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Agri-Stubble Aggregation and Disposal

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ABSTRACT: Agriculture, which is one of the primary activities of production, acts as a supporting service for both secondary and tertiary activities. On harvesting, alongside the specified crop so produced, tons of residue is additionally generated which can be termed as stubble. Usually farmers don't have enough time to make the fields ready for next crop and hence they prefer the cheap and easy way of disposing stubble that is burning the stubble which has lot of negative effect in environment and eco-system. The main objective of our project is to simplify the task of stubble aggregation and disposal. The application provides an effective means of collecting the stubble from the farmers and produce biogas from the stubble (crop waste).

KEYWORDS: Agri-stubble, disposal, crop, farmer, eco-system.

I. INTRODUCTION

The main idea of our project is which serves as a platform for both the agricultural vendors and bio-industries. Our project is developing in such way that it possesses the required features to meet the requirements of comfortable stubble trade, analyzing of stubble availability and its reuse. By use of website, stubble can be easily traded which there by reducing the harmful effects of stubble burning.One of the main problems faced by our surroundings is crop residue burning. Due to wide availability of recent tools and technologies for harvesting; a huge amount of residue is generated within the fields. The common practice to urge the fields free from such residue is stubble burning. Such practices pose a good sort of environmental problems. But at recent times, there are a lot of industries which are making use of this stubble for various purposes like power generation, to make paper and card board, packing materials, worm farming, Poultry litter etc.

II. LITERATURE REVIEW

[1] Keeping in view the increasing problems associated with crop stubble burning in the state of Punjab, several initiatives for its proper management have been taken up. Various departments and institutions of the Punjab government are promoting alternative uses of straw instead of burning. This outlines some of these alternative uses such as: use of rice residue as fodder; use of rice residue in bio-thermal power plants; its use for mushroom cultivation, for bedding material for cattle; its use for production of bio-oil; paper production; bio-gas and in situ. Other uses include incorporation of paddy straw in soil, energy technologies and thermal combustion. The study showed the reasons why stubble was considered as waste and how recent industries are overcoming its disadvantages, processing and reusing it in efficient ways.

[2] Food waste is a major constituent in municipal solid wastes and its accumulation or disposal of in landfills is problematic, causing environmental issues. Herein, a techno-economic study is carried out on the potential of biogas

