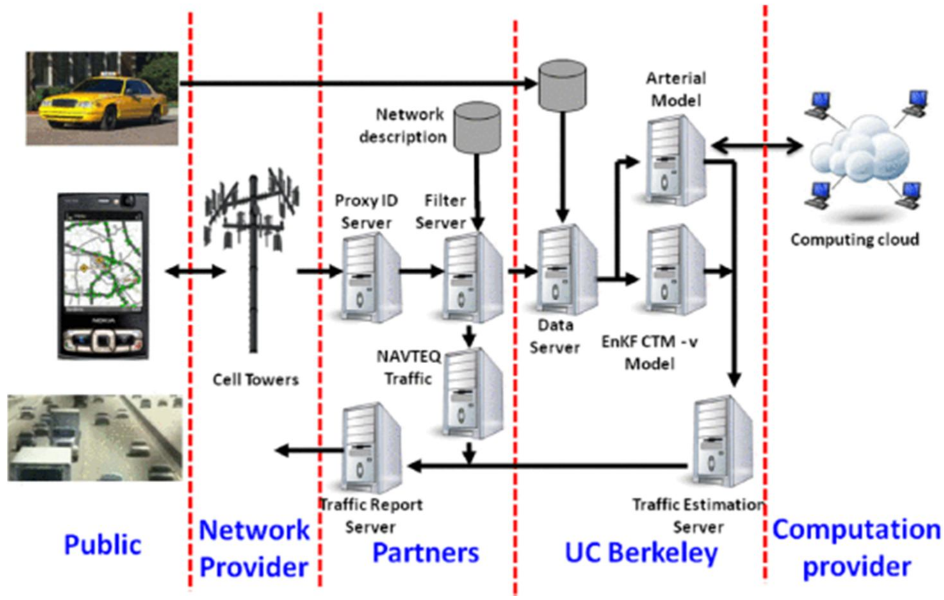


Fig.3 data can be shown from many source

The RoboEarth project stores data related objects and maps of applications from object recognition to mobile navigation to capture and deception (see Fig. 2) [156]. Columbia Grasp database [67], MIT KIT object database [88], and the Willow Garage Household Objects Database [40] are available online and used to test a variety of capture algorithms, including capture stability [45], [46], strong grip [162], and square comprehension [128]. Dalibard et al. paste "manuals" of fraudulent activities into objects [43].

One research challenge describes cross-platform formats for data representation. While sensor data such as images and pointing clouds have a small number of widely used formats, or simple details such as trajectories do not have standard standards yet but research is ongoing [129], [147], [149]. Another challenge is working with a few presentations for effective data transmission, e.g., algorithms for small-scale robotic system configuration and automation [51], [105].

Large databases collected from distributed sources are often "dirty" with erroneous, duplicate, or corrupted data [6], [158], such as 3D position data collected during robotic measurements [111]. New methods are needed that are powerful in dirty data.

## IV. CLOUD COMPUTING

The most sought-after calculations are now widely available [29] from commercial sources such as Amazon's Elastic Compute Cloud [1], [2], Google's Compute Engine [8], and Microsoft's Azure [12]. These programs provide access to tens of thousands of remote processors for temporary computer operations [105], [106]. These services were originally used mainly by web application developers but have been widely used in the application of science and computer technology (HPC) [20], [86], [114], [152].

Hearing impairment, models, and controls are a major problem in robotics and automation [62]. Such uncertainties can be modeled as a combination of position, posture, posture, and control. Cloud Computing is ready for a sample analysis based on Monte-Carlo. For example, the same Cloud Computing can be used to calculate the output of an antitrust product for many potential interference to an object and environment, the position, and the response of robots to sensors and commands [154]. This theory is being explored medically [157] and in particle physics [141].

Cloud-based samples can be used to calculate solid grip where there is a statistical uncertainty [90] - [91] [92] (see Figure 6). This comprehensive editing algorithm accepts as the inclusion of a Gausic equilibrium numerical framework around each vertex and the center and uses a corresponding sample to calculate the quality of the comprehension matrix based on the lower boundary potential for power closure.

