SIoAT in Action : Transforming Autonomous Agricultural Field Monitoring for Seamless Insurance Claims with Social IoT

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1. Introduction

The primary objective of this research is to investigate the facilitation of streamlined insurance claim processes for agricultural fields through the conceptualization and utilization of Social Internet of Things (SIoT) principles and technologies. SIoT presents an avenue for enhancing seamless collaboration between farmers' fields and insurance entities within the agricultural domain, thereby warranting an evaluation of its consequential impact on productivity.

Additionally, we examine the prevalent applications of Social IoT across various industries, laying the foundation for the integration and introduction of SIoT specifically tailored for the agricultural sector.

2. Related Work

This literature review employs thematic analysis to examine three primary domains: the application of IoT in agriculture, specifically focusing on precision farming and crop monitoring; the navigation of objects within the realm of Social IoT (SIoT); and the cooperative endeavors between farmers and insurance companies in response to climate change challenges. The systematic framework adopted in this study lays the groundwork for a comprehensive exploration of the practical implementation of Social IoT within both agricultural practices and insurance services.

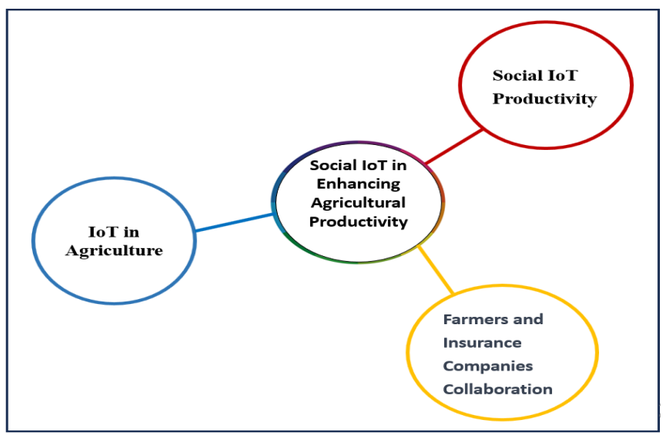

Fig 1: Three themes of reviewed literature

3. Aims and Objectives

The aim is to investigate and comprehend the transformative capability of Social Internet of Things (SIoT) in cultivating collaborative endeavours between agricultural stakeholders, particularly farmers and insurance entities, with the overarching goal of augmenting agricultural efficacy. Moreover, concreate objectives include:

- To Investigate and explain the operational and technical mechanisms that facilitate and fortify collaboration between farmers and insurance entities within the purview of Social IoT.
- and erogenous insurance claims. To implement the Social IoT framework adeptly to enable seamless and instantaneous data exchange among pertinent stakeholders involved.
- To assess the impact of this collaboration on agriculture productivity

4. Methodology

This research followed a mixed-methods methodology, developing a conceptual framework based on the Social Internet of Things (SIoT) principals and performing the field experiments. This approach selection aims to provide a holistic understanding by uniting theoretical underpinnings with practical applications, thereby bolstering the credibility of the study's outcomes and impact.

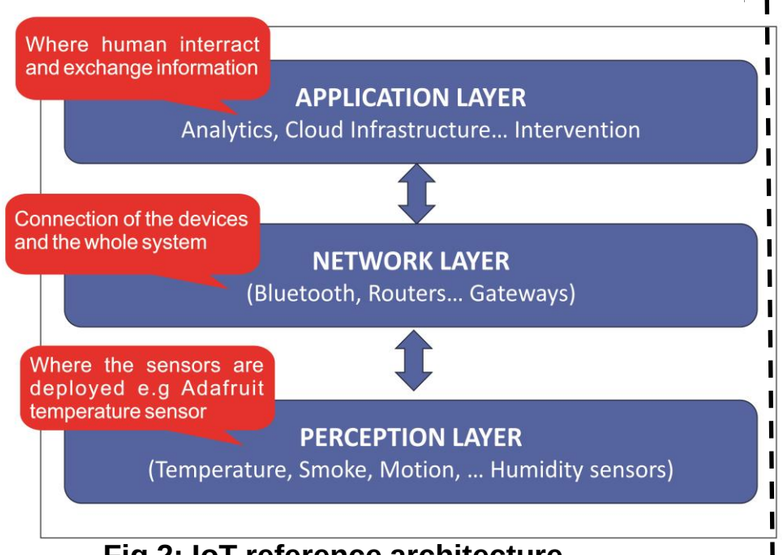

Fig 2: IoT reference architecture

The conceptual framework of the Social Internet of Agriculture Things (SIoAT) is extensively explained, delineating the selection criteria for tools and apparatus, encompassing Adafruit sensors, actuators, Raspberry Pi, the Python programming language, and services for farmers and insurance providers.