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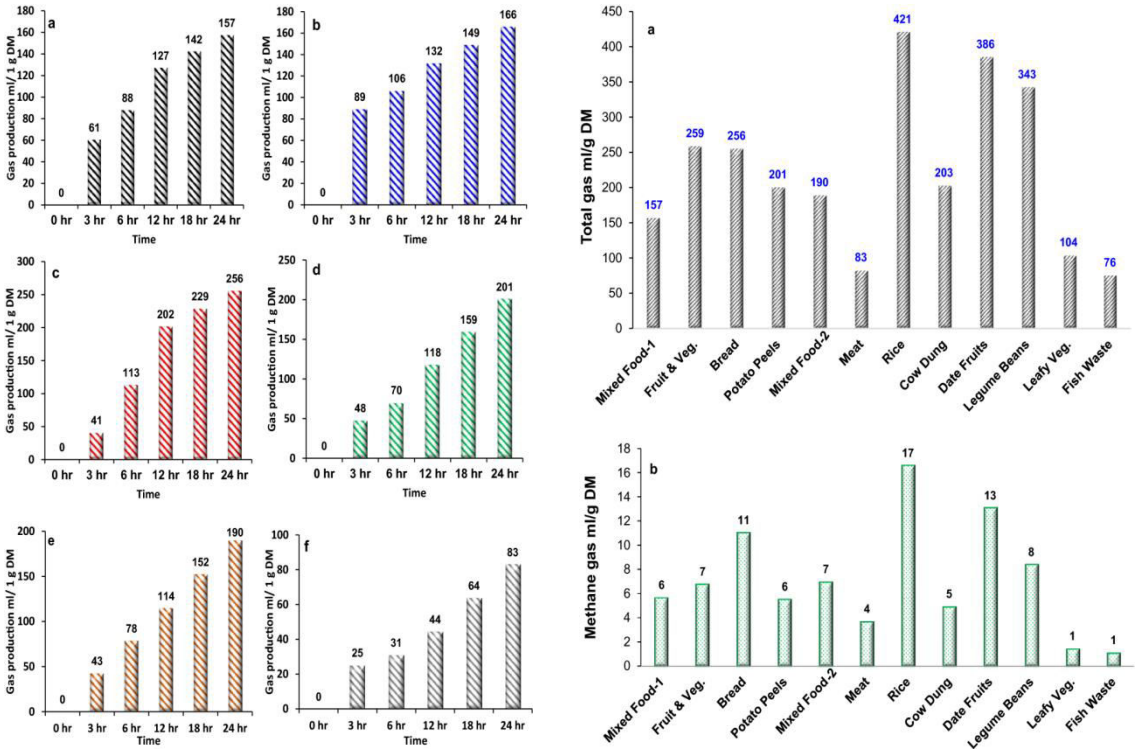
production from different types of food waste generated locally. The biogas production tests were at two-time sets; 24-h and 21-day intervals and results showed a good correlation between those two-time sets. Biogas production (24 h-time intervals): The total gas production from each sample was recorded in 3 h intervals for 24 h as shown in Figs. 1 and 2. The mixed food-1 sample showed a sharp increase in the gas produced during the first 3 h (61 mL/1 g DM), followed by a slight increase after 6 h (88 mL/1 g DM), then a sharp increase after 12 h (127 mL/1 g DM). Then up to 24 h, the increasing rate was almost stable, with total gas production of 157 mL/1 g DM. Similarly, the fruit and vegetable sample showed a sharp increase in the first 3 h up to 89 mL of gas per 1 g of dry matter of the sample.

The gas production profile for (a) mixed food-1, (b) fruit and vegetables, (c) bread, (d) potato peel, (e) mixed food-2 and (f) meat Samples over 24 h periods.



[3] Interest in anaerobic co-digestion (AcoD) has increased significantly in recent decades owing to enhanced biogas productivity due to the utilization of different organic wastes, such as food waste and sewage sludge. In this study, a robust AcoD model for biogas prediction is developed using deep learning (DL). Model approaches of biogas production show different levels of detail. They can be classified as white, gray, and black box or bottom-up and top-down approaches. On the one hand, biogas modelling can supply dynamic information on the anaerobic digestion process, e.g., to predict biogas yields or to optimize the anaerobic digestion process. Artificial neural networks, Fuzzy-logic, linear and non-linear regression models, as well as computational fluid dynamics modelling approaches of a digester.

[4] The dynamics of microbial communities involved in anaerobic digestion of mixed organic waste are notoriously complex and difficult to model, yet successful operation of anaerobic digestion is critical to the goals of diverting high-moisture organic waste from landfills. Machine learning (ML) is ideally suited to capturing complex andnonlinear behavior that cannot be modeled mechanistically. Machine learning (ML) is ideally suited to capturing complex and nonlinear behaviour that cannot be modelled mechanistically. This study uses 8 years of data collected from an industrial-scale anaerobic digestion (AcoD) operation at a municipal wastewater treatment plant in Oakland, California, combined with a powerful automated ML method, Tree-based Pipeline Optimization Tool, to develop an improved understanding of how different waste inputs and operating conditions impact biogas yield.

[5] The processes of anaerobic digestion and co-digestion are complicated and the development of computational models that are capable of simulation and prediction of anaerobic digester performances can assist in the

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operation of the anaerobic digestion processes and the optimization for methane production. The artificial neural network approach is considered to be an appropriate and uncomplicated modelling approach for anaerobic digestion applications. The study developed neural network models to predict the outcomes of anaerobic co-digestion of leachate with pineapple peel using experimental data. The multi-layered feed forward neural network model proposed was capable of predicting the outcomes of biogas production from the anaerobic co-digestion processes.

