



Study on Opportunities of Starting Iot Based Tech Startups in Sri Lanka and Their Challenges

MWP Maduranga*, Ravindra Koggalage

* IIC University of Technology, Phnom Penh, Cambodia

Abstract Information technology industry is one of the main segments in Sri Lanka's economy, which has a tremendous potential for Sri Lanka's ubiquity. The Internet of Things (IoT) has proved to be a transformative technology for many companies, regardless of industry. However, some industries can particularly benefit from this concept. With the advent of new companies offering powerful IoT solutions, start-ups and small and medium-sized enterprises (SMEs) seem to be aware of this. Until recently, advanced IoT solutions were only available to large companies with huge budgets. However, as technological innovations gradually integrate into society and become more accessible, start-ups and SMEs are also beginning to use the Internet of Things. Still, using IoT is one thing, but developing the right IoT devices to serve consumers and businesses is a completely different issue. This article provides entrepreneurs with the opportunity to develop new businesses on the Internet of Things and its key technical challenges.

Keywords Internet of Things (IoT), Tech Startups, Entrepreneurship

Introduction

It's no wonder that every start-up today is technology-centric. Those interested in entrepreneurship should not ignore the great potential of new technologies, especially the Internet of Things. In fact, according to Crunchbase, more than 26,000 startups are adopting the IoT as one of the key technologies for launching new products and services. IoT applications have great potential for many for-profit companies, regardless of industry. That's why global IoT spending continues to grow, according to IDC, which could even exceed US \$ 1 trillion (€ 0.88 trillion) in 2022. However, some industries can especially benefit from IoT solutions. By 2020, the Boston Consulting Group predicts that by 2020, nearly half of all IoT spending will come from manufacturing, transportation, and logistics. "Forbes Insights" and Intel have also added healthcare to the list of industries that have benefited a lot from actually applying the Internet of Things, and their use cases in these industries are certainly excellent. IoT start-ups are already enabling new business models, solving some of the most difficult problems, and truly transforming the industry related to the Internet of Things [1-2].

Internet of things as a New Business Venture

The Internet of Things is a concept and paradigm with a variety of visions and interdisciplinary activities. Over the last few years, the Internet of Things has evolved from a pure concept built around communication protocols and devices to a cross-domain field where devices, Internet technologies, and people (via data and semantics) come together. Create a complete ecosystem for business innovation, reusability, and interoperability. Includes addressing security, privacy, and trust issues. In IoT applications, physical objects have the capabilities of digital networks and virtual technologies to sense/actuate, program, address, and communicate with other objects and humans. Combining digital, networking, and virtual technologies with physical objects requires collaboration and collaboration between partners in different industries and disciplines.



Business Opportunities in IoT

Developing Smart Agriculture System

There are very good opportunities in automating agricultural processes in Sri Lanka. As its name implies, these kind of IoT-based product focuses on developing intelligent agricultural systems that can perform and even monitor many agricultural tasks. For example, the system can arrange for automatic irrigation of parts of the land, or you can wirelessly spray fertilizers/pesticides on crops via your smartphone. Not only that, but this IoT-based project has also been successful in monitoring soil moisture. This advanced system can handle traditional farming tasks, allowing farmers and growers to focus on more labor-intensive farming tasks.

Developing Weather Station System

For tech startups, this is one of the great IoT concepts. Remote monitoring of whether is very important in many ways. This IoT-based weather reporting system is specially designed to facilitate the reporting of weather sensing values over the internet. This is one of the best IoT projects. Temperature, humidity, and rain sensors are built into the system to monitor weather conditions and provide real-time weather statistics reports. This is an always-on automation system that allows you to send data to a web server via a microcomputer using WI-FI connectivity. This data is updated in real-time on the online server system. Therefore, you can view weather statistics directly online without relying on reports from weather forecasting agencies. The system can also set thresholds and alerts for specific instances and notify the user whenever a weather parameter exceeds the threshold.

Developing Home Automation System Development

Automating home functions is a key requirement of modern life. The Internet of Things, based on home automation, is a universal and popular application. It could save energy and time as nowadays people are very busy with their time schedules. The basic technical idea of home automation is, it will allow you to network all household appliances and operate them without manual intervention. Home automation has changed the lives of human beings and has made it possible to operate household appliances intelligently. This develops new solutions that use a variety of sensors such as LM35, IR sensors, LDR modules, node MCU ESP8266, Arduino UNO, etc. to control specific appliances such as lights, fans, door cartons, energy consumption, etc.

