Advantages and Challenges of Implementing IoT in Bangladesh's Agriculture

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Research Objectives

- Aim of the research:

  Identifying and overcoming the challenges of implementing IoT in Bangladesh's agriculture.

  The core concern in this work is the Internet of Things and its faced challenges by focusing on Bangladesh’s Agriculture. This is basically a literature survey article to summarize the core concept analysing the challenges faced.

Abstract

- The research shows what difficulties are faced by farmers in Bangladesh and what can be done to overcome them with the help of technology. We have analyzed many research papers and many of the papers focused on the humidity and weather conditions of a particular area. Moreover, they focused on water efficiency with the help of IoT. Our research proposes how farmers can **detect plant diseases**, **provide fertilizer to the plants,** and **check the weather** with the help of IoT such as **Weather Stations, Field Sensors, Equipment tools** and **Visual Capturing.** This will eventually help farmers to get higher profits.

Introduction

- Bangladesh's socio-economic backbone is Agriculture and to providing food for a huge population of 163 Million is a huge challenge. IoT ensures a worthy solution to strengthen it.

- The irrigation method, fertilization, disease detection and prevention are some of the most important components of a harvest that essentially determines the quality and quantity of production.

Drawback of traditional cultivating methods

- Improper irrigation:
  - Shortage in groundwater
  - Increased human labour
  - Excessive moisture reduces yields

- Improper usage of fertilizer:
  - harm the soil
  - reduces cultivable land

Introduction

- All these problems can be solved by automating the process. Utilizing the potential of modern technologies such as ML, Cloud computing to store and process the data and IoT devices to gather information from the environment and to remotely control all the farming equipment. These technologies can sense soil moisture and its consistency and supply necessary amount of fertilizer and water when required.

- IoT reduces by a huge margin –
  - human error
  - wastage of water and energy
  - human-labour

Introduction

These problems can be solved by implementing IoT and automating the agriculture process in Bangladesh.

- Efficient Energy Management and Low Energy Intensity
- Irrigation Water management
- Fertilizer management
- Pests Control and Disease Detection
- Structured Agricultural Knowledge Storage for R&D

Literature Review

- Their aim was to implement smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, smart irrigation with smart control and intelligent decision making based on accurate real time field data, smart warehouse management which includes temperature maintenance, humidity maintenance and theft detection in the warehouse. This has successfully implemented through four sections: node1, node2, node3 and an application to control system where every node is integrated with different sensors and devices and they are interconnected to one central server via wireless communication modules. [1]

- This system aims to use the absolute minimum amount of water required for irrigation of plants as well as remotely monitoring the entire system and environment of the field. This has successfully implemented by using temperature and humidity sensor which has connected to a microcontroller that keeps an eye to the environment and activate the motor based on some predefined conditions of real-time data. [2]

Literature Review

- This paper contributes the followings, first, empirically investigate agricultural practices and need in Bangladesh, second, glean the needs and requirements for shifting current system towards a knowledge driven smart automation system, and third, develops a platform for Precision Agriculture by leveraging the best practiced IoT design principles and contemporary technologies. This research proposes a comprehensive model of a PA (precision agriculture) system along with the transcript of empirical validation justifying its technical competencies to address the requirements. [3]

- This study investigated options and difficulties to improve water-efficient irrigation systems. The researchers conducted two peer reviewed case studies investigating options, stimuli and difficulties to improve water-efficient practices. It was revealed that despite technological advancement, farmers lack adequate means to know current on-farm water-efficiency levels and have weak incentives to do so which is why a knowledge-exchange program is essential. [4]

