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IOT Based Hydropower Energy

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ABSTRACT: Energy requirement have been raised exponentially in the last few years and now it has become a huge problem in all over the world. With rising demand of more electricity generating to overcome this problem the renewable energy resources are introduced to small scale production. The renewable energy resources are cost effective and pollution-free environment-friendly.Hydropower generation systems are one of the common renewable energy sources in the world. We can create energy from available water in our home like taps, roof rainwater through this micro hydro power that's why it is cheap in price and affordable for everyone and in remote control area where there is no source of large water in this micro hydro power will be very helpful. As due to pandemic and electricity failure we have created home made micro hydro power with software showing all parameters and remotely accessing by cell phone ,and this energy can charge small amount appliances.

KEYWORDS: Micro hydro power, water-level sensor, Bluetooth module, renewable source energy

I. INTRODUCTION

This article represents the development of a hydroelectric generating system that generates electricity from the potential energy of rainwater water flowing at the top of the roof, water taps , pipelines through converting the kinetic energy of water into electrical energy that can be stored in rechargeable batteries to be used as power supply for LED lighting, network routers, and for charging mobile phones. We have developed this only for small devices. It contains a turbine that rotates by the running water to generate the electricity and a charging circuit to store the generated electricity into rechargeable batteries. It also contains a water-level sensor to detect turbine on or off on Lcd display and monitor software which is developed in Arduino Uno to connect software and hardware device and an android application connected to Bluetooth-module as to control the whole operation of the system, measure voltage, current and display the amount of water flow, the amount of electricity generated, and the daily consumed energy. Mostly home power systems are battery-based. The ones which batteries are stored in our are alternating current which are expensive while DC is way less .In DC the amount we utilize and remaining energy gets stored in rechargeable batteries so that it can be shut down for servicing without interrupting the power delivered to the loads. Since only the average load needs to be generated in this type of system, the pipeline, turbine, generator and other components can be much smaller than those in an AC system.These are used to power most or all home appliances. This makes it possible to have a system that is nearly indistinguishable from a house using utility power.

The results show that the proposed hydroelectric generator can harness the untapped kinetic energy of water flowing can produce power around 10w when the velocity of water flow is more than 2.5 l/min which is enough to operate continuously and safely low-power electrical devices (mobile phones, LED lights, and network routers).

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II. LITERATURE SURVEY

We have explored many micro hydro power devices. wherein they need flow of rivers, streams, untapped, water and face various obstacles and also their availability of resources changes due to seasonal variations. Initially small scale isolated development of hydroelectric power in India was confined to providing a reliable and continuously available electric energy for the load and was accordingly based on minimum dependable dry period stream flows so that curtailment of load during dry period is minimized. Change to this defective design principle is called for because of the following reasons in addition as there is rise in cost of power generation.

i) Now new thermal power system is developing in which their generating capacity is very large in total amount of capacity

ii) However, only 15% of the hydroelectric potential has been harnessed so far and 7% is under various stages of development. Thus, 78% of the potential remains without any plan for exploitation .

iii) Wherever above is not feasible (it is neither cost effective nor the optimal solution to provide grid connectivity) decentralized distributed generation facilities together with local distribution network would be provided so that every household gets access to electricity. This would be done either through conventional or non-conventional methods of electricity generation whichever is more suitable and economical.

All sets have their disadvantages. Modernizing more hydroelectric and bring out best alternative towards more electricity generation is our upcoming future. We have overcome these disadvantages. As energy requirement is more in pandemic and more electricity is being used as due to power failure and less energy this hydroelectric generation is the best solution we thought of using our micro hydro power. our project is cost effective, more amount of energy and remotely accessible.
Hope we created this project useful and eco-friendly and in more accessing way.

