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A NOVEL APPROACH FOR GENERATION OF POWER FROM SEWAGE WATER TREATMENT AND POLLUTIONCONTROL USING EMBEDDED SYSTEM TECHNOLOGY

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ABSTRACT

Reduction of man –power is due to the implementation of automated machine. Almost all the machines, used nowadays in various fields like Industrial production, packing etc. are electric power dependent. Even house holding machines like fridges, washing machines, dishwasher, microwave ovens etc., depends on electricity. Mostly all the electrical and electronical equipments are current dependent.Inorder to meet both hands to get rid of this electricity demand,power generation should be incremented/increased.There are many resources used in building power plants for power generation. Among those all, hydropower generation (HPG) has its own role. It uses turbines mainly. In this paper, we present a novel approach of generating electricity with the help of two forms of turbines, water and steam. In order to run the steam turbine, filtered water is boiled, for that, wastes are burned. Non bio-degradable wastes are mostly burned here.Hazardous gases liberated during this burning process pollutes air. In order to avoid such risks, Air Purification process is undertaken. Not only the electricity demand, but also pollution control is a major and serious issue too. As water is more equally important than food for most species, water pollution should be controlled in serious. And it is a global issue too. Burning of screened wastes to produce heat energy for boiling the water, may produce harmful gases. This gas leakage is measured by a sensor, so that, the surrounding air may not polluted more. Hence if the solution for both the problem is found in a single setup, the consequence will be even more effective. The objective of this paper is to controlling the water pollution combined with power generation.

KEYWORDS:Boiler, DC Generator, Filter, Impulse Turbine, LCD Display, PIC Microcontroller, Steam Turbine.

I. INTRODUCTION

Human resources though seem to use and dwell on lands than in water resources, like sea, ocean etc., it majorly depends on water bodies both directly and indirectly. Not only coastal areas, but also people dwelling in Deccan plateaus also depend on water at least indirectly.Rain,what we consider as a main source of fresh water depends upon the earthly water bodies, which can be proved by evaporation process.So,polluting such water bodies

affects not only human lives but also other organisms, mainly aquatic species. Though sea water is not suitable for drinking purpose, it places a vital role as a source of rain in back-screen. But disposal of highly toxic wastes like nuclear wastes directly in sea water not only affects the sea-living organisms, but also leads to harmful effects like acid-rain etc., Even if the mighty-ocean gets such an adverse effect, then probably, the effects on blandly water bodies will be more adverse. At the same time, the extinction of species will also be more adverse. This cause a deadly effect in the food chain, extending the extinct species rate. According to surveys taken, already many species are in the verge of extinction. Not only animals like woolly mammoth but also bad species like Do-Do etc., are already any more.

The wastes in sewage water are screened and there by it are filtered. It is then made to flow over the turbine, and then converted to steam and so the second turbine is rotated. Thus the process holds multibenefits viz., pollution control, water recycling, power generation etc.

Both water recycling process and hydro power generation process exists separately. But when on joining both the processes with a single whole setup will be highly effective. In places where wastages are burnt, the heat energy liberated when on burning is wasted. Also, the toxic gas emitted when on burning such wastes are not considered to most. This makes the pollutants of water to pollute the air we breathe.