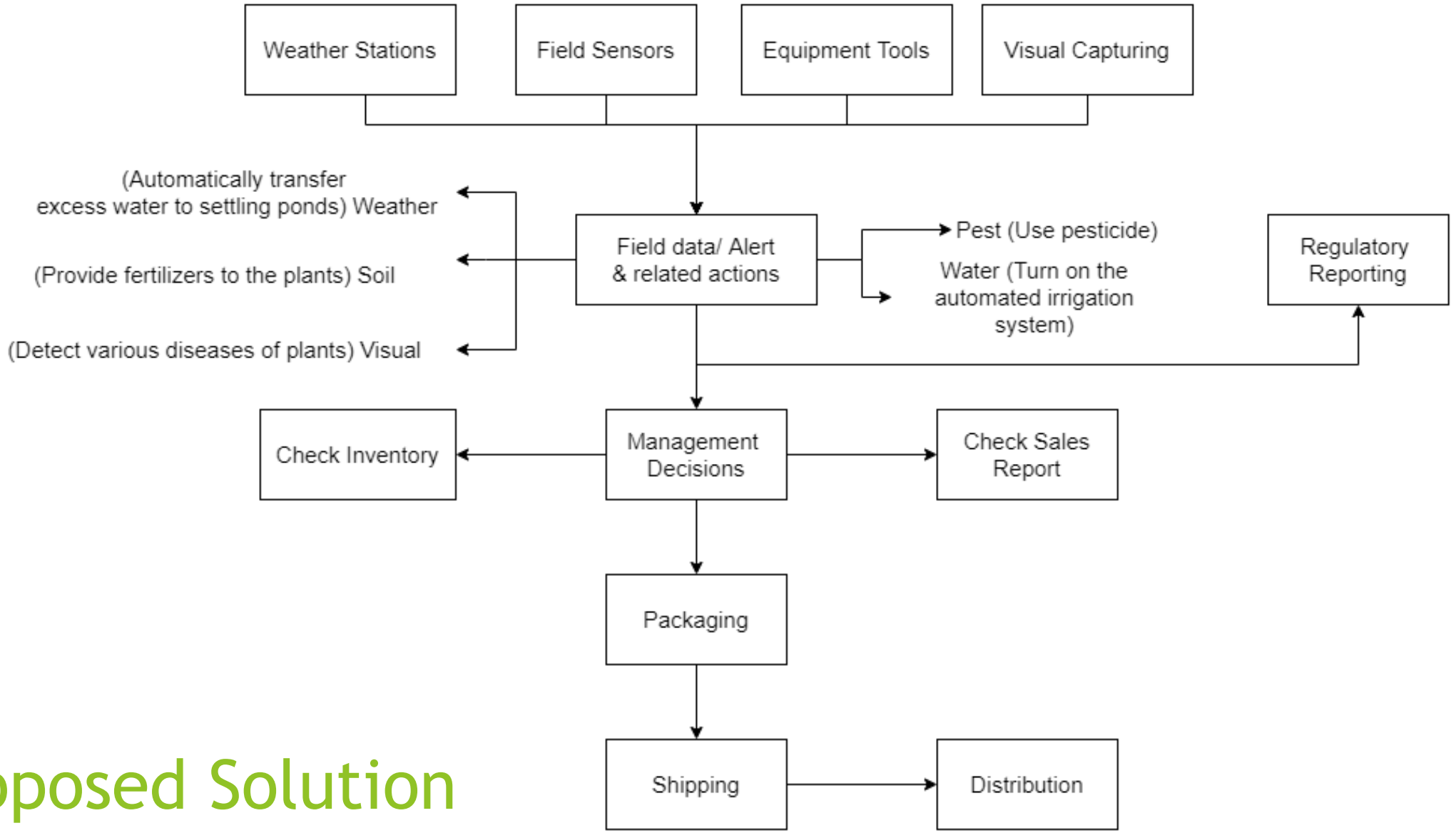
Literature Review

- An algorithm developed with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to control water quantity. The system can be powered by photovoltaic panels and can have a duplex communication link based on a cellular- Internet interface that allows data inspection and irrigation scheduling to be programmed through a web page. [5]

Proposed Solution

- 1. There should be an universal application created and maintained by the Agricultural Institute of Bangladesh.
- 2. That application have to be simple enough to reach regional farmers and it have to have a feature to control the IoT devices.
- 3. In every paper, there are enough efficient idea to make IoT in agriculture more effective, but none of them are being implemented in Bangladesh because of universal and simple remote control feature.
- 4. That application must have all-in-one interface that can able to control all aspects of cultivation.
- 5. Usage of that application should have promoted by the government through television, billboard etc.

Proposed Solution



Discussions

- The government of Bangladesh has enough funding to implement or to help people implementing IoT technology and internet connection is not an issue anymore in the regional area.
- Also almost all farmers are using smartphone nowadays because of it's availability and affordability.
- There are thousands of implementation idea to make the system automated. Therefore technology is also not an issue.
- The main issue is everyone implements the technology but not the proper UI for the farmers.
- Also for each implementation, different login or different app is required, which is tough for farmers to learn.
- So an universal application where the icons are simple and infographic and all IoT data and remote control technology can be done by it could be a solution to this problem.

Conclusion

- In this literature based survey article we have found why these efficient systems are not being implemented in Bangladesh even after they work properly.
- A design of the usage of application that proposed here will reduce the production cost and enable the farmers to get their desired profit. As a result people who are planning to move away from this profession can develop their expertise properly.
- Implementation of such an application definitely help to improve the yield of the crops and overall production.

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