

Just Walk To Generate and Stay Underthe Light to Transmit Quickly

SnehaChandrakant Kharade¹

¹Department of ECE, MIT-WPU KOTHRUD, PUNE University (SPPU), PUNE.

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ABSTRACT- In this paper, Light Fidelity is a bidirectional, high-speed and fully networked wireless communication technology similar to Wi-Fi. Visible light communication and a subset of optical wireless communications and could be a complement to RF communication (Wi-Fi or cellular networks), or even a replacement in contexts of data broadcasting. It is wire and uv visible-light communication or infrared and near-ultraviolet instead of radio-frequency spectrum, part of optical wireless communications technology, which carries much more information, and has been proposed as a solution to the RF-bandwidth limitations. Visible light communications works by switching the current to the LEDs off and on at a very high rate, too quick to be noticed by the human eye. Although Li-Fi LED would have to be kept on to transmit data, they could be dimmed to below human visibility while still emitting enough light to carry data. The basic objective of this project work is to promote the use of non conventional energy sources as the conventional energy sources are on the verge of depletion. Here in this project we have tried to make a hybrid system but it is not like other hybrid systems. The combination of solar panel with the piezoelectric crystals does not require a large open field for installation but is to be placed in the crowded fields. It is a non polluting energy source which uses the wasted energy of humans. It is also easy to install and is non depleting.

KEYWORDS: Arduino Uno, LED, LiFi, Moisture Sensor, Photodiode, Piezo-Electric Generator, Protection Circuit, Solar Panel, TTL To USB, Wi-Fi.

I. INTRODUCTION

For an alternate method to generate electricity there are number of methods by which electricity can be produced, out if such methods footstep energy generation can be an effective method to generate electricity. As we know that the Fuel deposit in the will soon deplete by the end of 2020,fuel scarcity will be maximum. Country like

India may not have the chance to use petroleum products. Keeping this dangerous situation in mind we tried to make use of non-pollutant natural resource.

The demand for data usage has increased exponentially in the last decade, people want to be connected to the Internet all the time, on multiple devices, update the latest happenings etc. With the advent of IoT more devices will connect to the LTE which will result in congestion and decrease in speed.

1.1 PROBLEM STATEMENT :-

During the period of lockdown due to covid-19 situation so many people are facing huge number of problems and one of them is electricity bill. every Indian citizen has got the electricity bill up to three times more than regular average monthly bill which was like a worst nightmare and is unbearable for common people of our country. So there was a need of a replacement for such heavily paid bills and minimum investment systems which are already available at market.

We have non renewable source of energy such as petrol, diesel which are depleting at faster rate, so to preserve them we have to discover new things to generate the power which can help to preserve the non renewable sources of energy.

And due to quarantine period all workers,students,businessmen decided to continue with their career, studies and business to recover the loss. So everyone started using WIFI and LTE networks for communication purpose. But due to heavy traffic and high demand for data transmission rates, we are facing continuous range and network issues especially in rural areas. So on the situation's demand we got to upgrade the technology and think over the improvements for better results and experience.

1.2 SOURCE OF IDEA:-

This technology was proposed by German physicist Harald Haas in University of Edinburgh. Li-Fi, at its core is light-based Wi-Fi with the main

difference is that it uses light instead of radio waves to transmit data. The Li-Fi system would consist of regular, off-the-shelf, LED bulbs that provide internet or data transmission as well as illumination. It utilizes the visible light portion of the electromagnetic spectrum (380 nm to 780 nm). Thus, it has 10,000 times more space available thus more available bandwidth is present. Theoretically, it can reach the speeds up to 224 Gbps. The most of the dependent upon 'the cloud' or our own 'media services' to store all of our files, including movies, photos, audio and video devices, games, the more and most bandwidth and speed should be needed to access this data. Therefore RF-based technologies such as today's Wi-Fi are not the optimal way.