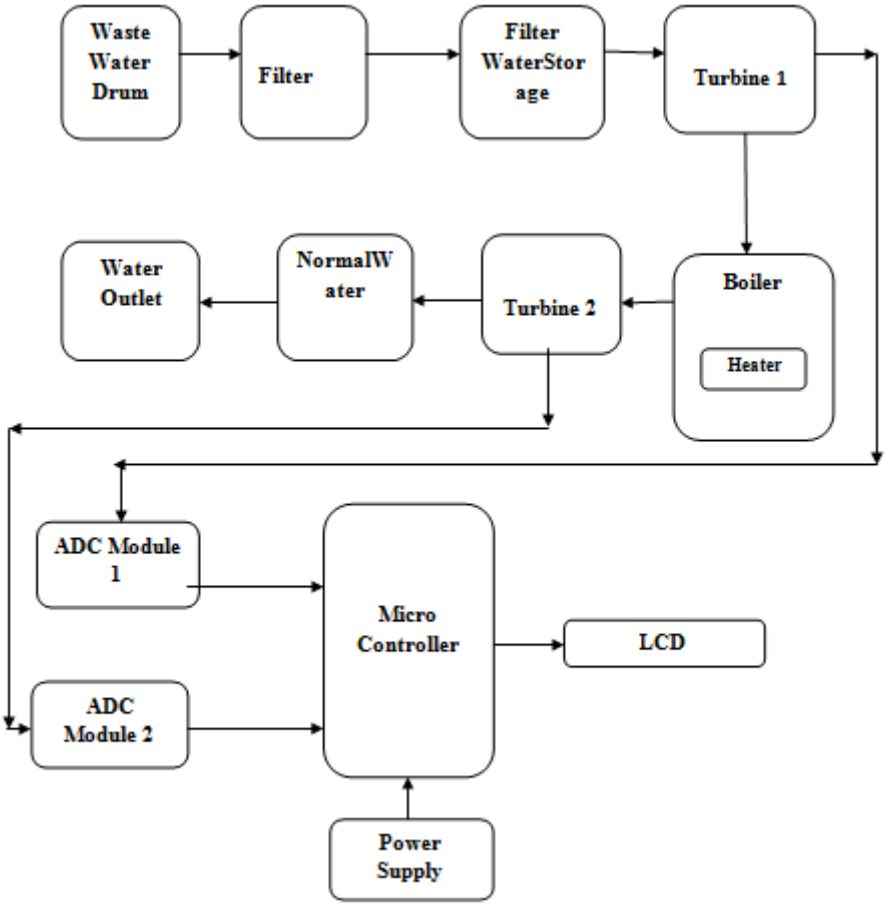
These problems are overcome by using the heat energy liberated when on burning the wastes, to boil the water to convert it to steam, by which the steam turbine wings can be rotated to produce power. Also, to check the liberation of gases directly into the atmosphere and to measure how toxic the gas is, a sensor is used. So that the polluted water is recycled, the wastes are degraded as well as the air pollution due to burning of solid wastes is also considered.

Solid wastes can either be the dried wastes screened in the initial process or the wastes collected from the environment. Such wastes are of two major types, categorized upon their decay ability via. Bio-degradable and Non-biodegradable wastes. As the name suggests, the wastes that can be decayed by the land are Bio-degradable and that cannot be decayed forever comes under the latter.

Non bio-degradable wastes are mostly used in our project so that direct disposal of such harmful wastes in lands is avoided. Hence Land pollution control is also under consideration at the same time; amount of wastes disposed in land is also reduced.

II. MATERIALS AND MATERIALS

The main blocks and modules involved in this process are given below.The three main modules involved of the process are Water turbine module, Steam turbine module and power production module



"Fig.1".Functional block diagram

In microbial process, supernatant or primary effluents which contain high levels of dissolved; organic load causing (Biological oxygen demand) is to be removed. Aeration is done to stimulate aerobic degradation is done using activated sludge reactor, so that carbon is converted to CO_2.Aeration is dissolving oxygen into the water to remove the smell and taste.

Tertiary treatment is a physiochemical process. It is an expensive process, but it sharply reduces inorganic nutrients. This treatment includes precipitation, chlorination etc. This process is so effective, such that it can be recycled into drinking water. Even pathogens can be removed by using activated sludge. Moreover, viruses are removed mainly by adsorption process.

The waste water after various stages like screening, aeration, pH correction, sedimentation, filtration etc., reaches the filtered water storage drum. The water here is ready to flow over the turbine through the nozzle. As narrower the nozzle head is, as much pressure the water gains, so that a forceful water flow is obtained. The force of the water coming out the nozzle is proportional to the speed of rotation of the water turbine.

