



## ENVIRONMENTAL STUDIES & LIFE SCIENCES

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## Bio-sustainability

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#### Role of Internet of Things (IOT)

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## Bio-sustainability – Internet of Things (IoT)

- Apps with advanced computing ability are capable to run multiple advanced application & have tremendous practices in Biotechnology.
- Mobile phones along with various devices & sensors are commonly used for production management, climate control, molecular diagnosis, education, and data management into a portable, simple to use application.
  - Monitoring of Environmental Factors
  - Large-scale industrial production
  - Crop improvement in Agriculture
  - Monitoring of instruments
  - To control climatic parameters
  - Product quality management
  - Data storage and security
  - Publication of new findings and Patenting
  - Automation of tests in the diagnosis of biohazards

## Bio-sustainability – Internet of Things (IoT)

Sensors, actuators, and devices (“things”) embedded in production equipment and networked through computer systems can generate an enormous amount of data.

The field has evolved due to the convergence of multiple technologies, including ubiquitous computing, commodity sensors, increasingly powerful embedded systems, and machine learning.

Intelligent apps and software are central components of an IoT system. They allow the “things” in the system to communicate with one another and to initiate or execute processes with less operator intervention.

In this new world, machines predict failure and trigger maintenance processes autonomously.

Software automatically adjusts machinery if it detects a measurement has deviated from acceptable changes.

## Bio-sustainability – Internet of Things (IoT)

Four ways biotech and pharma can benefit from the IoT today.

### Digitization of Pneumatic

Recent introduction of the Motion Terminal revolutionizes pneumatic valve functionality.

It does this by combining mechanics, electronics, and software in the form of a cyber-physical system. The Motion Terminal is the first valve to be controlled by apps.

With installed corresponding Motion apps, functions can be changed with a simple command or at the press of a button, whether for a simple change in the directional control valve functions, energy saving mode, proportional characteristics, or a format change.

## Bio-sustainability – Internet of Things (IoT)

### Preventative maintenance

The ability to analyze streaming data to assess conditions, recognize warning signs, and service equipment prior to failures prevents costly equipment downtime.

Strategically scheduling preventative maintenance for when equipment is not in use further reduces downtime.

Technology has played a transformative role in our lives and its impact on human health is never felt more than in the current times of the Covid-19 global pandemic.

In this scenario, development of autonomous health sensing and actuating systems, also referred to as closed loop systems that ‘sense’ and ‘act’ towards a biological condition, can play a critical role in addressing health crises of the future.

## Bio-sustainability – Internet of Things (IoT)

### System Diagnostics

Ability to determine the health of the system can prevent costly downtime.

Data and insights from an IoT-enabled manufacturing system can provide real-time intelligence about the current component and system state.

Failure events can often be pre-empted with the use of data. But if a failure does occur, human reaction time can be much faster because of the real-time data. Production can be stopped more quickly, resulting in less wasted product.

## Bio-sustainability – Internet of Things (IoT)

### Modular automation

The biotech and pharma markets are experiencing increasing demand for short product development times and customized products.

Flexible manufacturing systems can be achieved by dividing a complete plant into functional units — a concept called modularization.

Production modules can be combined to produce specific process plants which can then be extended by adding modules. This concept enables immediate adaptation to changing market and production requirements.