1.3 SOLUTION:-

To utilize the unused visible light spectrum which gave rise to the new concept called Li-Fi. To utilize the renewable sources like solar energy & piezoelectric crystal generated energy to convert into equivalent voltage i.e. Electricity. In addition with the piezo electric crystals used for the conversion of human energy into electrical energy, here in this project, we are also making use of the solar panel which is again a natural source of producing electrical energy. So, we can get a dual power supply to drive our loads. The idea of using solar panel is such, on the days when the place where the piezo electric crystals mat is placed is not flooded with people or is having a less crowd, we will get power output using the solar panel which is converting the sunlight into electricity. So we are going to get the output anyhow for our respective loads.

II. EXISTING SYSTEMS

Li-Fi stands for Light-Fidelity which provides transmission of data through illumination by sending data through an LED light bulb. Li-Fi uses Light Emitting Diodes (LED) which have high modulation bandwidth and energy efficient illumination. Walking is the most common activity in human life. When a person walks, he loses energy to the road surface in the form of impact, vibration, sound etc, due to the transfer of his weight on to the road surface, through foot falls on the ground during every step. This energy can be trapped and converted in the usable form such as in electrical form. This device, if embedded in the footpath, can convert foot impact energy into electrical form.

However, human kinetic energy can be useful in a number of ways but it can also be used to generate electricity based on different approaches and many organizations are already

implementing human powered technologies to generate electricity to power small electronic appliances.

- 1) A LIFI system which was implemented first was a simple sensed data transfer in the text form. Like any kind of message from one location to another location within same room. And that was limited to that room only but the speed of transmission was unbelievable.
- 2) So the people started thinking over it how to make it more convenient and upgrade its transmission capability. So after that some people came with the updated version of same topic but the change was that the LiFi hotspot was able to transmit an audio file successfully with a great clarity of sound.
- 3) Later on, it took some years to come up with its next step but not that bad. And the update was with the transmission of an image file but its quality was not that good as the transmitted file. The quality of visual was missing. Still that was a successful invention.
- 4) And after so many researches and failures the last and most demanded up gradation was able to get placed. A successful transmission of a video clip though a hotspot of a LED lamp. This was successfully implemented with a private software on a smartphone.

III. PROPOSED SYSTEM

With the onset of modern communication, and the increase in the bandwidth usage that led to its congestion, it is paramount that we find an alternative or a faster means of communication. This project using simple PIEZO sensor. And solar panel For this project the conversion of the force energy in to electrical energy. Light Fidelity is more commonly referred to as Li-Fi- is one such concept that is gaining momentum to become the possible alternative. In Li-Fi, the data is transmitted in several bit-streams through high-speed flickering of the LED bulb and decoded on the receiver side which consists of a photo detector. This happens in the form of a binary transmission of data, where '0' is the LED in its 'off state' and '1' is the LED in its 'on-state'. In this paper, we use this concept to transmit data to demonstrate the use-cases and the possible impact it can have in the ever- growing field of communication. In this paper, we transmit two types of data using Li-Fi: Audio and Text. We study the various topologies to understand the characteristics a Li-Fi based system can have. Generating electrical power as non-conventional method by simply walking or running on the foot step. Non-conventional energy system is very essential at this time to our nation. Non-

conventional energy using foot step is converting

mechanical energy into the electrical energy.