Cloud Computing has the ability to speed up many robotic applications and adaptive systems such as robotic robots by performing SLAM on Cloud [134], [135] as shown in Fig. 7 and subsequent visualization of object recognition [125]. Control over the construction of cloud robots has also been demonstrated [153].

With sample-based editing methods such as RRT *, Cloud Computing helps generate graphs; it is also important to note that these graphs can grow rapidly so graph reduction algorithms are needed to facilitate data transfer, as shown in Figure 8.

The cloud also facilitates video and image analysis [123], [137], and mapping [119], [136] (see Fig. 7. Cloud image processing has been used to assist the visually impaired [36] and for adults [58].
Bekris et al. [33] proposes a well-planned construction of the movement of new robot manipulators designed for flexible productive floors where price calculations are separated between the robot and the Cloud.
It is important to accept that the cloud is prone to network delays and service quality. Some applications are not time-sensitive, such as room-breaking or premature comprehension techniques or offline programming, but many programs have real-time requirements [83] and this is an effective research area

## V. INTEGRATED ROBOT READING

The cloud facilitates the distribution of robotic learning data by collecting data from multiple physical and spatial testing environments. For example, robots and switching systems can share initial and desired conditions, associated control policies and trajectories, and most importantly: emerging performance data and outputs.
The "Lightning" framework (see Fig. 10), proposes the framework of Collective Robot Learning by identifying trajectors from multiple robots with multiple functions and using Cloud Computing for similar layout and trajectory adjustment [35]. Such systems can also be expanded to global networks to facilitate shared path planning, including traffic routing, as shown in fig4.

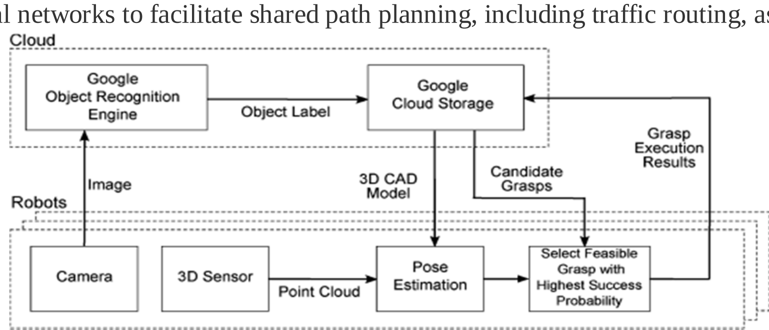


Fig 4. system architechture for cloud based pc

## VI. FUTURE CHALLENGES AND INDICATORS

Using the Cloud with robotics and automation programs presents many new challenges. The natural connection to the Cloud raises the breadth of privacy and security [133], [139]. These concerns include data generated by robots and sensors connected to the cloud, especially as they may include images or video or data from private homes or corporate trade secrets [130], [161]. Cloud Robotics and Automation also introduces robots and systems that can be attacked from a distance; a criminal can take a robot and use it to disrupt operations or cause damage. For example, researchers at the University of Texas at Austin have shown that it is possible to infiltrate and remotely control UAV drones with inexpensive GPS spoofing systems in a Department of Homeland Security (DHS) survey and the Federal Aviation Administration (FAA) [76] . These concerns raise new regulatory, reporting and legal issues related to safety, control, and transparency [107], [130]. The "We Robot" conference is an annual forum for ethical and policy research [160]. Advances in technology, new algorithms and methods are needed to address the network latency that varies with time and Quality-of-Service. Fast data connections, both wireless and wireless internet connections such as LTE [31], reduce latency, but algorithms should be designed to decelerate gracefully when Cloud resources are slow, noisy, or unavailable [34]. For example, "anytime" to measure speech recognition measurement skills on smart phones sends a speech signal to the Cloud for analysis and at the same time process it internally and apply the best results obtained after a proper delay. Similar algorithms will be required for robotic robots and systems [35].
New algorithms are also needed for those on a scale with Big Data size, which usually contain contaminated data that requires new methods of cleaning or sampling successfully [6], [158]. When the cloud is used for similar processing, it is important for sample algorithms to consider that other remote processors may fail or experience long delays in retrieving results. When using a census, algorithms are required to filter unreliable inputs and to estimate the cost of human intervention and the cost of robotic failure.

