

Energy Information and Monitoring(ENIMO)

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Introduction

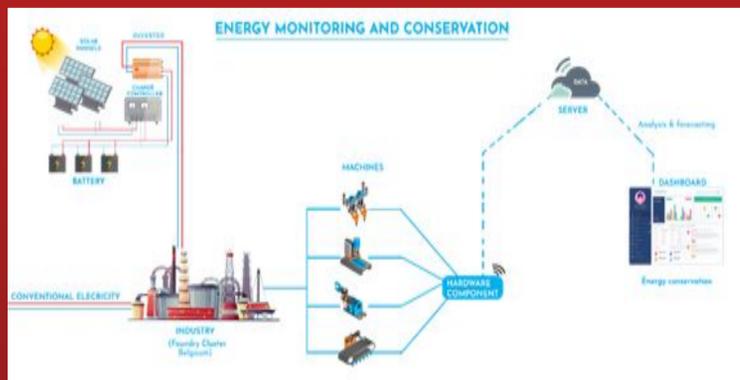
In today's era, the industries account for the major consumption of electrical energy in the country. In fact, 44% of the energy is used by industries in India. Due to the huge electricity demand, two major problems are being faced by the industry. One is the scarcity of energy and the other is escalated cost of the available energy. Industries have a great necessity for optimizing their energy needs and to decrease the cost for the same level of activity and increase the efficiency of the product in the industry.

Enterprises today face many complications when it comes to energy consumption. They have a great need for an efficient consumption of energy in the industry. Industrial machinery consumes a lot of energy even when the machinery is in either standby or switched off mode. In addition, surplus energy consumption is due to the mechanical fault within the industrial machine. In addition, one of the notable problems is not only finding out the fault in the machine but also the energy wastage caused by the machine. The industries aim to achieve a large number of goods/products in a less span of time, which in turn leads the machine to produce more goods and decreases the efficiency of the machine.

In this poster, the proposed solution ENIMO will not only monitor the energy consumption but also analyze patterns of the current running machine. The data collected from the machine is sent to the cloud to help predict the next maintenance and breakdown of the machine. There is a main hub, which uses the IOT technology to gather the data from all the sensors and machines.

Methodology

The Enimo does energy consumption monitoring of machines in industries using IOT in real time. As the data is being received from the machines, we process to the cloud and display the real-time insights to the user and generate the predictions on the collected data by using LSTM machine learning algorithms and data analysis to empower the decision making of an organization.



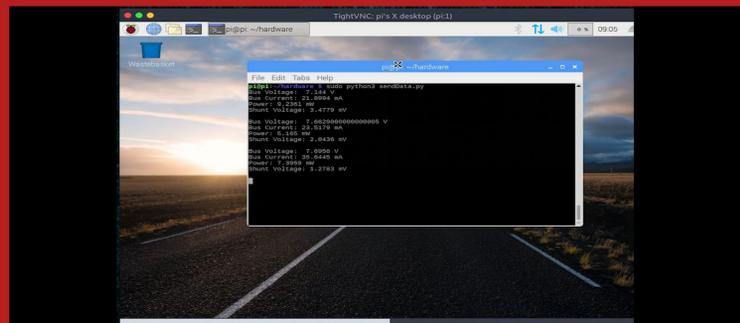
Enimo has three main objectives to fulfill and they are:

1. Identify faults and weaknesses in the machine early so preventative maintenance and replacement of the components can be done in a safe and orderly way
2. Ensure the machine is maintained at an optimum environment to achieve maximized performance and life.
3. Achieve energy efficiency by providing the required minimal energy to the machine.

Results

ENIMO hardware's control hub is installed at the input power supply of the machine and main source of the energy. The INA219 sensor is used to collect the current and voltage values consumed. The INA219 sensor will read the real-time readings of the machine's current and voltage values.

These valuable readings are sent to control hub. The control hub sends the data to the cloud for processing



These values are displayed on the React dashboard which provides a better visual aid to the user to track each necessary piece of information and take the right decision at the right time. ENIMO is designed to capture the power and voltage signatures for every 20 seconds. It means we have 4320 readings per each day, 30240 per week and 129600 per month. Now we have all sorts of points, it's almost like too much of the information



This huge data can be interpreted and used in generating predictions for decision-making. Coming to data analysis, the data stored in the database is first cleaned to reduce noise in the data. After smoothening the data, exploratory data analysis is made to gain more domain knowledge and check what parameters are influencing the output that is energy consumption by finding root mean square values. We use a regression model to generate the prediction. As we are dealing with machinery, from the available data, 80% of data is used for training and 20% of data is used for the testing. Alerts generated are sent to the user through SMS (using MSG91 SMS gateway), Email and notification will be displayed on the dashboard Our solution targets: Small and medium scale industries, factories, distribution facilities where there is a lot of machinery.

Features

Features of ENIMO

1. ENIMO learns about your machines and saves up to 30% on your electricity bill
2. Easy to Use Our systems are designed from the ground up to be easy to install and use. Go to our dashboard from your laptop, phone or tablets and start Controlling your machines via ENIMO dashboard.
3. Real-Time Energy Consumption & Data Analysis Detailed overview of the energy consumption with an analysis of individual device usage. Interactive & customized graphs give you visual access to instant data. Get suggestions regarding the optimization of bill & power consumption. Receive real-time data of the use and cost of your appliances
4. Fully Secure The data produced by our systems is often highly sensitive, and can directly relate to production levels, environmental conditions or occupancy. Our systems are fully secure from sensor to server.
5. Anticipate next month's bills with predictive estimates, right from the tooltip
6. Best-in-class accuracy (When reducing energy usage, sometimes by single figure % points, it's essential that the data you collect is accurate. Our electricity meters are accurate to Class 1 (+/- 1%).
7. Dashboard Presets (More than 10 pre-configured presets)

Conclusion

ENIMO is an energy intelligence system. It acts like an interactive energy efficiency solution for entire Industry either it is Micro, Small or Medium, which consists of sensors that connect directly to your breaker box. ENIMO monitors every machine that uses electricity. Enimo processes your electrical usage data and shares insights to help you make your machines smarter, more energy efficient and safer.

It also helps people to avoid blindly paying off electricity bill without knowing where that money is going. As most industries waste more than 30% of the electricity, they pay for. ENIMO uncovers energy trends, pinpoints, power hogs, and gives you control over your machines and your electricity bill. Enimo reduces your energy use with device level notifications and you can set goals to track your progress and stay on budget.

Thus, ENIMO web interface dashboard show you what's driving the cost of your electricity bill, share energy saving tips, and send electricity safety alerts. With ENIMO, you can power your machines smarter.

Future Scope

As of now, Industries are looking for alternative sources of energy as energy from the government has escalated prices per unit. The most preferable alternative renewable resource is Solar Energy as we in India are having a huge amount of sun's energy available around the year.

In Future, we also tend to provide another interesting feature (i.e. Monitoring Your Solar Plant). Using this feature, you can monitor everything going on inside your industry as well as your solar Plant and see how much energy is generating compared to how much grid electricity you are using in real time and for less money than traditional solar monitoring systems. It also shows the estimate payback period based on energy generation and usage and can even detect if there is something wrong with your solar plant and let you know it in right away.