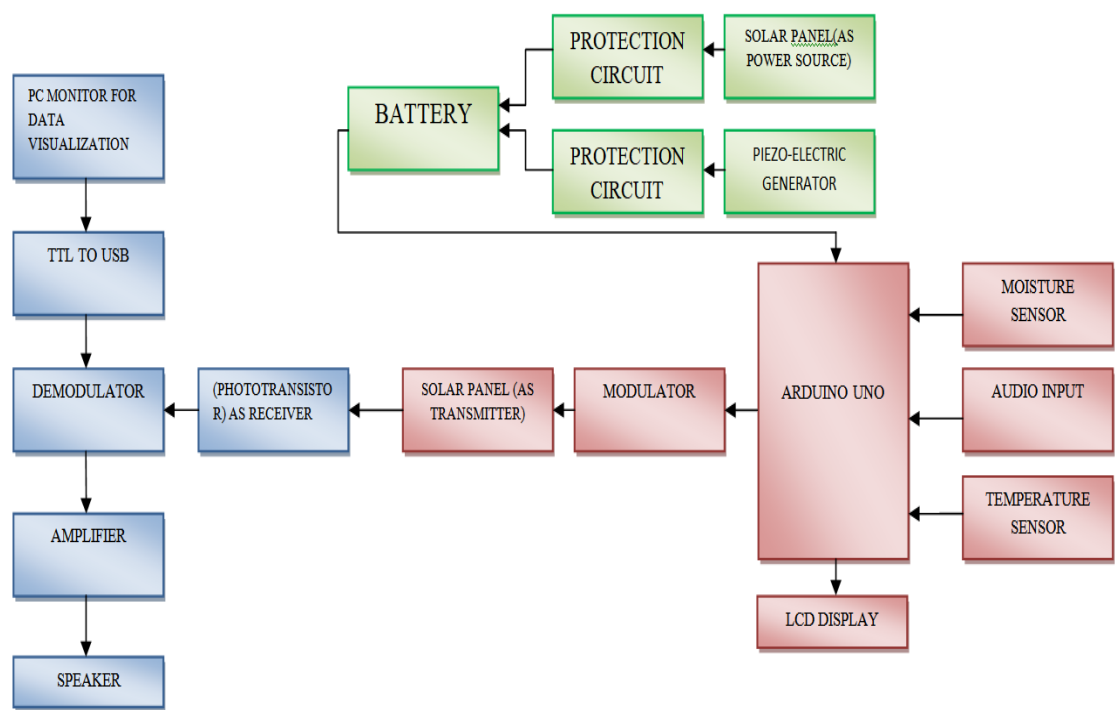


Fig.1. Block Diagram For The Whole System

- 1) **SENSORS:** here we are using them to sense the moisture in the room in term of percentage for detection and auto calculation of humidity. We are going to code it in Arduino and display it on the LCD for confirmation to the sender. However same thing goes with the temperature sensor in terms of degree Celsius.
- 2) **AUDIO INPUT:** an audio input with MIC or already saved audio clip or file is used here with an audio jack from devices.
- 3) **POWER SUPPLY:** but before that we need a constant DC power supply for the circuit. So instead of using the electricity connection we are going to use a hybrid solar-piezo power generation circuit as we discussed above.
- 4) **SOLAR PANEL:-** it is going to be used as a power source as well as a receiver too. So here we are going to use two solar panels for different purpose. This is the biggest advantage for us which can convert received light into a proper voltage value. This voltage will be stored to the battery through the given protection circuit.
- 5) **PIEZO-ELECTRIC GENERATOR:-** so it is going to be used as a power source too. As it will help to charge the battery more fast. But here we are going to implement these piezo under the floors (grounds) so that when people will walk on the floors these sensors will

generate equivalent voltage and through protection circuit. The voltage will be stored to the battery in DC form. The reason behind to place these piezo under the floors is given above in introduction part.

- 6) **BATTERY:-** here we are going to use the battery according to the requirement of the system, i.e. depending on the number of solar panels and piezo generators going to be implemented on the site.
- 7) **ARDUINO:-** Arduino used for this system, is more advance and less tricky. We are using it because its programming is quite easy compared to conventional coding. So all the sensors discussed above (i.e. moisture, temperature, audio) will be connected to the i/p pins. And at the o/p pins LCD display and modulator. The power will be supplied to it through the battery which is charged through solar-piezo generation circuit.
- 8) **MODULATOR:-** this will encode the signal which is to be transmitted and give it to the transmitter section in other words this system's transmitter (i.e. LED with proper intensity of light).
- 9) **TRANSMITTER (LED):-** it will start flickering according to the input i.e. in the form of binary language (1001100). When the '0' is to be transmitted LED goes OFF and '1' LED

goes ON. But the flickering of the light will be that fast even a human cant notice it with a naked eye, but the correct data will be transferred until it gets interrupted with an object between the transmitter and receiver.