III. SYSTEM OVERVIEW

In our project we attempted that with the help of micro hydro energy we are going to charge micro devices like charging mobile phones, led lights. we have connected water-level sensor to detect weather water level is low,high,medium and it will display on lcd display screen and to remotely control we have connected Bluetooth module in mobile phone and an Arduino uno to connect between components, hardware / software device. An android application is created where it will show all the parameters.
The code for android application and Arduino uno is written in java.

IV. METHODOLOGY

The system is broken down into main modules:

1. **Rotation of turbine :-**

   - We are using turbine to rotated in water. When it will rotate in the flow of water, it will generate energy which we are using further in the project.

2. **Arduino uno :-**

   - Arduino is a single board micro-controller. We are using this micro-controller to connect all the small components together to make one circuit. It is open-source platform, so that we can easily connect our project between hardware and software.

3. **Water level detection :-**

   - When the turbine will be done he's work, then we will detection the level of water. So, to detect the level of water we need the water level sensor for detection. It will detect the level of water, if
   - it is high, low or medium on LCD display screen so that we can get the water level.

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4. **Mobile charge :-**

- When the energy is generated by rotation of turbine in the flowing water, then we will charge our mobile phone using USB cable which is connected to Arduino uno.

5. **Notification :-**

- We have created android app to display the notification of mobile. In this notification we will get the message that your phone is fully charge.

6. **Rechargeable batteries:-**

- If the energy is remain after the mobile phone is charge, then we are storing the remain energy in rechargeable batteries. So that we can use this energy in future

Calculations :

General Formula:

Power=Torque x Angular Velocity

= Force x Distance x Distance x 2x π x RPS

=Mass Accelation x Distance x 2x π x RPS

=m x g x s x 2 x π x RPM /60

Estimation of flow rate:

Time required for each stroke =3 seconds

Maximum number of strokes= 2

Required maximum volume of water = 10 liters

Required flow –rate= volume of water x no of stokes/Time of each stroke

- ⇨ Required flow-rate=10 liter x2/3sec
- ⇨ Required flow rate =6.66 liter per second

