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Extracting Energy From Biomass

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ABSTRACT: Extracting energy from biomass is an important alternative to produce different types of energy (heat, electricity, or both) assuring low pollution and better efficiency. The aim of this work is to develop an electronic system using ESP8266 platform connected to a gas sensor, to measure and display the curve of daily methane production on processing. The sensor will send the gas values in ppm to the ESP8266 board so that the later sends the RS232 hardware protocol. The code developed with processing will transform the values into a curve and display it on the computer screen. There are 2 main objectives of this study being carried out; firstly to determine whether food wastes (canteen and cafeterias wastes) can produce methane gas (biogas) that can generate heat and electricity and secondly to establish how much methane gas (biogas) can be produced with the certain amount of the feedstock. It should be pointed out that this MBPP can generate 600kW electricity per day as this system can generate electricity about 25kW/h. The methane produced per day is approximately 180 cubic meters. The higher the wastes, the higher the amountof methane gas produced. The cow dung is used to increase the bacteria in the tank; the methane gas production will be higher if the bacteria breed.

KEYWORDS: Biogass, Anaerobic digestion,MQ-2,esp8266

INTRODUCTION:

Global warming is now an international issue, and reducing greenhouse gas (GHG) emission became the number one occupation of the industrial countries since pollution is mainly related to energy consumption .The electricity sector can be helpful in reducing anthropogenic GHG emissions since 40% of global GHG emissions are related to electricity production using fossil-fuel based materials. Hence, clean energy resources, mostly solar, Biogas typically refers to a gas produced by the breakdown of organic matter in the absence of oxygen. It is a renewable energy source, like solar and wind energy. Furthermore, biogas can be produced from regionally available raw materials and recycled waste and is environmentally friendly and CO2 neutral. Biogas is produced by the anaerobic digestion or fermentation of bio degradable materials such as manure, sewage, municipal waste, green waste, plant material, and crops Biogas comprises primarily methane (CH4) and carbon dioxide (CO2) and may have small amounts of hydrogen sulphide (H2S), moisture and siloxanes. The gases methane, hydrogen, and carbon monoxide (CO) can be combusted or oxidized with oxygenwind, hydro and biomass are proposed as promising alternatives for electricity production. The performance of anaerobic digesters is characterized by the methane production rate, which is a product of biogas flow rate (BFR) and methane composition. The methane content also influences the energy content of biogas. Various operating conditions like feed rate, hydraulic and solids retention time, temperature,alkalinity, pH, and feed quality can affect methane production rate . Changes in these conditions may adversely affect the process, and corrective actions need to be taken to assist in process recovery. For example, a feed overload can cause pH to drop, increasing production of carbon dioxide, thereby lowering the methane content of biogas.Toxins in feed can inhibit microbial populations and lower biogas and methane production rate. On-line process control and optimization techniques to reject disturbances, usually monitor methane production rate (or methane composition) as a measured variable. Therefore, it is essential to monitor in real-time, on-line digester methane concentration and BFR. Producing energy from waste seems like a good idea to reduce green gas emission ,create energy, and use the residue called digestate rich in nutrients as a fertilizer for the soil, which made us keen on developing new ways of upgrading biogas production systems and developing new approaches to help us to monitor their production as well .The integrated management of production by an automatic monitoring system provides important supervision and planning functions that ensure continuous and efficient operation of the plant. display at any moment on the screen of a computer a curve showing the production of biogas (CH4) as a time function. The program automatically warns the instructor of the methane production evolution by setting an alarm in case of an increas or deficit in produced quantity Open-source Esp8266 Uno microcontrollers and associated sensors, it is possible to develop inexpensive devices and controllers for various applications.

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LITERATURE SURVEY:

Tittle: Food Waste to Energy: an Over View of Sustainable Approaches for Food Waste Management and Nutrient Recycling

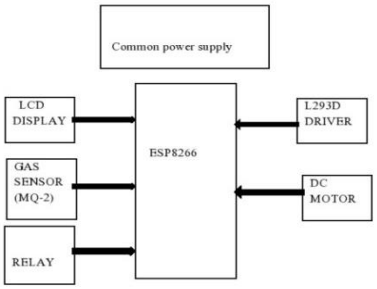
Year: 2017

Author: Paritosh, Kunwar, Sandeep K. Kushwaha, Monika Yadav, Nidhi Pareek, Aakash Chawade, and Vivekanand Vivekanand

Food wastage and its accumulation are becoming a critical problem around the globe due to continuous increase of the world population. The exponential growth in food waste is imposing serious threats to our society like environmental pollution, health risk, and scarcity of dumping land. There is an urgent need to take appropriate measures to reduce food waste burden by adopting standard management practices. Currently, various kinds of approaches are investigated in waste food processing and management for societal benefits and applications.

Anaerobic digestion approach has appeared as one of the most ecofriendly and promising solutions for food wastes management, energy, and nutrient production, which can contribute to world's ever-increasing energy requirements. Here, we have briefly described and explored the different aspects of anaerobic biodegrading approaches for food waste, effects of cosubstrates, effect of environmental factors, contribution of microbial population, and available computational resources for food waste management researches.