- 10) **RECEIVER:-**a phototransistor or any photo sensing component will get the flickering of LED and convert it into equivalent voltage ie. if it gets light it converts it into (+ voltage) and if doesn't (0 voltage) then the voltage is given to the demodulator for further process.
- 11) **DEMODULATOR:-** then the demodulator converts the received noisy and destructed

signal into a proper voltage with respect to reference voltage and decodes it into the processed signals.

- 12) **MECHANICAL SWITCH:-** then if the mechanical switch is selected at audio signal, then the signal is forwarded at the amplifier section and then the amplified signal is sent to the speaker. But if the mechanical switch is selected at the data then the signal is forwarded at the TTL to USB section and the PC monitor or LAPTOP as shown in block diagram above.

3.1 CIRCUIT DIAGRAMS FOR POWER SUPPLY AND LIFI SYSTEM

3.1.1 LIFI SYSTEM

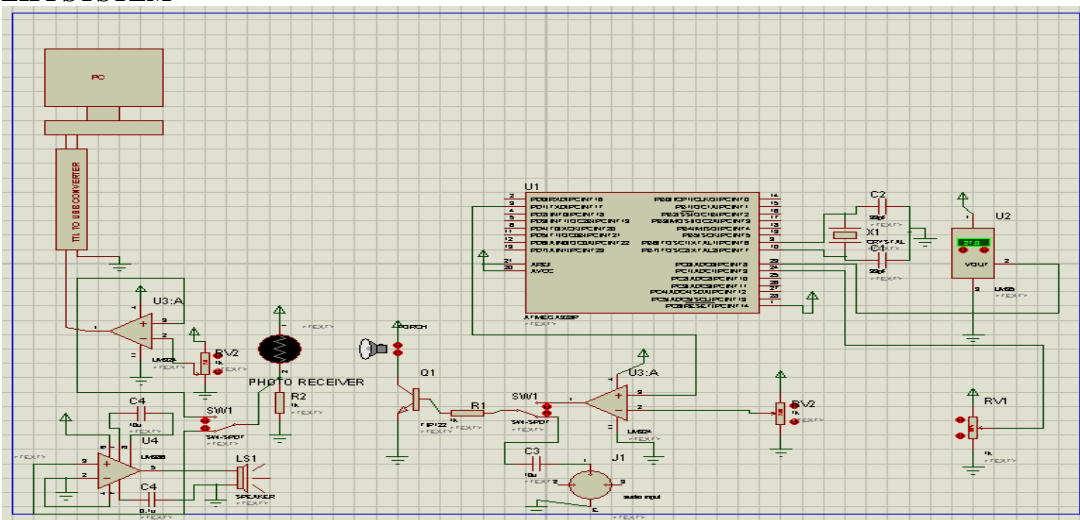