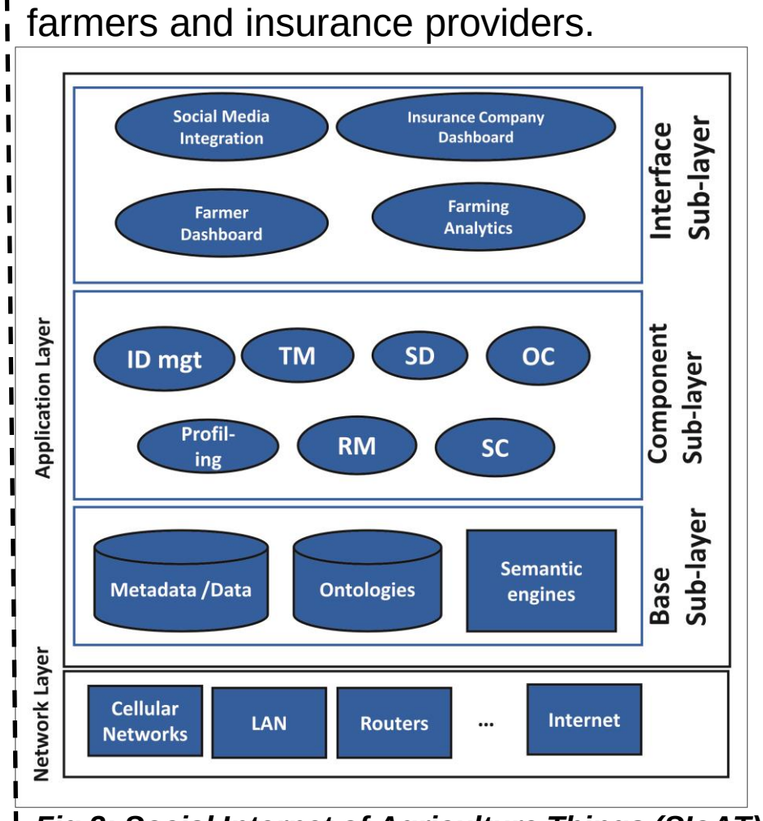

Fig 3: Social Internet of Agriculture Things (SIoAT)

In Figure 3, the Interface Sub-layer facilitates farmers in making informed decisions based on real-time data via Farming Analytics, continual monitoring in real-time through the Farmer Dashboard, and the Insurance Company Dashboard provides the risk analysis and collaborative endeavours. SIoT concepts and technologies empower the seamless integration and interaction of various entities among stakeholders such as in our case farmers and insurance providers.