A turbine is a rotary mechanical device that extracts energy from a fast moving flow of water, steam, gas, air or other fluid and converts it into useful work. It is a turbo-machine with at least one moving part called a ROTOR ASSEMBLY, which is a shaft or drum with blades attached. Among many types of turbines, impulse turbine is used. Here in this, the potential energy, or the head of water is first converted into kinetic energy by discharging

water through a carefully shaped nozzle. As the turbine rotates faster, the rod connected to the rotor, then to the generator. Eventually, the electricity is generated as much the generator can do.

2.1. Water Turbine Module

Water turbine is the first source of power in the setup. There are two outcomes from the turbines, wiz., previously filtered water and electricity due to its rotation. The water is given to the boiler and the current to the DC module.The boiler here boils the water and evaporation takes place, where the water is converted into steam. Here furnace can be used for heating purpose.but,burning the solid wastes which were initially screened, after drying it will be more effective, such that the water are reduced with no dilemma of how to dispose them into the outlands with public waste disposals. A sensor is placed, so that any leakage of toxic and other gases can be checked. This avoids the air from the risk of getting toxic.

2.2. Steam Turbine Module

The steam from the boiler is pressured out to reach the wings of the steam turbine. As the steam falls on it, the turbine rotates, and so the rotor rotates, finally the generator generates power. Thus the steam turbine acts as a second source of power.The steam on travelling out of the turbine portion undergoes condensation process, where it gets converted into water. It is a normal form of water in which no chemicals are added intention. The water can be used from the water outlet.This water from the water outlet can be used for various purposes like vehicle cleaning, irrigation etc.

2.3. Power Production Module

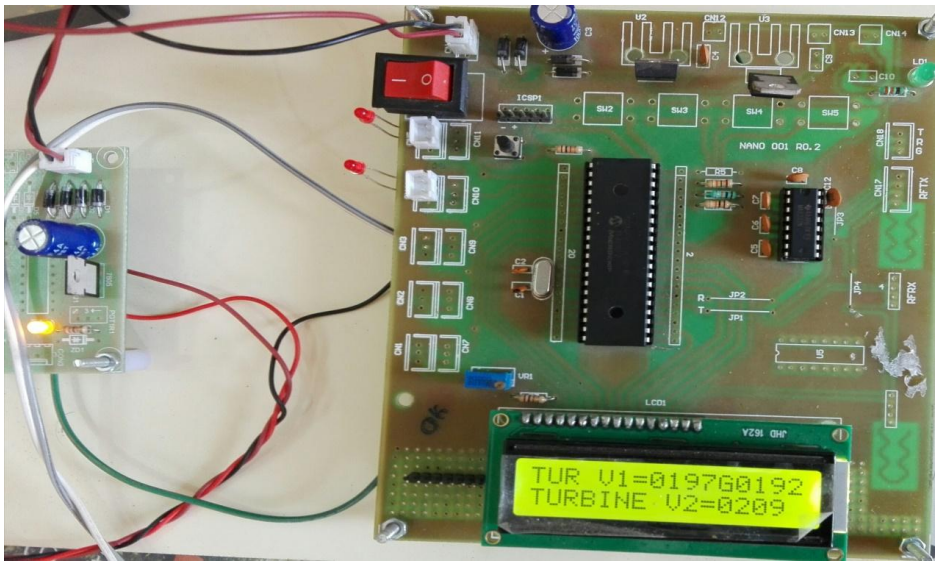
The electric current from both the generators connected to the turbines are of Analog form. In order to get the current measured in more acute and digitized form, the Analog current converted into the digital one probably, ADC module is included in the next stage.The output of ADC module is given to the PIC16F877A microcontroller. It is a peripheral Interface Controller. The major advantages of this PIC are high operation speed (0.2µsec/cycle), Low power consumption, easier I/O interface and a threshold of 2 volts. It is a 40 pin IC, consuming current of 20mA.It is a 16 series, 8 bit microcontroller.

