Exploring Edible Insects: A Nutritional and Technological Frontier for Sustainable Food Solutions

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Background :

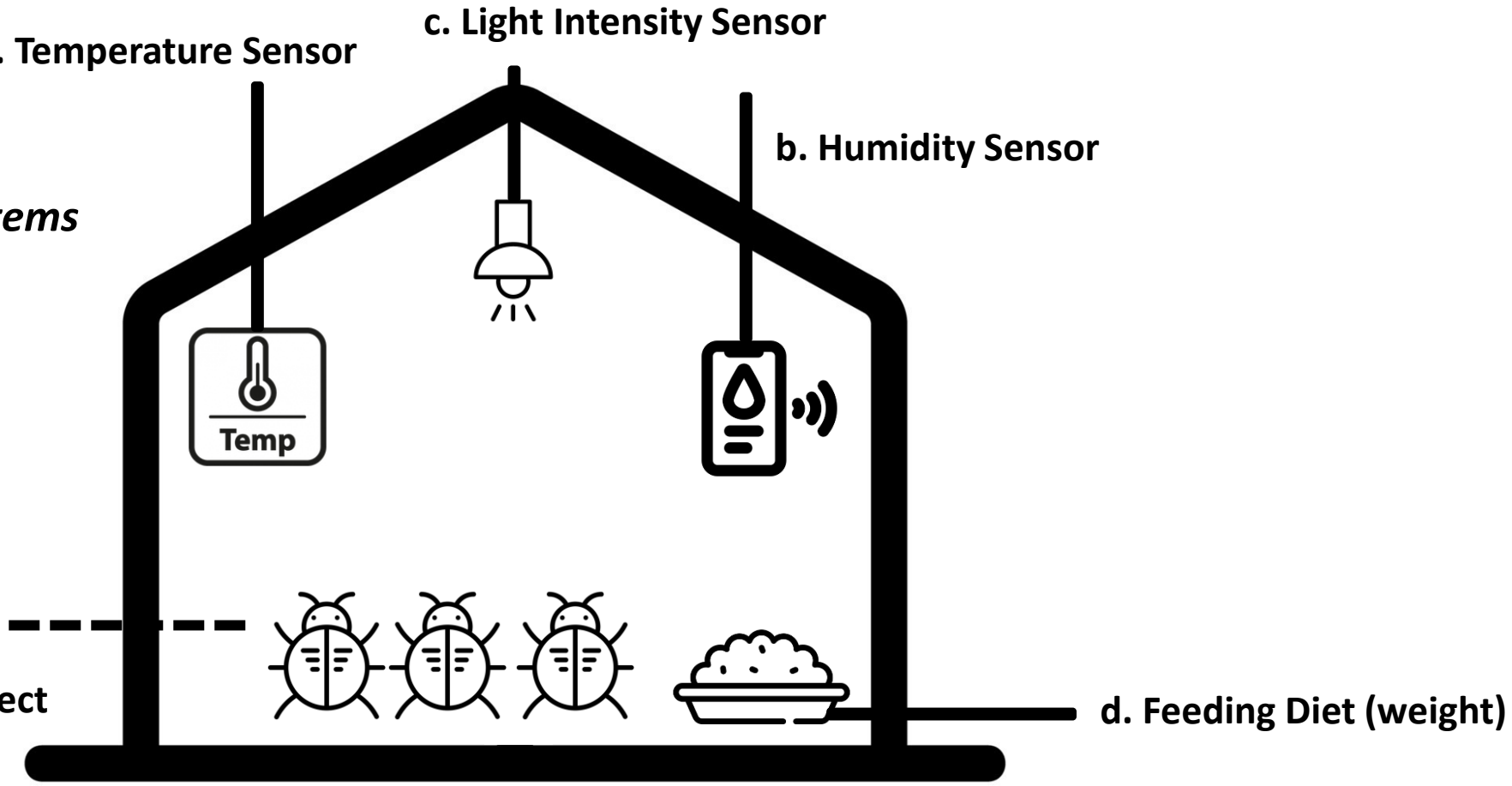
- Escalating global population intensifies the search for high-nutrition food sources, leading to the emergence of edible insects as sustainable options.
- Edible insects, like **sago worms, superworms, and crickets**, offer exceptional nutritional content, addressing food insecurity, especially in regions lacking conventional meats.
- Despite nutritional advantages, cultural acceptance, **food safety concerns**, and **production challenges** hinder widespread adoption.
- Insects' resource efficiency makes them eco-friendly alternatives, aligning with Food and Agriculture Organization (FAO) advocacy.
- In developing countries, edible insects mitigate malnutrition and food security issues.

Targets :

- Comprehensive evaluation of insect-based ingredients (sago worms, superworms, crickets) focusing on **technological aspects** like **insect farming, extraction methods, refining techniques, and potential applications**.
- Examination of insect-based ingredients applications in food technology, emphasizing innovative culinary uses and **health-oriented product development**.
- Identification of technological challenges related to upscaling extraction processes, refining techniques, and optimizing nutritional properties.
- Research emphasis on integration of **Information and Communication Technology (ICT) systems** for efficient large-scale insect-based ingredient production.
- Uncovering the potential of insect-based ingredients for diverse applications, addressing food security challenges, and fostering sustainable technological solutions in the food industry and beyond.