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- **SYSTEM ARCTITECTURE :**

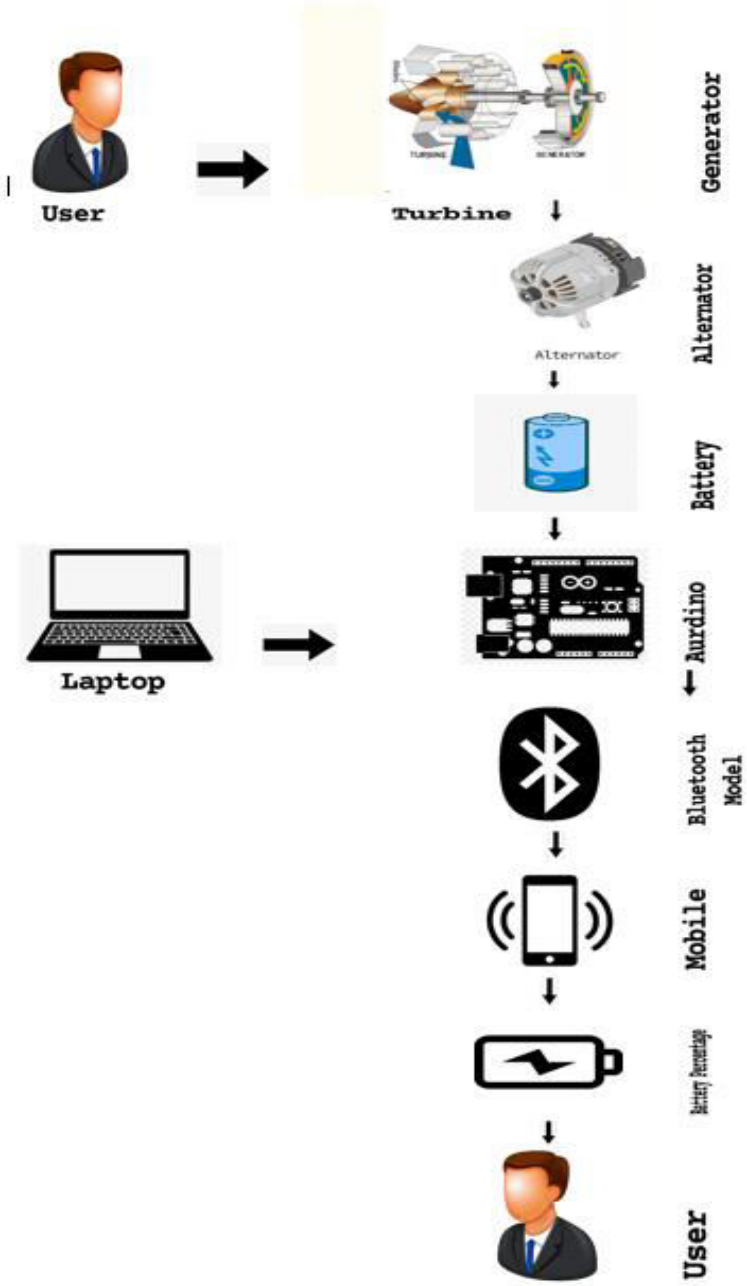

Fig 1 : System Architecture

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- **Block diagram:**

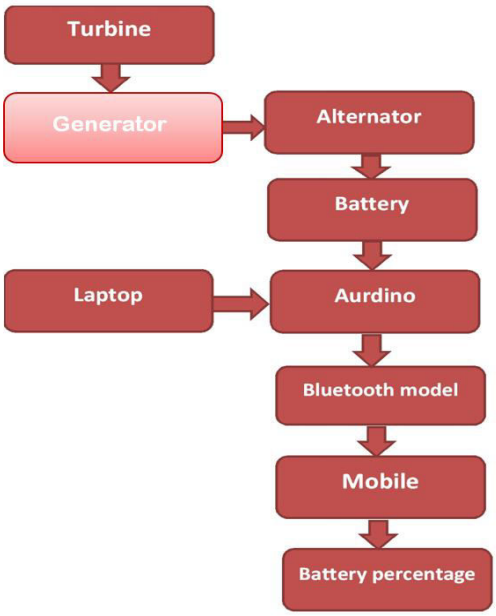

Fig 2 : Block Diagram

- **Circuit diagram**

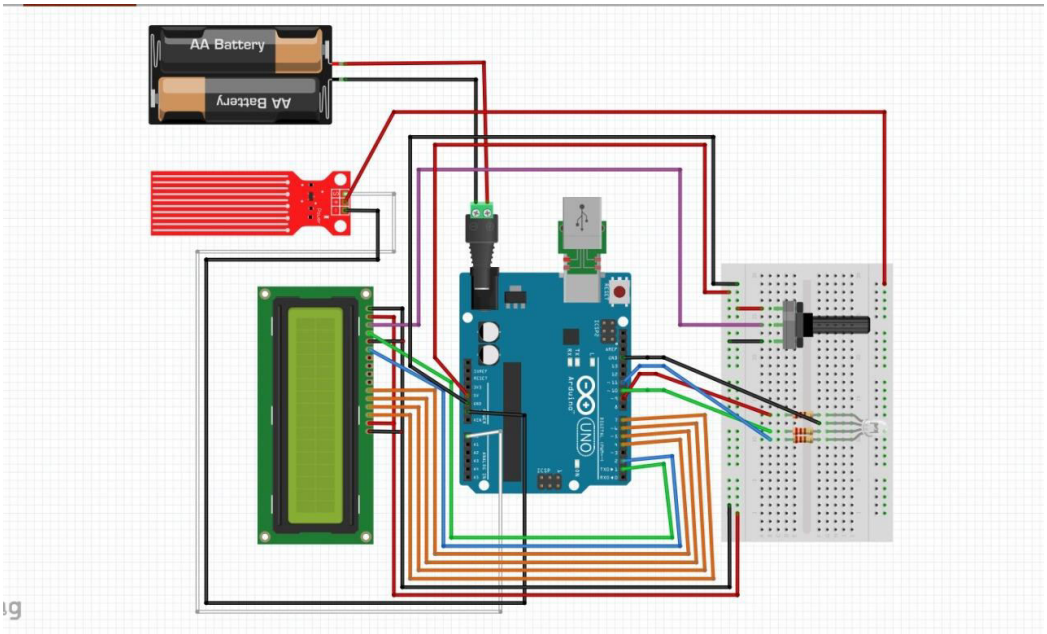