Developing Face Recognition Systems

Many organizations are required to identify and authorized persons using electronic systems. Internet of Things products include building intelligent AI robots with advanced facial recognition capabilities. This is one of the best IoT projects, and intelligent AI robots are designed to recognize different people, their faces, and their unique voices. The system includes face detection (recognizing the same face and attributes in an image), person recognition (matching individuals in a private repository containing thousands), and emotion recognition (a series of facial expressions). Includes facial recognition features such as) happiness, contempt, neutrality, and fear). This combination of advanced identification features constitutes a powerful security system. The system also includes a camera that allows the user to preview the live stream through facial recognition.

Developing Air Pollution Monitoring System

One of the best ideas to start a new business on designing a customized-on Air pollution monitoring system. Air pollution is a threat all over the world, and monitoring the level of air pollution is our challenge. Whereas traditional air pollution monitoring systems cannot successfully monitor air pollution levels and pollutants, Internet of Things-based air pollution monitoring systems can not only monitor urban air pollution levels, but also web servers for future use. You can also save the data. This intelligent air pollution monitoring system facilitates cost-effective air quality measurement technology. The system incorporates sensors that monitor the five elements of the Environmental Protection Agency's air quality indicators: ozone, carbon monoxide, sulfur dioxide, nitrous oxide, and particulate matter. Besides, the system also includes a gas sensor that can alert the user in the event of a gas leak or flammable gas. Besides, there are temperature and humidity sensors.



Developing Smart Parking System

In many cases, It's hard to find a parking space because the cities and urban areas are crowded for a minute. This is not only time consuming, but also frustrating. Thanks to the Internet of Things, there is a solution to the parking crisis. Based on the Internet of Things, this intelligent parking system aims to avoid unnecessary travel and harassment when looking for a suitable parking space. To get started a new venture, this is a great idea. Therefore, when in a parking space, the system uses IR sensors to monitor the entire area during operation and provide the same image. In this way, you can drive directly to the parking lot without wasting time looking for a parking lot and checking the available space in the parking lot. Also, the system will be adjusted to open the car door and only if there is an empty slot in the parking space.

Developing Smart Traffic Management System

As the population grows, so does the number of vehicles on the road. Traffic congestion is a daily problem as the number of public and private cars increases in cities and metropolitan areas. One of the best IoT products on the market. To solve this problem, this IoT-based project has created an intelligent traffic management system that can effectively manage traffic on the road and provide free access to emergency vehicles such as ambulances and fire trucks. Emergency vehicles can connect to intelligent systems to find signals and paths that can dynamically control traffic flow. The green emergency vehicle notification light flashes. Also, even at night, an intelligent traffic management system can identify and monitor traffic violators.

Developing Streetlight Monitoring System

In Sri Lanka, pretty much every street having a street light, Streetlights are an important source of energy consumption. Streetlights usually remain on, even when there is no one on the street. With the help of streetlight monitoring systems based on the Internet of Things, you can effectively monitor and optimize the energy consumption of streetlights. In this IoT-based product, streetlights are equipped with LDR sensors that can monitor the movement of people and cars on the road. If the sensor can capture the movement on the road, the sensor sends a signal to the microcomputer, which turns on the street light. Similarly, if there is movement on the road, the microcomputer turns off the light. In this way, you can save a lot of energy. Not only that, but smart lighting systems also allow users to monitor estimated power consumption based on the current intensity of streetlights. Equipped with a load detection function, it can detect lighting defects. When the system detects an error, it automatically marks a particular lamp as faulty and sends the data to the IoT surveillance system for quick repair.

Developing Smart Anti-Theft System

Security is one of the main choices for families, businesses, and businesses. Having a strong security system helps prevent unnecessary intruders. Anti-theft systems based on the Internet of Things are the perfect solution for protecting homes and businesses. This IoT-based security system is programmed to monitor the entire floor of the building and track anomalous movements. When turned on, the movement may trigger an alarm and notify the property owner about harmful visitors. This works as follows: Each time you leave a house or building, the piezo sensor turns on to track movement in and around the property. This can consider as one of the best IoT projects based venture to start.

Developing Health Monitoring System/ Remote Patient Monitoring Systems

This is one of the interesting IoT venture can start. This IoT-driven health monitoring system is designed to help patients actively manage their health. This system allows users to monitor their physical vitality and send data to qualified doctors and healthcare professionals. The doctor can then provide the patient with immediate solutions and guidance based on the patient's health. The app's sensors can monitor important patient signs such as blood pressure, ECG, EEG, sugar levels, and heart rate. If your health value is higher or lower than normal, the system will notify your doctor immediately. The idea of creating this system is to allow patients and doctors to connect remotely and exchange medical data for professional supervision. This application can be used anywhere in the world.