Part 1: Insect-Farming (site monitoring)

IoT-based Monitoring Systems



<u>Responding Variables:</u>

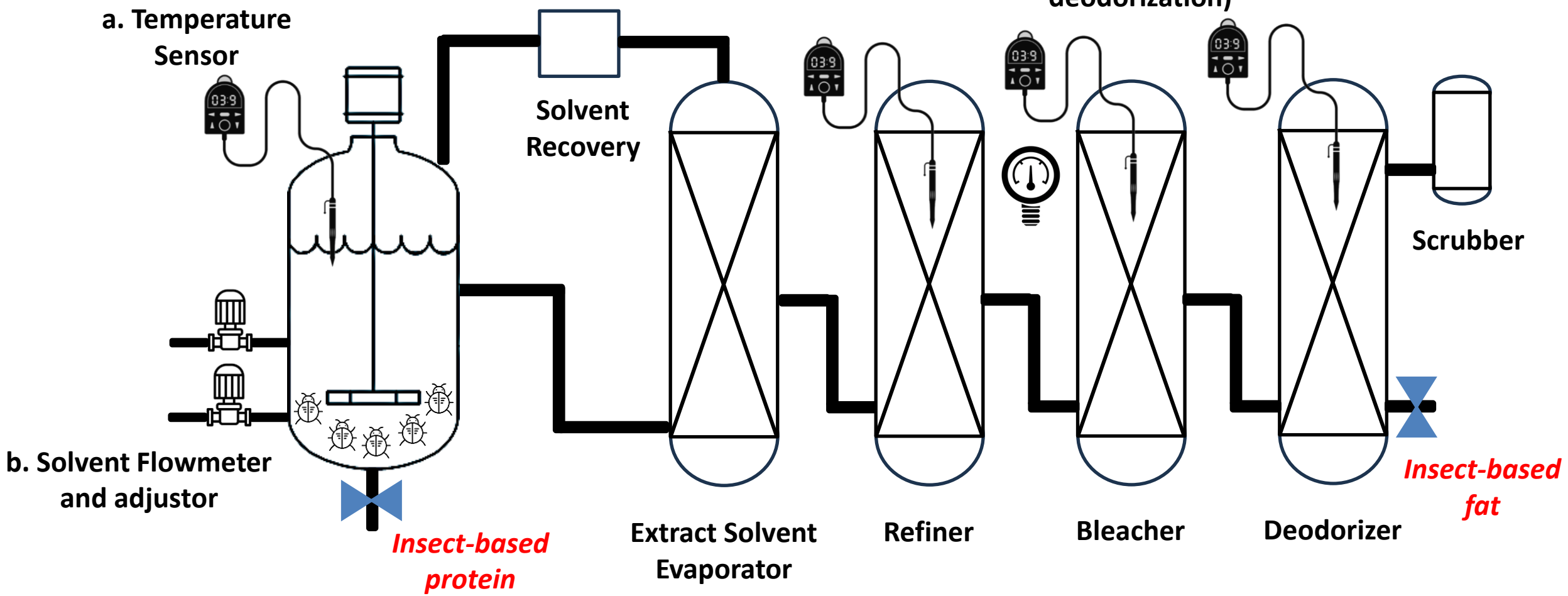
1. **Feed conversion rate**
2. **Insect growth rate**
3. **Nutrition profiles of insect**

Part 1: Insect-Farming (site monitoring)

- IoT sensor technology for optimal insect-based animal protein and oil production
- Installation of sensors (temperature, humidity, light and feeding diet) in the insect farms
- Implement real-time data collection and analysis to track insect growth, behavior, and health parameters

Part 2: Extraction and Refining Monitoring

IoT-based Monitoring Systems



Part 2: Extraction and Refining Monitoring

- IoT sensor technology for optimal insect-based animal protein and oil extraction
- Installation of sensors (temperature, solvent flowmeter and adjustor, pressure) in solvent extractor, refiner, bleacher and deodorizer
- Monitoring quality attributes of insect-based protein (amino acid profiles, functional properties) and insect-based oil (fatty acid profiles, functional properties, phytosterol or stanol content)
- Mitigating risks related to contamination and safety concerns

Impact: (Max. 3 slides)

Impacts :

- *Scientific and Technological Impact*
  - Innovative insect-farming, extraction and purification techniques
  - Real-time monitoring and optimization of these techniques through the integration of ICT
  - Identification of potential food applications using these insect-based ingredients

- *Societal Impact*
  - Addressing food insecurity especially in developing regions or countries
  - Highlighting the nutritional values of these insect-based ingredients, promoting their consumption and aligning well with SDGs

Impact: (Max. 3 slides)

Impacts :

- *Collaborative Impact*
  - Interdisciplinary collaboration among scientists and technologists from diverse fields and food manufacturers as well as farmers

- *Environmental and Economical Impact*
  - Sustainable resources utilization
  - Reduced pressure on conventional resources and reduced environmental footprint
  - Market diversifications and investment opportunities

Conclusion :

- *Target*
  - Integration of IoT systems for efficient large-scale production of insect-based ingredients with promising functional and nutritional profiles

- *Methods*
  - IoT sensor technology for real-time monitoring and optimization in a) insect-farming and b) extraction and refining processes

- *Scientific and Societal Impact*
  - Sustainable food resources
  - Reduced environmental footprint
  - Market diversifications and investment opportunities

Conclusion:

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danke
謝謝
ngiyabonga
teşekkür ederim
Баярлалаа
mersi
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спасибо
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nandri
thank you
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asante
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감사합니다
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