Fig. 2.Lifi System circuit diagram

3.1.2 POWER SUPPLY FOR THE SYSTEM USING SOLAR-PIEZO GENERATOR

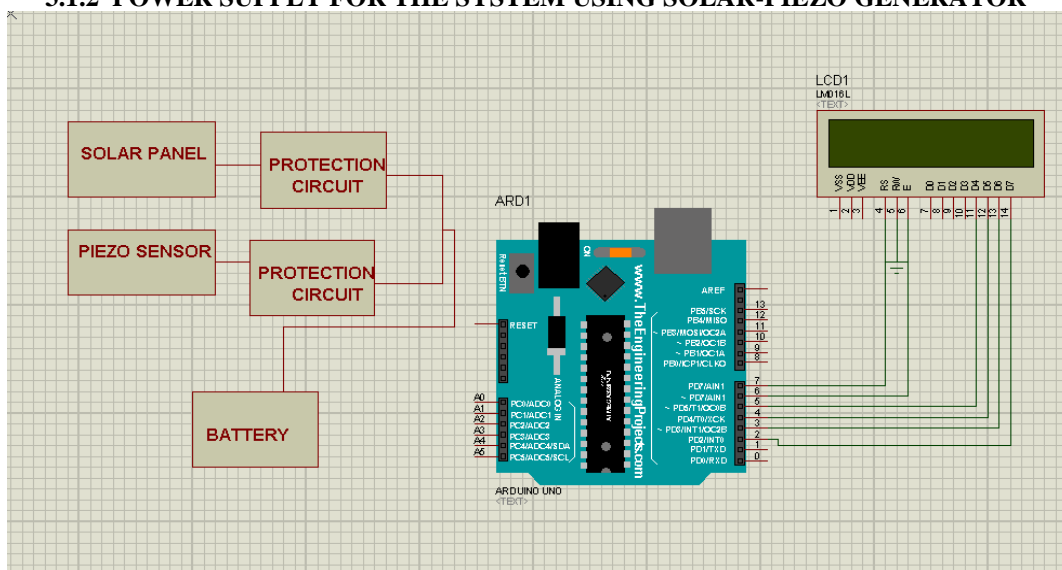


Fig.3. Power Supply For The System Using Solar-Piezo Generator

IV. SYSTEM ALGORITHM

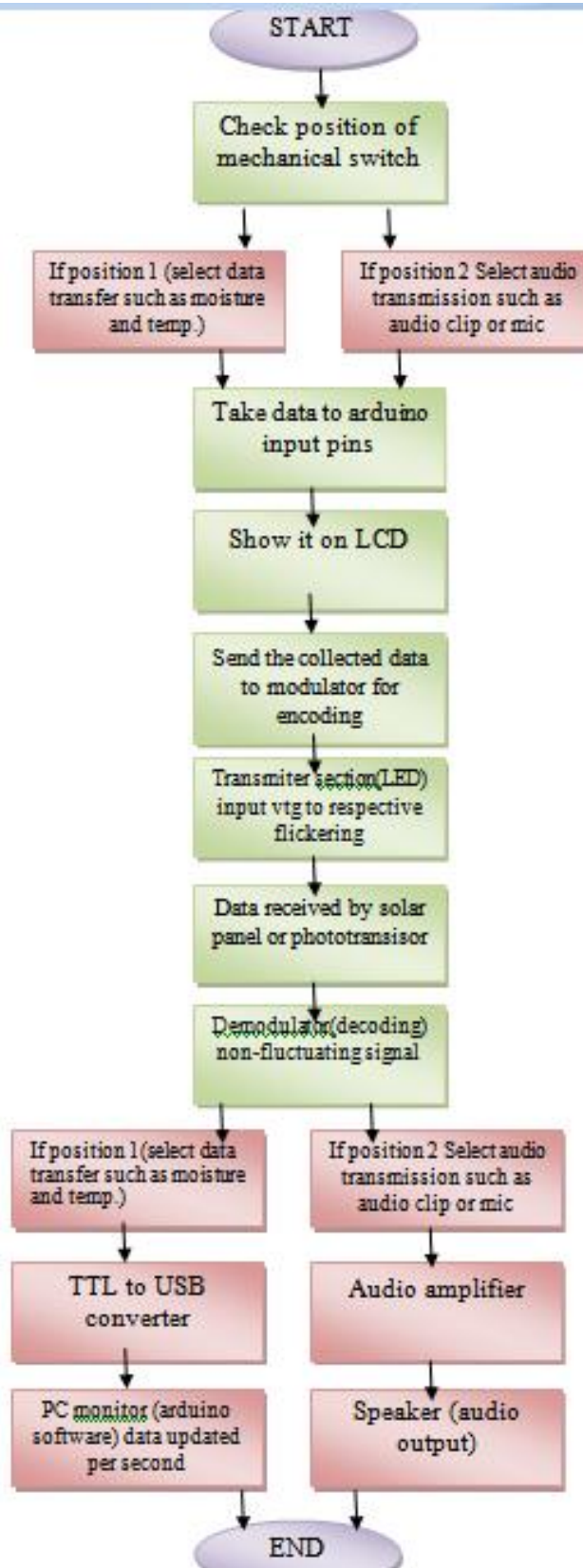


Fig.4. System Working Flow Chart

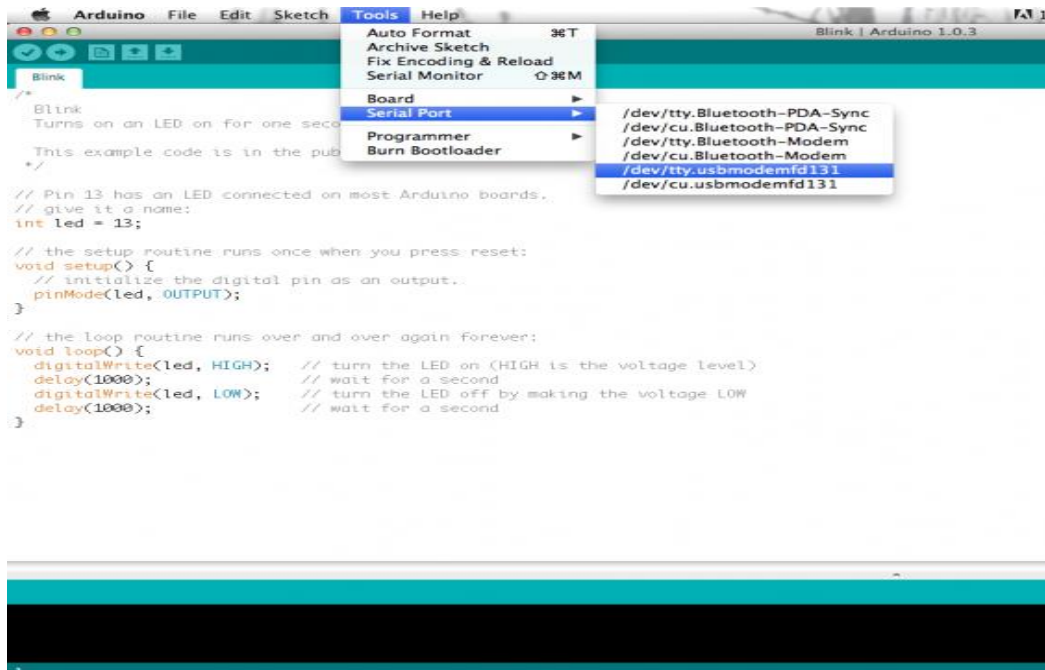


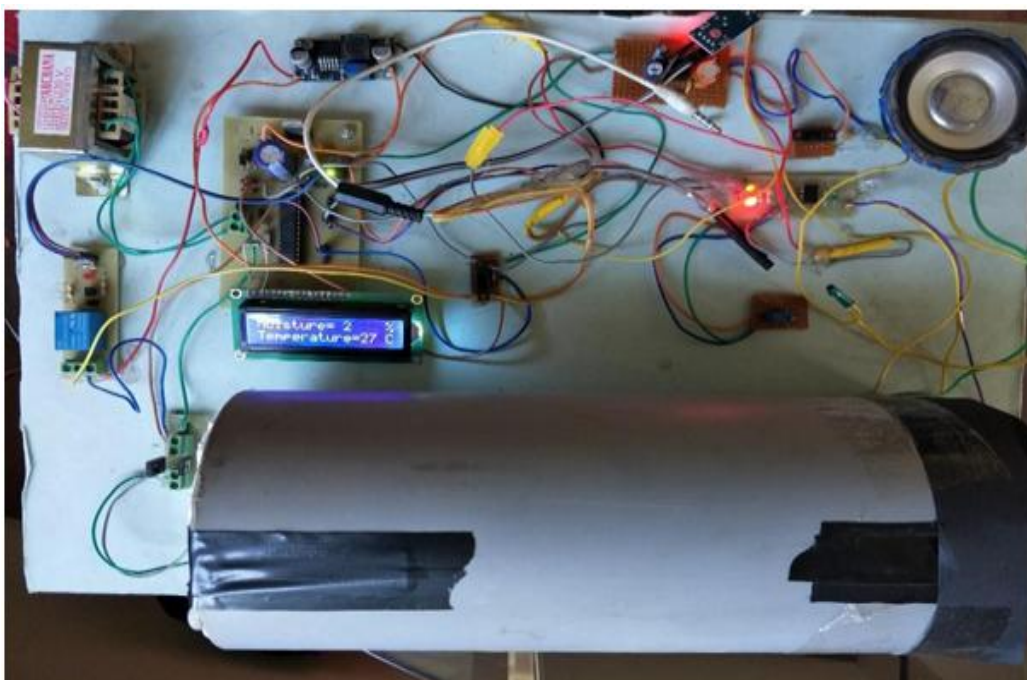
Fig.5. Using Arduino Software For Coding The Arduino And Microcontroller