[6] A study estimates that crop residue burning released 149.24 million tonnes of carbon dioxide (CO2), over 9 million tonnes of carbon monoxide (CO), 0.25 million tonnes of oxides of sulphur (SOX), 1.28 million tonnes of particulate matter and 0.07 million tonnes of black carbon. These directly contribute to environmental pollution, and are also responsible for the haze in Delhi and melting of Himalayan glaciers. The heat from burning paddy straw penetrates 1 centimetre into the soil, elevating the temperature to 33.8 to 42.2 degree Celsius. This kills the bacterial and fungal populations critical for a fertile soil.

III. EXISTING SYSTEM

Review deals with different modeling approaches of biogas production within renewable energy systems. As the review considers varying research disciplines and their respective views on biogas production with different system boundaries, the literature regarded is categorized using holistic energy system modeling, modeling of regional substrate potential, modeling of greenhouse gas (GHG) emission, and detailed dynamic process models. Dynamic Biogas Process Modeling The performance of biogas plants as a result of AD, the possibility of controlling a full-scale biogas plant, the impact of fluctuating energy markets, and the behavior of energy production are modeled within different research fields, mostly on a scientific or technological level.

In the existing system, it is found that there are many systems which make use of several remote sensing, neural network and image processing techniques to detect the areas where stubble burning took place and also efficiently calculated its impact on composition of air. The main disadvantage of these systems is they did not provide efficient means to dispose the stubble, which left the problem of stubble burning unsolved. Conventional implemented methods at the biogas plants are not adequate for monitoring the operational parameters and finding the correlation between them.

Problem Identification

- Burning the stubble which has lot of negative effect in environment and eco-system. Due to burning of the large stubble for crop reside, loss of soil microbes.
- Absence of support (farmer's unwillingness).
- On other hand, the machines used to stubble reduction are too costly and the state governments should come forward and provide better subsidy so that farmer can afford these machines.
- Lack of awareness about the technology, its associated benefits as well as incentives provided by the government has also been identified as one of the reasons for low usage of biogas as their primary fuel.

Problem Definition

Management of agricultural waste can be possible by applying the following functions: Production, collection, storage, treatment, transfer and utilization of crop stubble.

- Education and awareness.
- We manage the agriculture waste by generating biogas and manure.
- A well-run biogas digester fed with crop residues could generate about 200-400m3 of biogas per day on an average.
- Recently, studies that can overcome the limitations of AD by combining the anaerobic decomposition, monitoring and controlling the state variables of the anaerobic process using various sensors and artificial intelligence are being conducted by many researchers.
- This Special Issue targets, but is not limited to, interesting recently advanced topics related to anaerobic processes, such as the following:
- Microbiology of AD
- Sensors of anaerobic processes
- Real time monitoring of anaerobic processes
- Intelligence control of anaerobic processes
- Biogas upgrading (methane, hydrogen)
- Digestate polishing and N, C recovery

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IV. PROPOSED SYSTEM

Proposed System and Description

The proposed system is a user-friendly web application that facilitates the trade of the stubble in efficient way, easily track stubble transportation and its disposal.The technology used to produce biogas is quite cheap. It is easy to set up and needs little investment when used on a small scale. Small bio digesters can be used right at home, utilizing kitchen waste.Biogas can also be compressed to achieve the quality of natural gas and utilized to power automobiles. Building such plants requires relatively low capital investment and creates green jobs. For instance, in India, 10 million jobs were created, mostly in rural areas, in plants and in organic waste collection.Optimization of biogas plants requires accurate estimates of substrate tools for estimating CH4 potential using AI.