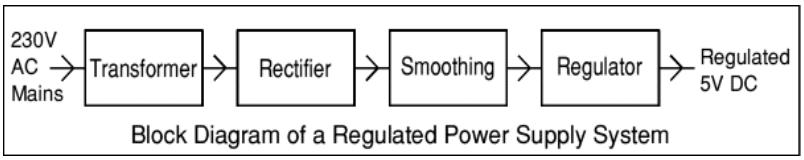
BLOCK DIAGRAM



HARDWARE DESCRIPTION

POWER SUPPLY:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

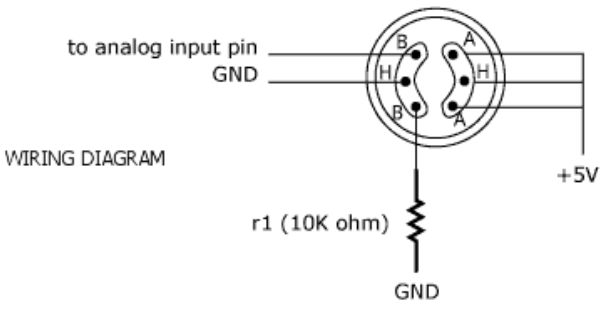


Block Diagram of a Regulated Power Supply System

GAS SENSOR (MQ2):

MQ2 gas sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide. MQ2 gas sensor is also known as chemiresistor. It contains a sensing material whose resistance changes when it comes in contact with the gas

PIN DIAGRAM:



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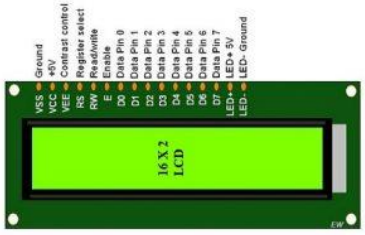
LIQUID CRYSTAL DISPLAY (LCD):

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.

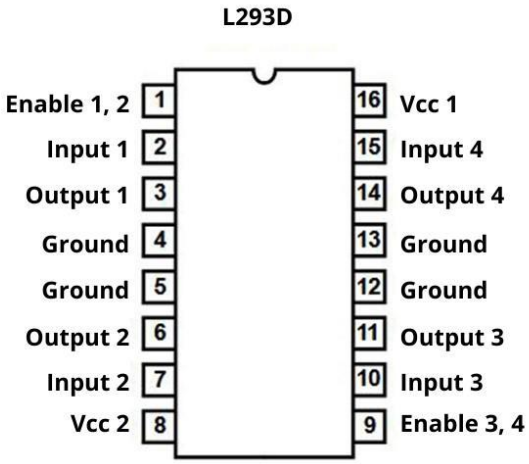
PIN DIAGRAM:



L293D DRIVER:

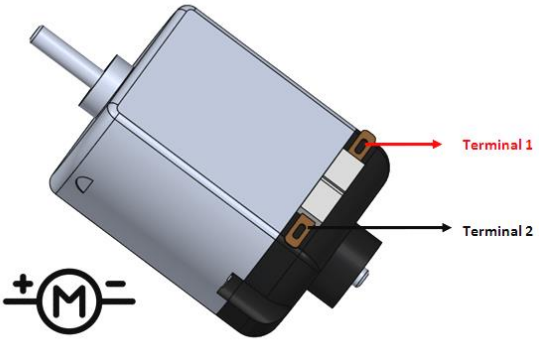
The L293D IC receives signals from the microprocessor and transmits the relative signal to the motors. It has two voltage pins, one of which is used to draw current for the working of the L293D and the other is used to apply voltage to the motors

PIN DIAGRAM:



DC MOTOR:

The DC motor is the motor which converts the direct current into the mechanical work. It works on the principle of Lorentz Law, which states that "the current carrying conductor placed in a magnetic and electric field experience a force". And that force is the Lorentz force



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ESP8266:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all WiFi networking functions from another application processor

RELAY:

Relays are electrically operated switches. They are used to control a circuit by a separate low-power signal or to control several circuits with one signal. Relays were first used in long distance telegraph circuits as amplifiers.

SOFTWARE DESCRIPTION

ARDUINO IDE:

Arduino IDE(Integrated Development Environment) is the software for Arduino. It is a text editor like a notepad with different features.It is used for writing code, compiling the code to check if any errors are there and uploading the code to the Arduino.It is a cross-platform software which is available for every Operating System like Windows, Linux, macOS.It supports C/C++ languageIt is open-source software, where the user can use the software as they want it to.

PROTEUS DESIGN SUITE:

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards

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CONCLUSION

Biomass-based power systems are unique among non-hydro renewable power sources because of their wide range of applicability to a diverse set of needs. Biomass systems can beused for village-power applications in the 10-250 kW scale, for larger scale municipal electricity and heating applications, for industrial application such as hog-fuel boilers and black- liquor recovery boilers, in agricultural applications such as electricity and steam generation in the sugar cane industry, and for utility-scale electricity generation in the 100 MW scale

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