Fig 3 : Circuit Diagram

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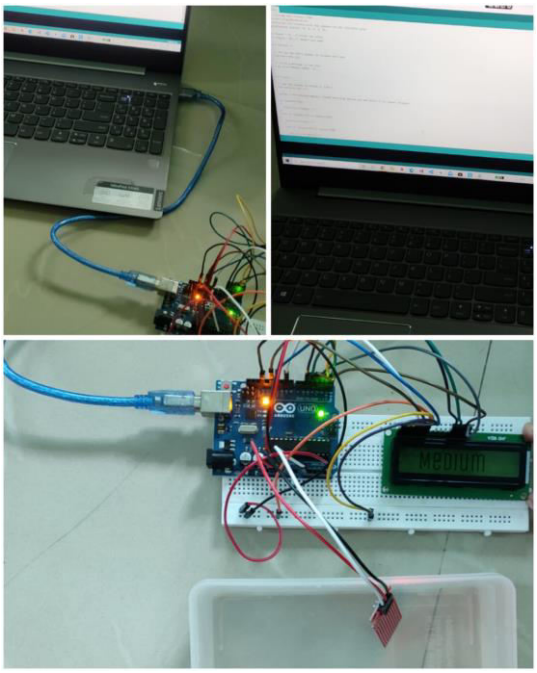
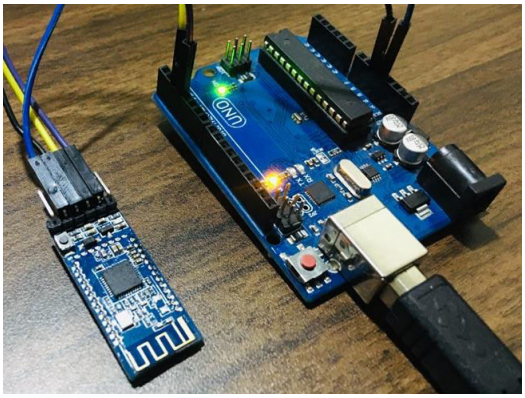
RESULTS

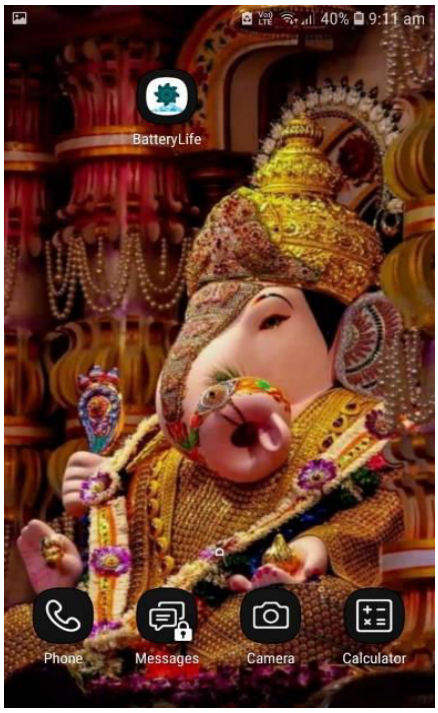
Screenshots of Hardware :





Screenshot of the application:

Step1:- Click on the turbine icon i.e. Battery indicator aplication to open the application.