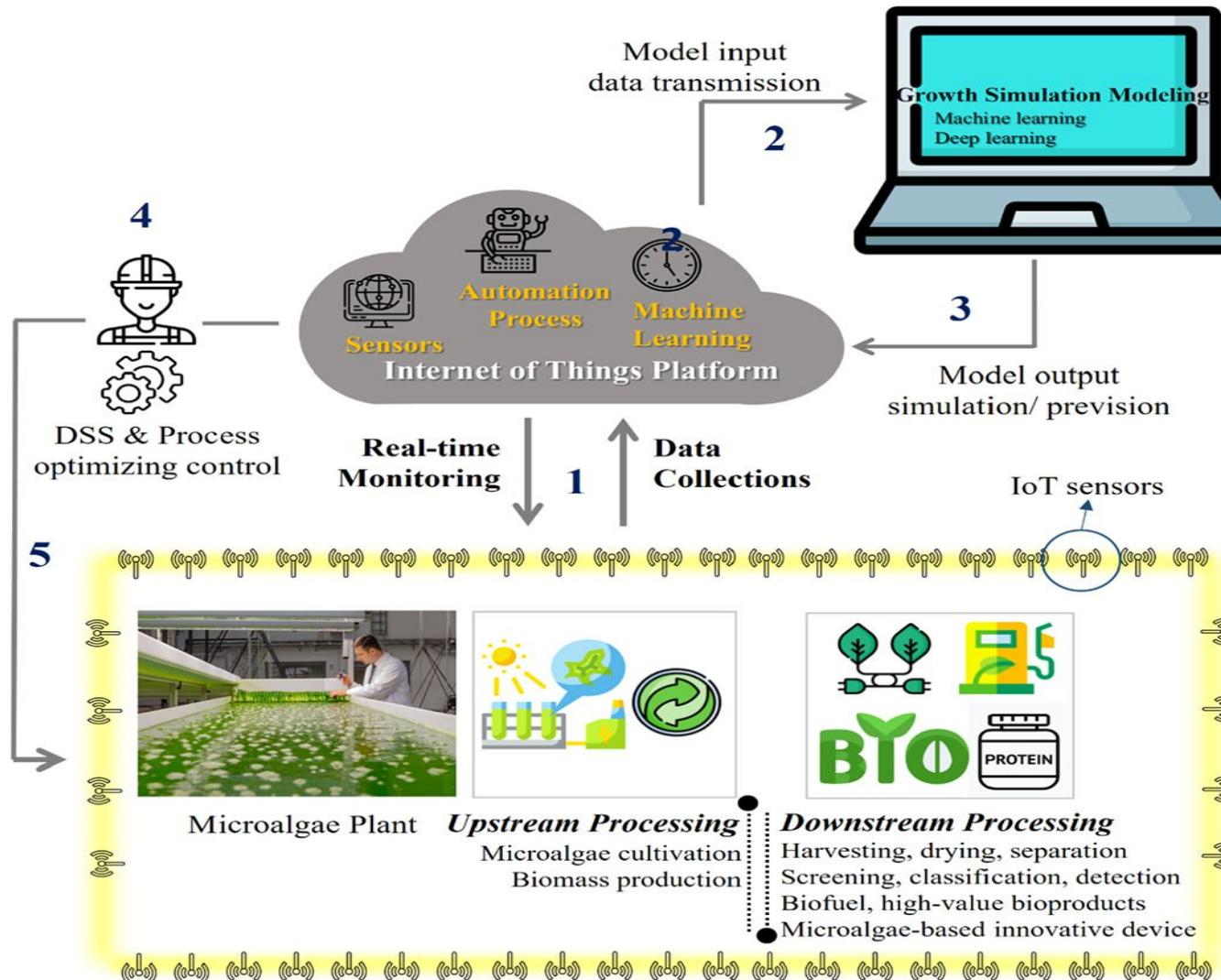
## Bio-sustainability – Internet of Things (IoT)

***Microalgae bio refinery*** is a platform for the conversion of microalgae biomass into a variety of value-added products, such as biofuels, bio-based chemicals, biomaterials, and bioactive substances.

Commercialization and industrialization of microalgae bio refinery heavily rely on the capability and efficiency of large-scale cultivation of microalgae.

Thus, there is an urgent need for novel technologies that can be used to monitor, automatically control, and precisely predict microalgae production.

## Bio-sustainability – Internet of Things (IoT)



## Bio-sustainability – Internet of Things (IoT)

- IoT helps real-time monitoring of microalgae biorefinery process parameters.
- IoT assists in sufficient data collection to make smart prediction and decision.
- IoT promotes automation in microalgae bio refinery.
- IoT guides microalgae bio refinery towards low-cost and high efficiency.



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