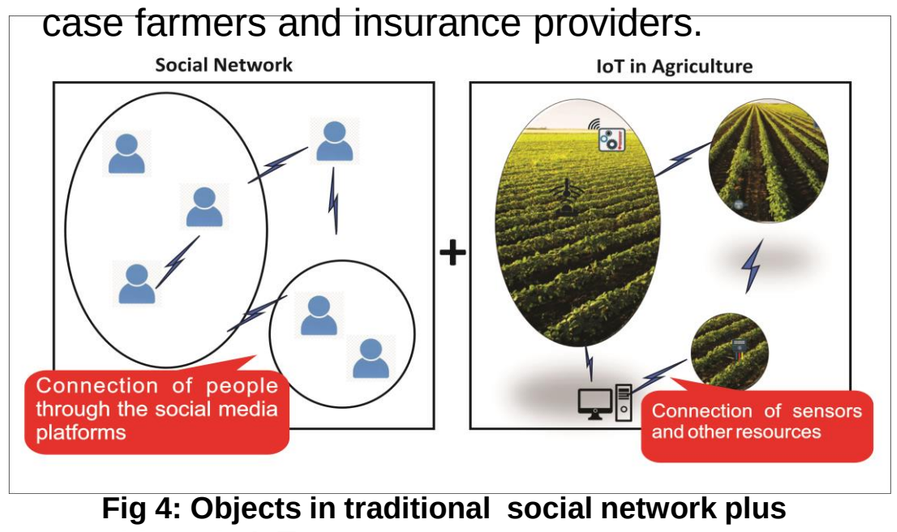

Fig 4: Objects in traditional social network plus objects in IoT

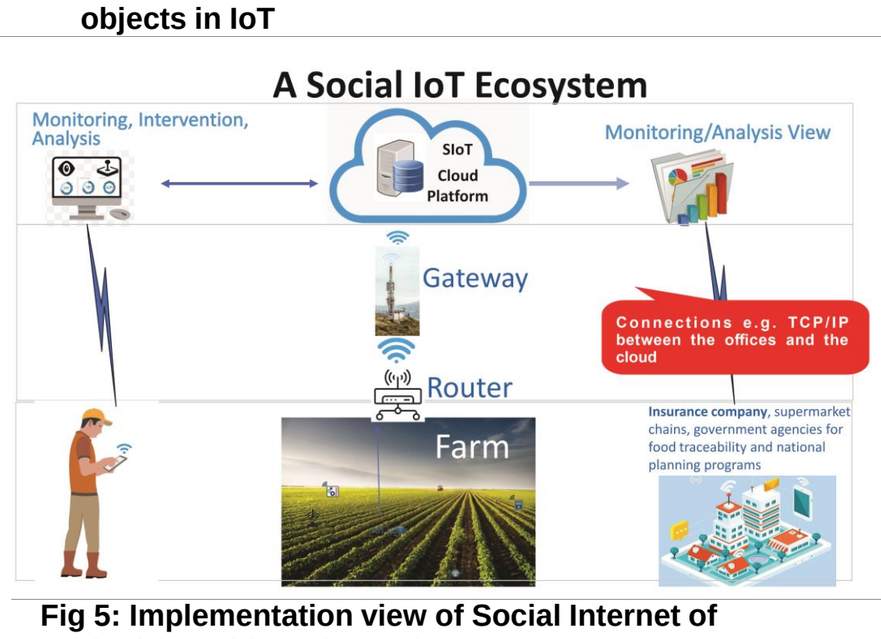

Fig 5: Implementation view of Social Internet of Agriculture Things (SIoAT)

Figure 6 illustrates a laboratory experiment demonstrating the technical viability of the Social Internet of Agricultural Things (SIoAT). This experiment involves the collection of soil data from the agricultural field, which is subsequently transmitted to a cloud server. At this server, analytical processes are executed, and the resulting insights are disseminated to insurance providers.

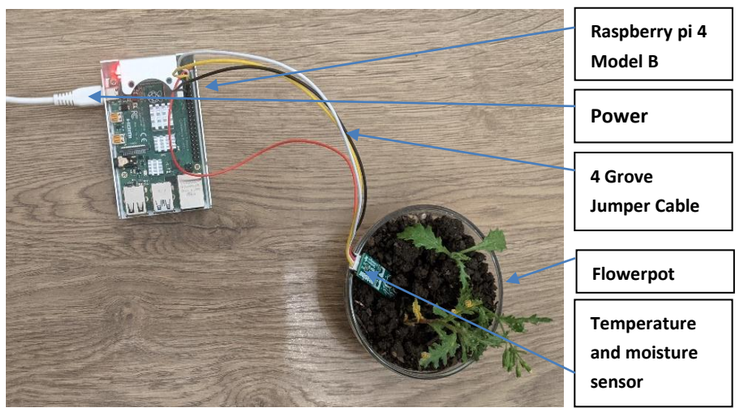

Fig 6: Lab demonstration view of Social Internet of Agriculture Things (SIoAT)

5. Conclusion

This work is in its initial stages, and it provides a seamless and autonomous solution for enhancing agricultural yield and insurance risk management. By exploring IoT technologies and their convergence, the study highlights the SIoT framework's capacity to enable dynamic real-time data exchange, empowering stakeholders with actionable insights.

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Department of Computing

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1. Introduction

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Additionally, we examine the prevalent applications of Social IoT across various industries, laying the foundation for the integration and introduction of SIoT specifically tailored for the agricultural sector.

2. State of the Art

This literature review employs thematic analysis to examine three primary domains: the application of IoT in agriculture, specifically focusing on precision farming and crop monitoring; the navigation of objects within the realm of Social IoT (SIoT); and the cooperative endeavors between farmers and insurance companies in response to climate change challenges. The systematic framework adopted in this study lays the groundwork for a comprehensive exploration of the practical implementation of Social IoT within both agricultural practices and insurance services.