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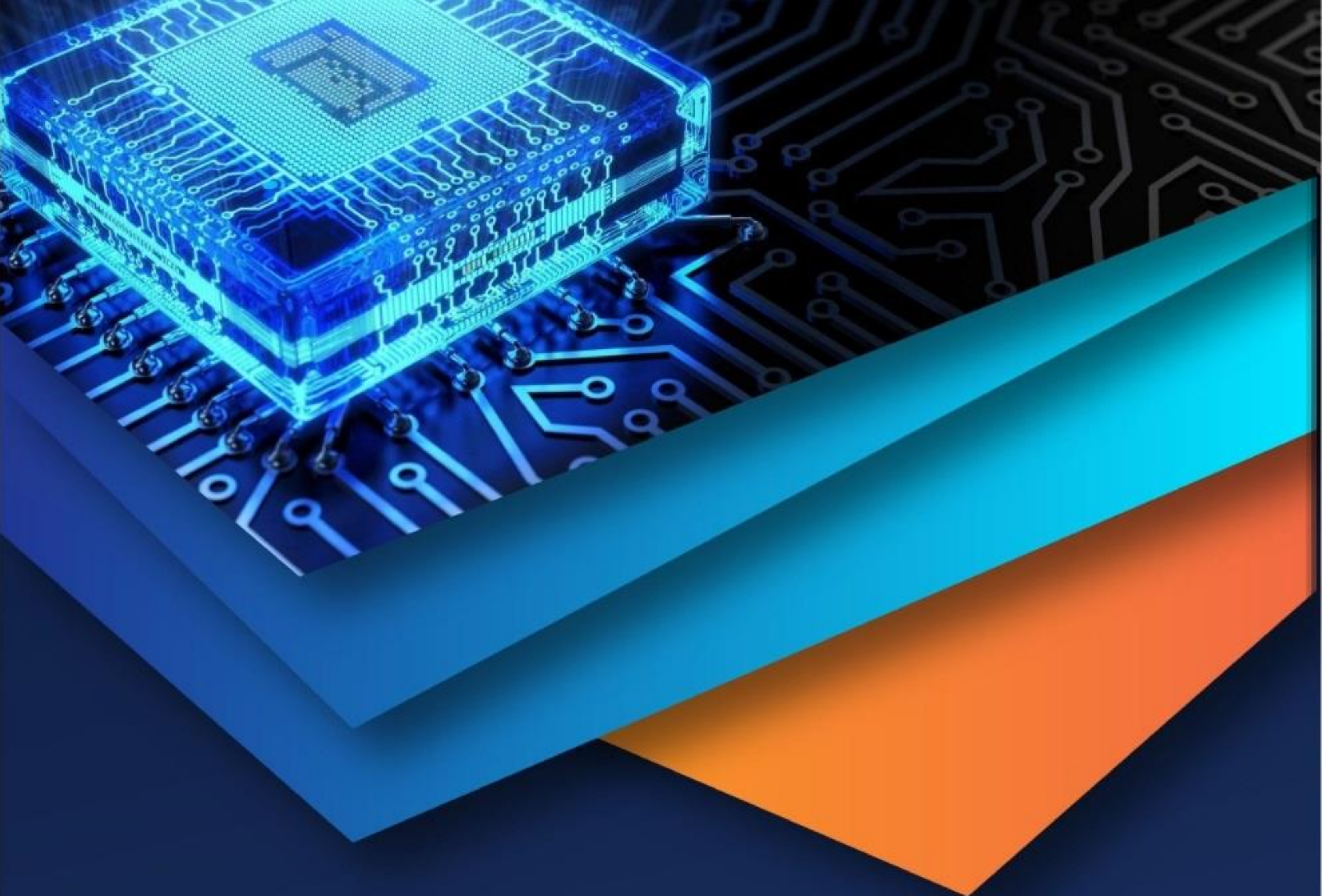


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