Importance of Internet of Things (IoT) in Livestock Industry in Pakistan's Perspective

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***Abstract*– The word Internet is like umbrella in which all worlds are working under its shadow. It has many capabilities and provides awesome facilities such as Internet of Things (IoT). It plays an effective role to trace animals, monitoring animal farms, managing its products and determine the diseases. No doubt IoT is very helpful to livestock in Pakistan. But the term IoT still not famous in livestock department in Pakistan due to its high cost, complex implementation, technical staff requirements and financial resources. In this study we discuss the role of IoT and its hidden facts on livestock department. The noticeable of animals and their products are very hot issues in Pakistan. This study provides the platform where we can trace the animals, monitoring farms, produce good quality products, overcome security issues, determine diseases and give healthy food items to our nation. With the help of IoT, we can determine those issues which a human mind not detects. Therefore, the expert system which based on IoT must be constructing in Pakistan livestock industry, especially in University of Agriculture Faisalabad (UAF) to enhance their livestock, veterinary department regarding diagnostic issues of animals and make them easily traceable with the help of IoT.**

***Keywords*– IoT, RIFD, USDA and UAF**

I. INTRODUCTION

The term IoT was first introduced by Kevin Ashton in 1999 in the context of supply chain management. The Internet devices are captured by IoT [1]. IoT things are active participants in human life, animal tracking, business, information and social processes, where they are enabled to interact and communicate among themselves, with the environment by exchanging data and information sensed about the environment. The IoT is now going rapidly on global network where everything is connected to the internet. The volume of device and its services increasing every day and these devices are connected on wire or wireless connection by powerful resources [2].

This approach of IoT will be beneficial in livestock department in Pakistan. While reacting autonomously to the real/physical world events and influencing it by running processes that trigger actions and create services with or without direct human intervention. According to Forrester, a smart environment uses information and communications to make technology more helpful in cities homes, hospitals etc. Internet of things uses different types of networks such as Radio Frequency Identification tags (RFID's) and other mobile phone networks for communication and they are mutually collaborating with each other to achieve their objective. It is also the ability of devices to connect each other or exchange data over internet wireless sensor networks etc. In IOT paradigm the term thing is considered as device that is connected with each other or human being through some kind of well-defined network [4]. That network is either same or of different type depends on some protocols that are defined by third parties. In IOT paradigm the objects/things around is connected through some network and they need some data for communication or data may be used for other purposes so we have to go beyond traditional networks and storage mechanism [5], [6].

Cloud computing serve as storage of data and the network with high speed and large capacity is needed. Discussion about network is later in this research paper. Networks and internet is going to be changed in near future because, According to an estimate there is up to 50 billion devices that is going to connect with each other in 2020. This plays a vital role in our lives like almost 90% things around us will on internet and can be accessible from any part of the world that open the vendors to smart homes, smart cities, smart hospitals and many more that discussed later in the paper in the section of applications of internet of things [6].

II. IOT ARCHITECTURE

According to [15], [16], IOT's architecture is consists of three layers, First is sensing layer, 2nd is network layer and 3rd is application layer as shown in Fig. 1.

A) Sensing Layer

The main working or objective of sensing layer in IOT is to collect, sense, acquired and collect data from external environment by using different sensing mediums like RFID tags, Bar code Readers, [7] different type of actuators and terminals etc. The collected information is then converted into digital signals.

B) Network Layer

Network layer is present in between sensing and Application layer. It is very important layer with wide functionality [8]. This layer performs functions like transmission, information processing, Network management and intelligent processing etc.

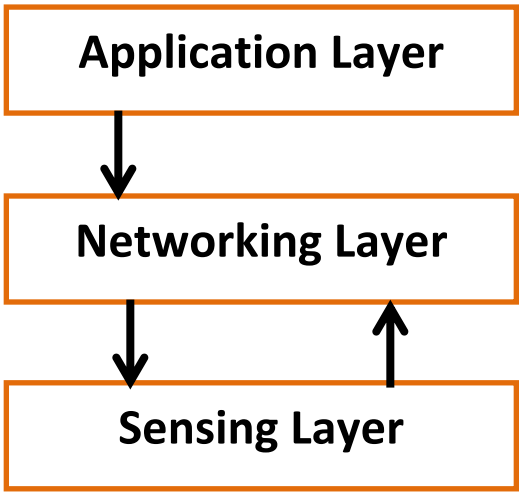

Fig. 1: Architecture of IOT

C) Application Layer

The application layer is the main layer that provides information to other sub ordinates like industries and the place of implementation of IOT. It makes real time implementation of different technologies. This is the simple overview of the architecture used by IOT. These have some major concerns like security and privacy etc [9]. Different groups are working to refine this architecture because this architecture has to support billion of devices in near future. These issues are discussed later in this paper [10].

III. TECHNOLOGIES

We have discussed in the introduction portion of this paper devices that are interconnected are increasing day by day due to this continuous improvement is needed in technology [11]. Today many complexities are solved such as size of wireless devices are continuously become shorter. IPv6 allows us to connect billions of devices [11], [12]. ABI research estimated that over 5 billion wireless chips will be shipped till 2013. In this portion we discuss the related technology RIFD and other technologies are list down that will be very useful in large scale environment of IoT [13].