The output of microcontroller is given to LCD, in which the value of the voltage is seen displayed digitally. LCD (Liquid Crystal Display) is a flat panel display or an electronic visual display that uses the light modulating properties of liquid crystals. To be noted, Liquid crystals do not emit light directly. LCDs are also available to display arbitrary images or fixed images with low information content.

III. RESULTS AND DISCUSSION

The water with sewage is contaminated in natural water resources. The main cause of water contamination is discontinuous or total misuse of water. The treating water resources without any awareness of water pollution and its effect like how it affects living organisms, results in major problems, which may also cause global issues, if it persists. So the water resources like ponds, rivers, streams, and lakeside. Should be used and maintained perfectly. The affected water resource should not to be polluted anymore.

However, this only prevents further pollution in such water bodies. So in order to find a solution for the problem that had already happened, the only way is to recycle the polluted water. Water recycling is the most efficient way to get the problem solved. Although recycling of water is found to be the right path for this problem, a method in which recycling is done also plays a vital role. But we may all mostly do not insist on this domain initially. The method of recycling has its role in various ways like cost wise, economical wise, size, effectiveness etc. Recycling should be effective as well as simple, so that it can reach the awareness consumers to make them aware of the importance of recycling and to use water bodies properly.



"Fig.2"Snapshot of our designed kit.

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The sewage water from the polluted water resources is first made to be filled in the container.

In the container, the wastes in the water are screened out using a screener. The density of the screener depends upon the dust particles that is, as minute the dust particle are;denser will be the screener. The container containing the screened water may also have sediments, settled down at its bottom like sand particles etc. The screened water often been devoiced from physical wastes is made fall on the wings of the turbine, with a force, so that the turbine rotates and there by with the help of the operator connected with the turbine, electricity is generated. Then the turbine drove water enters the boiler here, evaporation process takes place, where the water is converted into steam. The steam from the boiler reaches the wings of steam turbine, with a pressure, so that the turbine rotates to generate electricity again. Then happens condensation, where the steam gets converted into water. This brought and from the whole set up through a water outlet. This water although is not suitable for drinking purpose, it can be used for other purposes like cleaning vehicles, washing clothes etc. Water after some purification stages, can also be used for irrigation.Boiling the filtered water can be done with the heat energy obtained by burning the non-bio degradable wastes. Unlike bio-degradable wastes, non-bio degradable wastes do not get decayed and cause land pollution.The electric current from the turbines is an analog. Here an ADC converter is used to convert it to Digital and then is given to Micro-chip, so that the value of the current got is displayed in LCD, as digital output.Economizer near water outlets, solar panels for heating purposecan be added as improving features to make the process more effective.

IV. CONCLUSION

All the water resources are not suitable for drinking purpose. Only a few of them serves as a good resource of water. The main source of water is considered as rain. Natural water is polluted both by nature and by manmade processes. Water is naturally polluted by Glacier smokes, Volcano lavas, Smokes and gases, Smokes from the forest fire, fog, mist etc. Manmade pollutions are by washing clothes, vehicles, animals, draining of dyes, chemicals and leather wastes in water bodies etc.Probably; pollution caused by human activities affects water in higher proportion than nature. This affects the ozone layer both directly and indirectly as other resources of pollution, global warming and greenhouse effect do. This leads to acid rain. Acid rain not only affects human but also our earth. Acid rain affects organisms in various cases, such that earth resources also get affected. So the origin of the main issue starts from human point of view. And effective waste to get rid of the issue and also prevent from causing further effects are recycling of waste water and creating awareness among the people respectively. This may result in the implementation of this project with further improvements. This project demonstrates the strengths of controlling pollution and maintaining water resource and to meet in hands with the electricity demands within a single whole setup, giving effectively profitable outcomes.

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