Developing Smart Irrigation System

Farmers usually need to irrigate the land manually. Not only is this a time-consuming task, but it is also labor-intensive. After all, it is very difficult for farmers to continuously monitor the water content of the entire field and expand the land that needs water. This IoT project is an intelligent irrigation system that can analyze soil moisture levels and climatic conditions and automatically water fields as needed. You can use a smart irrigation system to check the water content and set a predefined threshold for the optimum water content in the soil. When the threshold is reached, the power is turned off. The Arduino / 328p microcontroller controls the motor for water supply and has an on / off switch so you can use it to start or stop the motor. When it starts to rain, the smart irrigation system will automatically shut down.

Technical Challenges in IoT Based Startups

Compatibility

The efficiency of the Internet of Things (consumers and businesses) is to bring all connected devices together as a single ecosystem. Smart homes rely on the synergies of multiple devices. Smart cities are only possible if all aspects of the home, office, vehicle, and industry work together as a whole. Analysts at McKinsey believe that interoperability is needed to achieve 40% to 60% of the economic value provided by the Internet of Things. However, interoperability is threatened by the presence of different vendors and service providers that power devices using different operating systems and technologies. The lack of standards in the IoT industry caused this. In general, maker A's equipment, maker B's equipment, and maker C's equipment should work together effectively, but they are not. Moreover, with the rapid growth of innovation, the technology used in connected devices can quickly become obsolete, making the device useless.

Connectivity

The difference between IoT devices is the ability to connect to the Internet. However, there are also connectivity issues. There is no uniformity in communication protocols. So far, there is no universal communication standard that allows all devices to communicate. Another connectivity issue is the challenge posed by the proliferation of IoT devices, which puts pressure on Internet bandwidth. Quality below the Internet cannot achieve the purpose of connecting devices. Therefore, the more IoT devices your company uses, the more resources you need to support your implementation. In any case, the industry is very much looking forward to commercial adoption of 5G as the new technology alleviates the delay issue. However, a fully global implementation will take time and the rapid growth of IoT devices will not stop.

Data Analytics

According to Stacy Crook, "The amount of data generated by IoT devices is not yet available to many companies." But the problem of "big data" goes beyond that. Most of the data generated is unstructured, which is already a challenge for the data analysis itself. The Internet of Things does not work on its own, but it works in conjunction with other technologies such as artificial intelligence, machine learning, and data analytics. Without effective resources to extract relevant data and generate actionable insights from the vast amount of data available, it is impossible to maximize the potential of IoT devices. According to expectations, within five years, 80% of all data may be unstructured. Unstructured data itself is not a problem, but as big data grows rapidly, the risks become even higher.

Data Security and Privacy

Moving data to the cloud makes it more vulnerable to hackers. Recent developments in hacking strategies raise concerns about serious problems. Both large companies and small and medium-sized companies have a high hit rate of 43%, and IoT devices are connected and connected to the company's central network, increasing system vulnerabilities. Hackers have many endpoints that can be attacked (especially those that look trivial). In 2019, cyber attacks on IoT devices increased by 300% and the number of devices used increased. Moreover, with the adoption of the Internet of Things, people are increasingly concerned about privacy. Connected devices collect large amounts of data, most of which contain personal information, and the organization that collects this data



must protect the data. However, the recent rise in data breaches has made it difficult for consumers to trust their businesses on data alone.

Discussion

As per the study, there is huge potential for starting IoT based ventures in Sri Lanka. Many institutions, organizations, and individual personals are much keen on adopting new technologies to make ease day to day life. For institutions for their privacy, and efficiency IoT systems can be integrated. This paper discussed many IoT based solutions/products that can be introduced as a new tech startup. Though IoT is having a large scope in almost all areas of our day to day applications. Some disadvantages hinder further implementation of the IoT systems at a faster pace. The main disadvantages of the IoT are discussed. The Internet of Things displays real-world physical objects in a networked world, providing intelligent systems and application formation. Sensors, middleware, digital communications and computing, protocols, and other networks have led to the expansion of interconnected devices. Advances in communication, connectivity, and integration will help you choose your equipment and services. A variety of services and devices that offer similar functionality lead to search and discovery. The discovery and classification of similar devices and services makes systems more expensive and error-prone. Addressing these shortcomings will enable the next generation of the Internet of Things to identify and meet information needs.

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