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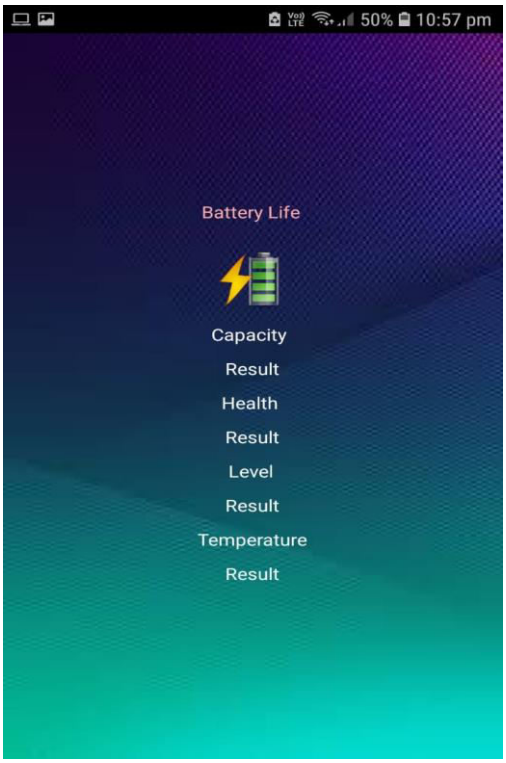
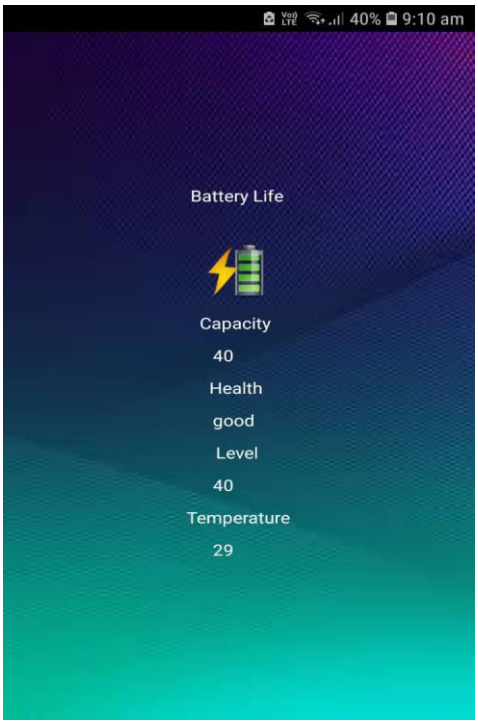
Step2:- The screen will display like this.



Step 3:- The final output i.e. the battery level,temprature,health,capacity will be shown.



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VI. CONCLUSION AND FUTURE WORK

Despite of various systems designs all produces their best performance has to develop micro hydro powers are not that difficult to operate and maintain .micro hydro power is always cost-effective than any other form of renewable power. For homeowners who don't have any power utility they usually have these three options:
Purchasing a renewable energy
Extending the utility transmission
Buying diesel generator
Their initial cost and maintenance are so huge than comparatively micro hydro energy is way lower. Micro hydro powers has no electricity bills and very less costing. They are best efficient way lighter and compactible.
For now this micro project is battery-based and used for small home appliances.Later with the help of guidance we will expand intoDC motors to AC current and plan to work on fitting into pipelines and to make more software monitoring servicing to ensure every details of frequency and constant flow of energy like more wider range of application information and minimal resources.

VII. ACKNOWLEDGEMENT

We request to submit the "Review of hydropower" project report and express our gratitude to everyone who assisted and support's us throughout the project's completion. The development of this project has been completed by their encouragement .We are thankful to our prof.Mr. S. S. Gaikwad(principal) and our project guide MrP.S.Chopade (Head of computer department) and MrV.P. Badhe (Mentor) for there wonderful guides through the project's development and for their continue motivation.

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