V. RESULTS AND DISCUSSION

As per the implementation of the system, The charged battery is connected to the Arduino input and then the sensed data has been shown on the LCD screen.

The data is then displayed on the LAPTOP in Arduino software that is changing per second ie it is measuring a real-time temperature and the humidity.

And when we switched the mechanical switch then an audio clip which is transmitted to LED using a smartphone connected through the 3.5mm Audio jack. And the audio is immediately started playing on the speaker. For cross-checking we placed an obstacle between the LED and phototransistor the Audio stopped playing. This was a successful implementation and results were as expected.



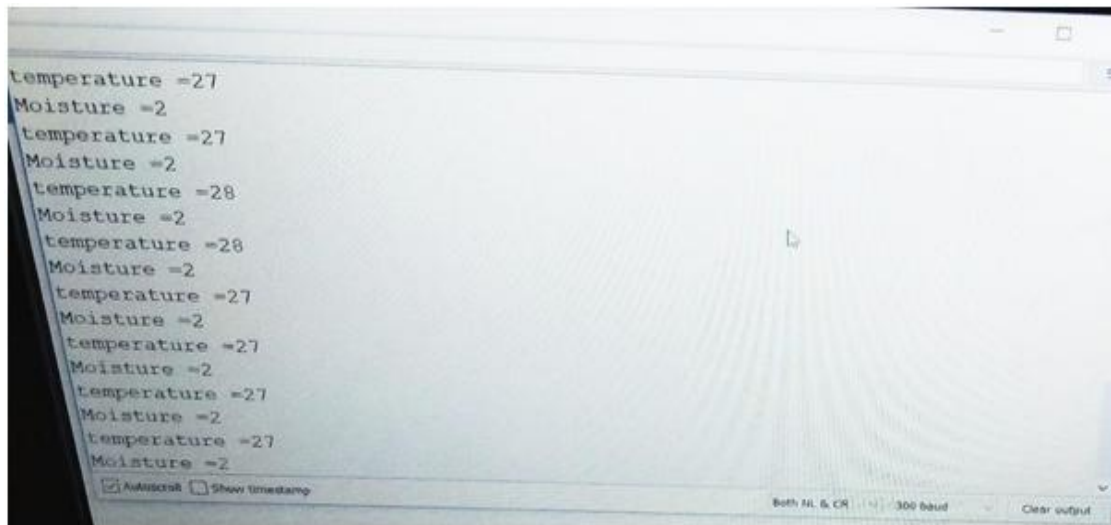


Fig.6 . Actual system implementation and results on laptop

VI. CONCLUSION

In this proposed system the Li-Fi transceiver using AVR328P is designed that is able to transmit digital data. The results shows the transmission of data string on the serial port monitor. After ensuring the successful transmission of data string and audio were transmitted and received successfully. This data transmission is seen on JAVA interface. Therefore a Li-Fi prototype has been designed which demonstrates the basic principle and also supports the claim of the advantages of Li-Fi over Wi-Fi. **“SOLAR AND PIEZO POWER GENERATION”** is successfully tested and implemented which is the best economical, affordable energy solution to common people. This can be used for many applications in rural areas where power availability is less or totally absence As India is a developing country where energy management is a big challenge for huge population. By using this project we can drive both A.C. as well as D.C loads according to the force we applied on the piezo electric sensor.

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