Integration of Artificial Intelligence into Biogas Plant Operation

From supply of the raw material to the arrival of the products to customers, there are serial processes which should be sufficiently monitored for optimizing the efficiency of the whole process. In particular, the anaerobic digestion process, which consists of sequential complex biological reactions, requires improved monitoring to prevent inhibition. As Artificial Intelligence has been integrated in different areas of life, the integration of it into the biogas production process will be inevitable for the future of the biogas plant operation. Online monitoring is inevitable for future oriented biogas plants, but the parameters should be determined carefully. In the studies performed, it was found that pH is not an early instability detection parameter, relying on organic loads due to its instability.In addition to the pH measurements, alkalinity measurements, which are essential for early detection? The artificial intelligence (AI) is emerging nowadays, making human life easier. As the area of renewable energy is growing significantly for the sustainable development, the deployment of AI can help greatly to achieve its goals. Anaerobic digestion is a non-linear biological process where biomass is digested to generate biogas and slurry in the absence of oxygen. AI models have been developed for the prediction of yield and energy content of the produced biogas. This chapter presents a comprehensive review of AI techniques for the modelling of the biogas production process.

The integration of appropriate AI technique in biogas used for optimum biogas production round the year is:PI (Proportional Integral)/PID (Proportional Integral Derivative) is a simple, robust and fine control strategy that does not require a model. The demerits of this strategy are its applicability with only linear systems and the strategy can be implemented for single input/ output systems.On-off is a simple control strategy and suitable for valve and pump control. Nevertheless, it cannot supply fine control and it does not have direct effect process stability.Adaptive control can be used for controlling non-linear/dynamic.Fuzzy logic can be implemented in multiple input/output and nonlinear systems, but highly relies on the expertise of the operator.

Solutions to the burning problem

Farmers can also manage crop residues effectively by employing agricultural machines like:

- Happy Seeder(used for sowing of crop in standing stubble)
- Rotavator (used for land preparation and incorporation of crop stubble in the soil)
- Zero till seed drill (used for land preparations directly sowing of seeds in the previous crop stubble)
- Baler (used for collection of straw and making bales of the paddy stubble)
- Paddy Straw Chopper (cutting of paddy stubble for easily mixing with the soil)
- Reaper Binder (used for harvesting paddy stubble and making into bundles)

[7] India mainly based on rice, wheat cropping system. In compare of wheat paddy straw is a major field-based residue that is produced in large amounts in India. This waste of energy seems irrelevant, given the high fuel prices and the great demand for reducing greenhouse gas emissions as well as air pollution. As climate change is extensively recognized as a threat to development, there is a growing interest in alternative uses of field-based residues for energy applications.

Alternate Uses of Agriculture waste:

Agricultural waste includes paddy and wheat straw, cotton sticks, bagasse and animal waste. Keeping in view the increasing problems associated with crop stubble burning several initiatives for its proper management have been taken up.

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V. MODULE DESCRIPTION

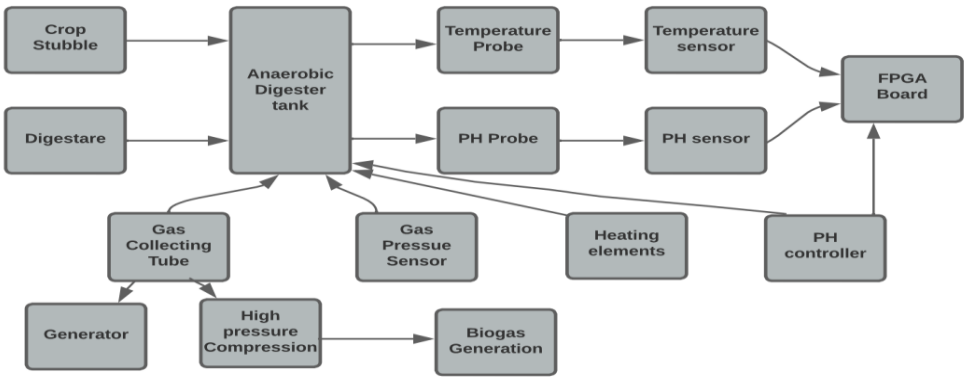
Stubble supplier module

1. Registration and login module (before seeding only farmers should register the what type of crop he is going to farm, after 3-4 months respective crop stubble get collected from various farmers. Based on rate of registration of similar type of crop we predict the biogas production.)
2. Request/helpdesk module for farmers (there is an interaction with farmers by our consultants to know the details of their registered crop on our website and going to check the quality of stubble in a sequence manner to know the future rate of stubble collection.)
3. Order module (if stubble ready after harvest done then farmers sell the stubble through our website at respective costs given to them based on crop type.)
4. Payment and shipment module(the admin pay to the farmers after getting the quality stubble from farmers and stubble is shipped to our custody)