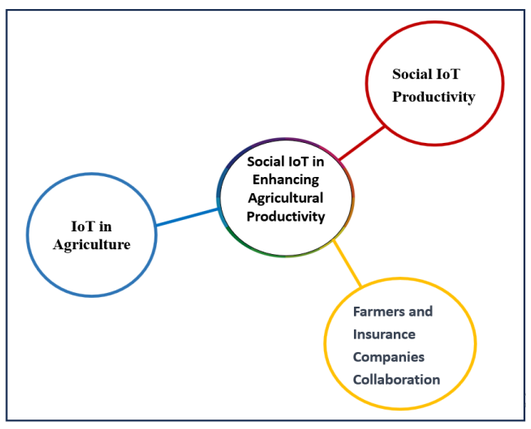


Fig 1: Three themes of reviewed literature

3. Aims and Objectives

Aim:

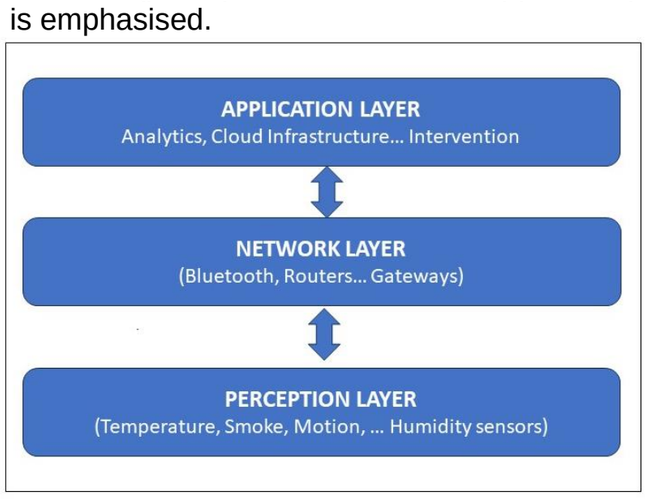
The aim is to investigate and understand the transformative potential of SIoT in fostering collaboration among farmers and insurance companies, ultimately improving agricultural efficiency.

Objectives:

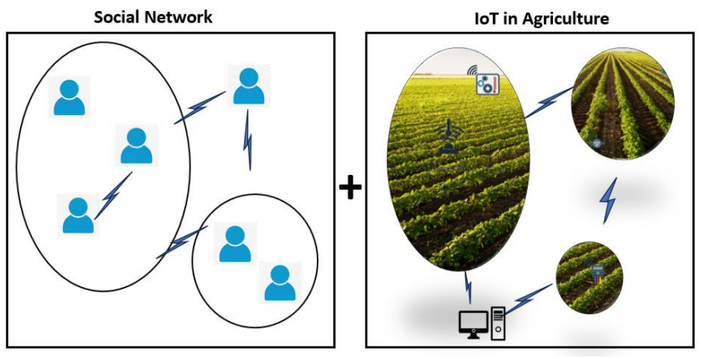
1. Implement the Social IoT framework to facilitate real-time data sharing among stakeholders.
2. Explore the mechanisms enabling collaboration between farmers and insurance companies through Social IoT.

4. Methodology

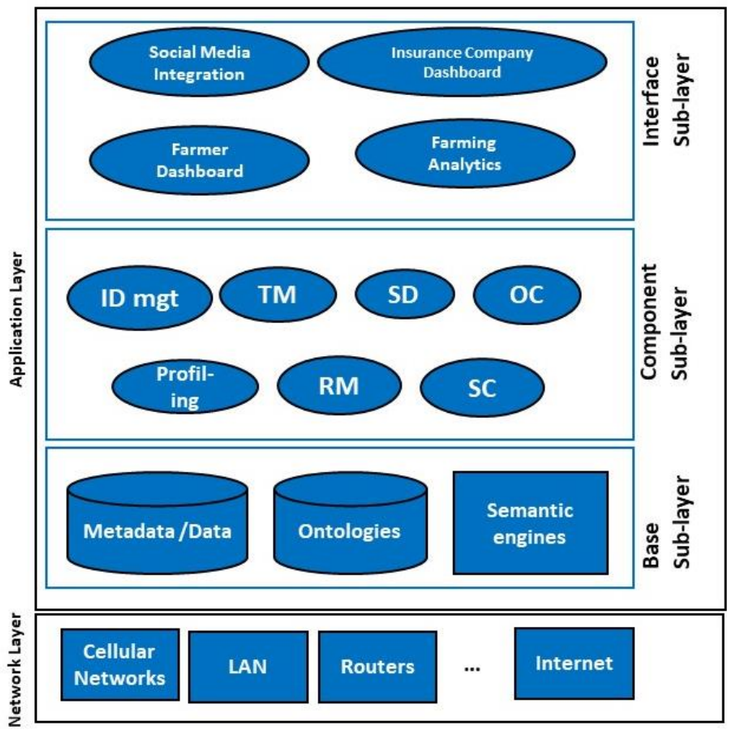
Employing a mixed-methods approach with a pragmatic philosophy. The IoT three-layer structure (perception, network, and application) is emphasised.



