

CS449-Internet of Things

Case Study Assignment

Case Study 1: A state-of-the-art usage of IoT in Agriculture.

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CASE STUDY TITLE	Revolutionizing traditional agriculture with IoT
Summary	As we all are well aware the Internet of Things is truly revolutionizing the entire era of technology. Being it from fin-tech to retail to healthcare, every sector has witnessed some or other kind of growth by merging the concepts of IoT in it. However, still, in the Agricultural sector, the presence of IoT is limited to certain areas only. We are still not able to merge the extraordinary functionalities of IoT in the domain of agriculture. However, this sector has tremendous potential to rise with the inclusion of IoT. From automation to analytics to just making simpler tasks simpler, agriculture can be vastly improved with its help. However, this task is not as simple as it is for other sectors. There are several valid reasons which make the practical implementation of IoT in agriculture a bit difficult. However, where there are problems, we have solutions. Hence, one thing can be made clear IoT will truly revolutionize traditional agriculture.
The issue to be resolved (At least five Sentence)	As discussed above, the sector of agriculture comes with unique sets of problems. Firstly, unlike other domains, this sector cannot have a generic solution to the same problem. The primary reason is that the techniques used for agriculture are mainly dependent on the region. Every region have different weather conditions, soil types, different varieties of crops that can be grown and the

Department of Computer Science & Engineering

	<p>availability of water. This makes it almost impossible to provide a general solution. Thus, the tools, protocols, sensors, and IoT infrastructure as well as architecture that will be used will also vary. Take reference to India, here, every state has different soil composition and as a result, other parameters also change. Secondly, specifically talking about India, where subsidies provided to farmers vary from state to state also becomes a major issue. Because of this, farmers of one state can buy expensive and sophisticated IoT architecture while that of other states need to settle with the basic one. Now, though scientists and researchers are focussing more and more on making IoT components cheaper and affordable, still we need to pay a premium for them. So, we need to develop the architecture according to the state policies as well. Hence, we can easily use high-end Drones with infrared sensors and fertilizer sprayer to monitor the farmland in Gujarat and Uttar Pradesh, but we need to use cheaper alternatives like moisture sensors which sometimes becomes unreliable in states like Bihar and Odisha.</p> <p>However, the above-mentioned problems are solvable with proper planning and focusing on beneficiaries, which is discussed further.</p>
Beneficiaries	<p>The main beneficiary will be the farmers. Also, livestock bearers and herders can be benefitted. Other direct beneficiaries will be the companies and organizations manufacturing the IoT devices and those who are directly related to farmlands and cattle. Also, indirectly, Government will be considered a beneficiary. There are several valid points for it. Firstly, IoT will improve the quality of farming, which in turn will increase the yield, and thus, the government will have more stocks of products to be purchased from farmers. Also, this will benefit the entire supply chain and life cycle. Ultimately, consumers will get better quality products.</p>
Impact over	<p>Farmers can be benefitted from the following:</p>

Beneficiaries (At least five Sentence)	<p>They can use state-of-the-art IoT devices and infrastructures in a variety of applications. Some of them are:</p> <ol style="list-style-type: none">1. Using Drones fitted with necessary sensors like RGB, and multispectral sensors, to monitor their land day and night.2. Also, driverless vehicles can be used for plowing, sowing, and harvesting produce.3. Soil monitoring sensors4. Moisture monitoring and water sensors.5. Fruit and vegetable quality can be checked during the entire lifecycle.6. Smart water management <p>Live-Stock bearers can be benefitted with :</p> <ol style="list-style-type: none">1. Drones with Cameras and RFID sensors track the livestock without any manual labor.2. Smart GPS trackers to track the movement of livestock.3. Essential sensors to monitor the health of the cattle.4. Smart cattle sheds <p>The government can be benefitted with:</p> <ol style="list-style-type: none">1. Surveying with the help of sensors and drones.2. Getting a live feed of data directly from the farmland.3. Keeping track of livestock population through APIs and RFIDs.
Technologies to build (Write specific detailing of technologies)	<p>The drones can be equipped with RGB sensors that detect visible light and spectral sensors which can detect the health and quality of the crops with the help of light absorbed through the crops.</p> <p>For driverless vehicles, we will use LIDAR, which scans the environment with lasers.</p> <p>These vehicles will heavily rely on Machine Learning, Data Analytics, complex algorithms, and processors to maintain and update the virtual systems.</p>

	<p>We will use soil moisture sensors, MQ135 sensors for air quality index, and Tensiometers, to maintain the soil health.</p> <p>We will also use photoelectric sensors for smoke detection, MQ135 for air quality index, MQ2-flammable sensors, and temperature sensors for cattle-shed.</p> <p>RFID tags will be used for multiple purposes.</p> <p>Talking about the protocols, we will mostly use MQTT protocols, HTTP Protocols, Bluetooth, NFC, WiFi, and LTE.</p>
Any other information <i>(Any Relevant thing which you want to add)</i>	<p>In addition to the above discussion, there are multiple other protocols like ZigBee and many others that can be used. Also, there are certain more complications and potentials which will still hamper the progress. However, there is great potential for the IoT to flourish in the field of agriculture.</p>