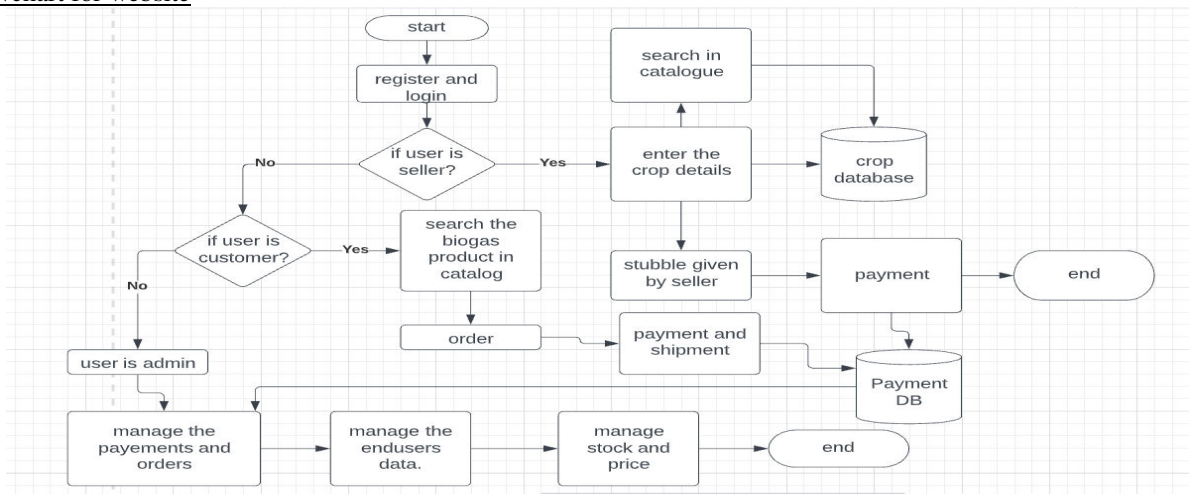
Biogas Buyer Module

1. Registration page (respective bio industries register into our website and grab their raw material.)
2. Order page (to order the biogas product)
3. Payment and shipment page.