The architecture of the Social IoT (SIoT) platform is detailed, outlining the choice of tools and equipment, including the Adafruit sensors, Raspberry Pi, Python programming language and Matlab.



We are going to concentrate on the application layer of the Server component of the (Atzori et al., 2012)'s SIoT system architecture as illustrated below in Fig 3



The Interface Sub-layer aids farmers with data-driven decisions through Farming Analytics, real-time monitoring via Farmer Dashboard, and Insurance Company Dashboard for risk assessment and collaboration. Social Media Integration facilitates communication.

5. Implementation

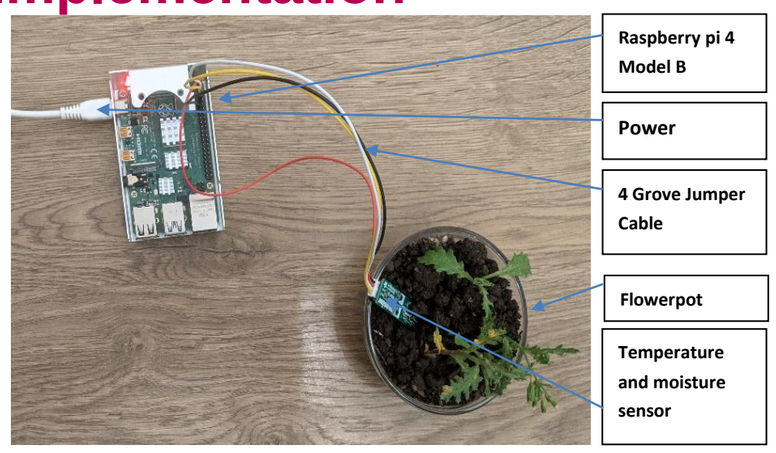


Fig 5: A lab-controlled experiment showcases the technical feasibility of real-time data collection using a Raspberry Pi and Adafruit STEMMA Soil Sensor

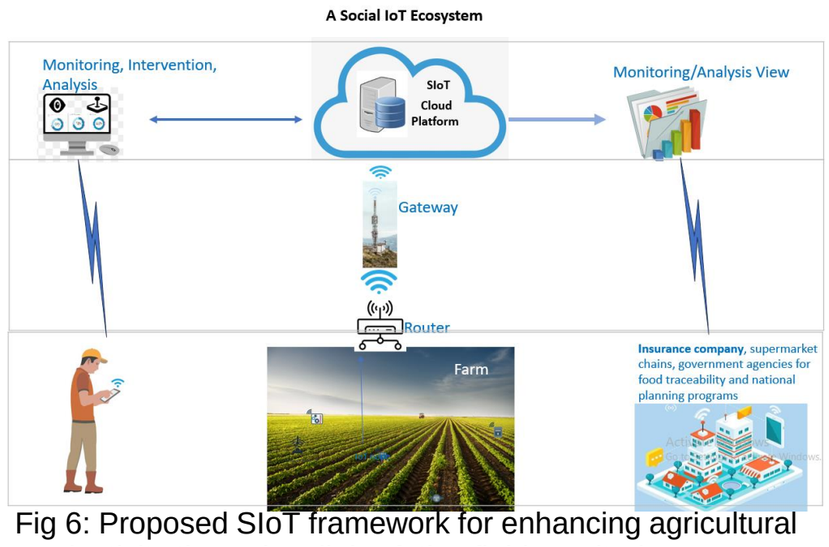


Fig 6: Proposed SIoT framework for enhancing agricultural productivity through collaborfative field monitoring

6. Conclusion

This dissertation delves into the potential of the Social Internet of Things (SIoT) for enhancing agricultural yield and risk management. By exploring IoT technologies and their convergence, the study highlights the SIoT framework's capacity to enable dynamic real-time data exchange, empowering stakeholders with actionable insights

7. References

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