- Radio Frequency Identification (RFID)
- Wireless Sensor Devicess (WSN)
- Cloud Technology
- Nano Technology
- Visible Light communication Technology (VLCT)

A) Radio Frequency Identification (RFID)

RIFD define a system that uses the wireless technology to identify an object of real world. In this technology uses numbers of unique numbers, text, code, and letters with the help of radio waves. There are many types of RIFD systems that are used in livestock in abroad country especially European union countries. This was used in first time in cars with tags which approved by United State Department of Agriculture (USDA) [14]. There are four major components that are used in RIFD system to determine identification, detect diseases and other object in animal. Following are the components used in this technology showed in Fig. 2 and Fig. 3.

Transponder*:* Transponder is an electronic data chip which contains information about target animal. This source of chip is tag with animal to which we want to identify. This microchip has unique number that control by some other wireless devices [14], [15].

Transceiver: Transceiver is like receptionist to receive the data from transponder. This term is contains radio transmitter and an antenna to send and receive signals. This may be part of hand- held device or central device to take the information with RIFD technology [13], [14], [15].

Data Accumulator: This is a device where information is stored permanently a retrieve when require. Data accumulator could be a Personal Digital Assistant (PDA), computer and other devices in which data can be manipulate and store [16].

Software for Manipulation: this section is very important for whole system of RIFD. Software is works like Translator that take data, recognized data of animal and convert it into useful information. Software is like a human soul that manages everything in this RIFD technology [17].

IV. IOT CHALLENGES

We face many challenges regarding IoT, due to large number of devices that are going to be connected with each other. They either belong to same network or different networks. First issue we faced regarding IoT is the Compatibility and integration of network with one another. We are currently using IPv4 that doesn't have capacity to support millions of interconnected devices [18], [19]. So the shifting of IPv4 into IPv6 is looking favorable to make real sense of IOT. Moreover, some following issues can be faced [20], [21].

- Unauthorized Access
- Sensor-Nodes Security
- Clouds threats

V. CONCLUSION

Research on IoT is growing very rapidly due to many reasons. The main reason is the major deployment of technology in last decade. Developing countries are also giving much importance to the work in IOT because they think that IoT can play a vital role in market and economy growth and secured for animals. Due to some problems IoT will take 3 to 5 years to capture the market. In this study we have discussed the benefits of IoT and provide the well-define platform for deployment. Pakistan is one of the beautiful countries that contain high volume of agricultural area. In Pakistan a lot of universities are going to develop agricultural growth, quality of foods, and to overcome livestock issues and diagnose animal diseases. The entire work continues manually about animals such as animal type, history, disease,

production, location, etc. in University of Agriculture, Faisalabad. This research forces to must adopt IoT in this department to control issues and give healthy foods to people. This research focuses on the security issues, like the security of animals from thieves and finding animals' locations. IoT based on RFID has secured infrastructure related to animals and provides less effort system to detect any object of animal.

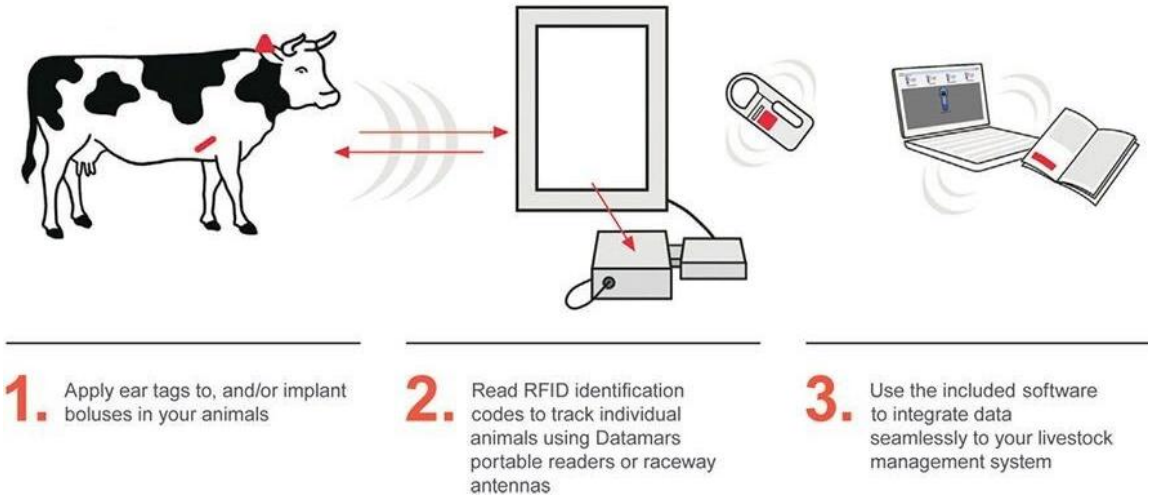

Fig. 2: Components of RIFD System

Fig. 3: RIFD Tags for Animals

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