Architecture of biogas plant



Flowchart for website



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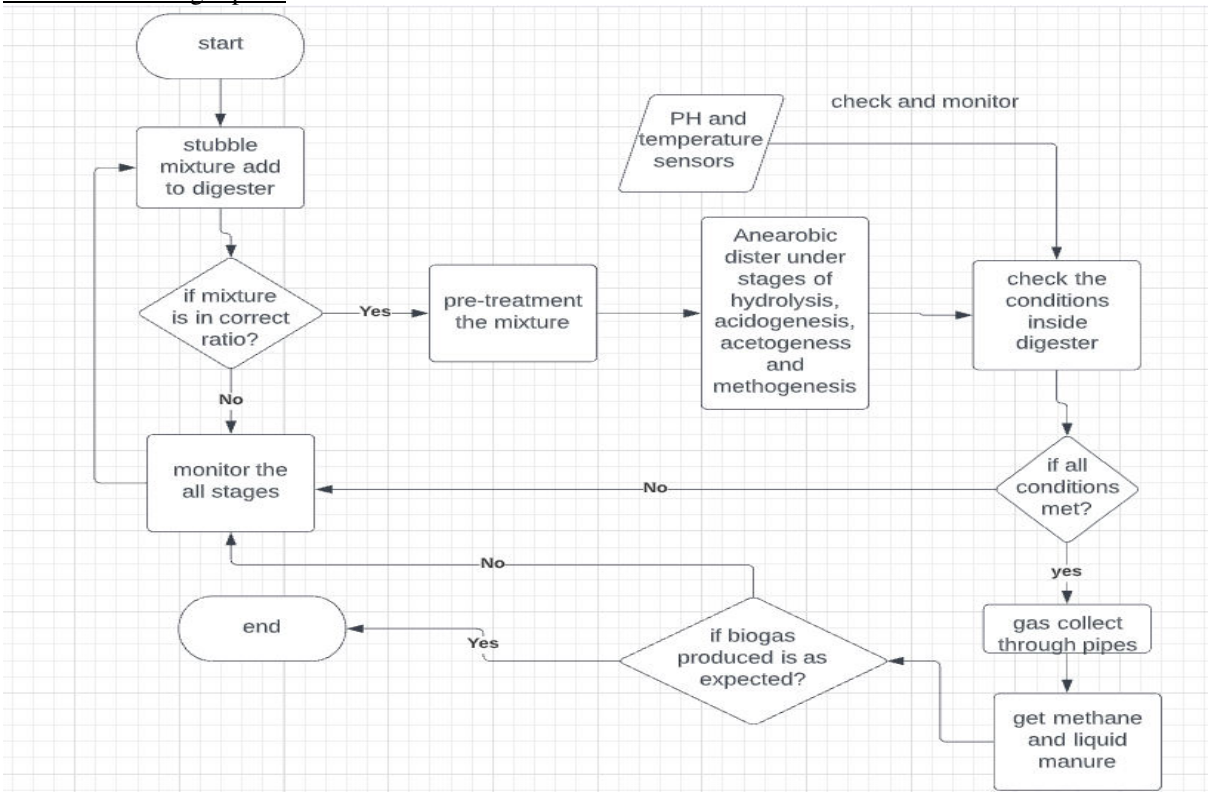
Flowchart for biogas plant



VI. IMPLEMENTAION

Implementation is the stage where theoretical design turned into a working system. Implementation is planned carefully to propose system to avoid unanticipated problems. Many preparations are involved before and during the implementation of proposed system. The system needed a device which is either a mobile phone or laptop or desktop with internet connectivity and a well-developed user interface to give or receive inputs and outputs to the web application respectively. The stubble suppliers and biogas buyers are end users and they will use our application to get their requirements. It also provides the end-users order products based on the date andtime.

Implementation procedure & Steps

Prepare Infrastructure

Many solutions are implemented into a production environment that is separate and distinct from where the solution was developed and tested. It is important that the characteristics of the production environment be accounted for. This strategy includes a review of hardware, software etc. In our example above, the prototype consists of both software and hardwaredevices.

Designing the web Application

In designing the web application and make it perfect to work we are ready with our research and development team who will always checks whether the web application is running perfectly and correctly and if any unusual activities are performing by the application then they will immediately reacts and solve the problem.

Using the web Application

On get into the web application respective user has to register and login into the website using the username and password. Every user has to know about their credentials and next select the products they require. And then order the products.

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Coordinate with the Team involved in Implementation

This may be as simple as visualizing the database of business data to the clients. These team members might actually have a role in getting the solution successfully employed by coordinating each other in every aspect of implementation.

VII. CONCLUSION & FUTURE ENHANCEMENT

In this paper, the proposed work is buying and selling stubble and biogas through our application. Our application maintains the user's data and their orders. The application can be accessed from anywhere. With the system we proposed, we are trying to extend this to the maximum. The scope of the project can further be improved by in many ways. We can add the other useful products that comes from crop stubble, biogas like manure, related products etc. a system which serves as a platform for both the agricultural vendors and bio-industries people has been successfully designed and developed . It is developed in such way that it possesses the required features to meet the requirements of comfortable stubble trade, analyzing of stubble availability and its reuse. By use of this website, stubble can be easily traded which thereby reducing the harmful effects of stubble burning.

FutureEnhancement: In future we would like to improve the website to be more user-friendly provided with extended features product suggestions based on locations. A mobile application based on the idea proposed will also be developed. With the system we proposed, we are trying to extend this to the maximum. The scope of the project can further be improved by in many ways. Also develop biogas plants in many locations.

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