International Journal of Research in Engineering, Science and Management
Volume-2, Issue-2, February-2019
www.ijresm.com | ISSN (Online): 2581-5792

Novel Idea for Sensor Battery Recharge with Wireless Charging in Smart Washrooms

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***Abstract*: Sensor nodes facing problem with battery durability in wireless sensor and performance issue when weak battery sensor node have in network, reduce such issue by new mechanism of wireless power supply to recharge battery in sensor for water taps in offices or buildings premises .**

***Keywords*: Wireless Charging Sensor Node, Sensor Node.**

1. Introduction

Sensor node is a simple structure it has shown in figures1, it have sensor module, processor and transceiver these parts efficiently works with battery, if battery weak then performance of the node degraded and it causes failed to recognize the objects. This will overcome with novel design, such as supply energy with wireless power transmission mechanism. One of the most important advances in sensor technology in the last ten years has been the focused development of smart sensors. The definition of "smart" and "intelligent" sensing can be debated. In general, it is difficult to identify any features in a smart sensor that parallel intelligence in natural systems; however, the terms have become cemented in the technical jargon. The basic tenet of smart sensors is that the sensor complexities must be concealed internally and must be transparent to the host system. Smart sensors are designed to present a simple face to the host structure via a digital interface, such that the complexity is borne by the sensor and not by the central signal processing system. This report does not address specific technologies associated with smart sensing but instead presents the concept and identifies where and why opportunities exist for new sensor materials as well as for the utilization of existing materials that have not traditionally been used for sensing applications. The primary sensor element within a smart sensor may not be made of a conventional transducer material. Nonlinear and hysteretic materials, previously discarded as being too unreliable or unstable for sensing applications, may now be applied in a sensor that contains its own dedicated microprocessor; the need to burden a central processor with a complex constitutive model or filtering algorithm is thereby avoided. Applications can be envisioned that exploit the inherent memory or hysteresis of nonlinear materials to reduce the signal processing workload for example, "record" peak temperature.

The principal catalyst for the growth of smart-sensing technology has been the development of microelectronics at reduced cost. On-chip actuators for self-calibration and mechanical compensation may be created using micromachining techniques or thin-film technologies. Many silicon manufacturing techniques are now being used to make not only sensor elements but also multilayered sensors and sensor arrays that are able to provide internal compensation and increase reliability. It is difficult to predict the future in smart sensing, as the new applications will be driven by the availability of new sensing materials, an improved understanding of the transduction characteristics of "old" materials, and manufacturing techniques for micro actuators, micro sensors, and microelectronics. It is clear, however, that the smart-sensing concept creates new opportunities for using novel materials for sensors.

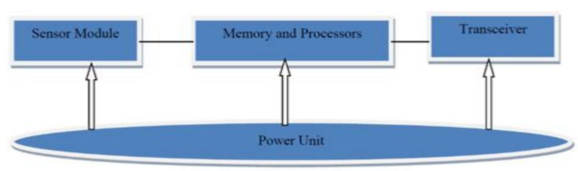

Fig. 1. Sensor Node Basic Structure

Washrooms are among the highest-maintenance rooms in companies. A new technology now monitors soap, cotton towel and toilet paper dispensers fully automatically, and notifies the cleaning staff when levels are running low. The bases of the "CWS Washroom Information Service" (WIS) are the sensors. They are battery powered and monitor the fill levels of soap dispensers, cotton towel rolls and toilet paper. Sensor performance depends on battery if this weak then the recognizing of object will fails. So novel idea to supply power through wireless transmission to recharge sensor battery for their respective water taps in washrooms.

2. About sensor water taps

A. Water conservation

Electronic taps are usually designed with a low flow rate, an aerator in the spout and system or materials that prevent leakage. For instance, while traditional basin taps pour between 10 and 15 liters per minute, sensor taps would not use more than 6 liters and their solenoid valve is closed by default (and placed before the hose, which in this case supports up to 15 bar). Bear in mind that a dripping tap can waste between 300 ml and 1 liter per hour.

B. Energy saving in the long term

Each sensor tap requires 6, 9 or 12 volts, depending on the brand. This expense is unavoidable, whether hardwired or battery operated. Nonetheless, e-taps can make a difference during activation. Selecting the preferred flow and temperature every time a traditional faucet is activated wastes energy, among other things. In this regard, automatic basin taps with a constant temperature (cold, warm or premixed) are a great choice for commercial washrooms. Likewise, thermostatic faucets would be more energy efficient in showers than mixer lever ones.

- These settings can be even more environmental friendly if power comes from renewable energies and if further restrictions are implemented in the tap handle or in the rest of the system (aerators, flow limiters, pressure reducing valves). The latter gadgets sound a wise choice also for those who are still using traditional basin taps.
- Water and energy efficiency reduce the total bill amount in dwellings. A British household needs on average 360 liters each day and a portion of it can significantly decrease from 30% to 50% by placing sensor taps in the bathroom and kitchen.
- In order to know how much water you are wasting and how to avoid it, you could make a water audit of your premises. If you are interested in how much you are spending at home, check this water calculator.
- In motion sensor taps water flow is already customized. Adapting the flow once and then again seems time consuming. What is the point of selecting our desired water flow every time we use the washbasin tap if 99% of the time we want the same flow?
- The fact that the flow rate is preset also means a cleaner area in the bathroom, since splashes during activation are not possible. In this respect, the self-closing mechanism will not lead to sink overflow and users' dirty hands would not be touching the tap.

3. Work related

Sensor battery devices produce relatively small magnetic fields. For this reason, chargers hold devices at the distance necessary to induce a current, which can only happen if the coils are close together. A larger, stronger field could induce current from farther away, but the process would be extremely inefficient. Since a magnetic field spreads in all directions, making a larger one would waste a lot of energy. An efficient way to transfer power between coils separated by a few meters is that we could extend the distance between the coils by adding resonance to the equation. A good way to understand resonance is to think of it in terms of sound. An object's physical structure like the size and shape of a trumpet -- determines the frequency at which it naturally vibrates. This is its resonant frequency. It's easy to get objects to vibrate at their resonant frequency and difficult to get them to vibrate at other frequencies. This is why playing a trumpet can cause a nearby trumpet to beg into vibrate. Both trumpets have the same resonant frequency. Induction can take place a little differently if the electromagnetic fields around the coils resonate at the same frequency. The theory uses a curved coil of wire as an inductor. A capacitance plate, which can hold a charge, attaches to each end of the coil. As electricity travels through this coil, the coil begins to resonate. Its resonant frequency is a product of the inductance of the coil and the capacitance of the plates.

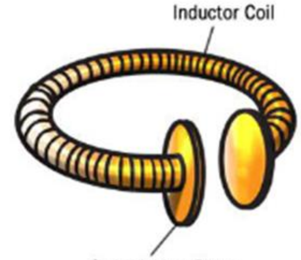

Fig. 2. Resonant Structure

In a short theoretical analysis they demonstrate that by sending electromagnetic waves around in a highly angular waveguide, evanescent waves are produced which carry no energy. An evanescent wave is near field standing wave exhibiting exponential decay with distance. If a proper resonant waveguide is brought near the transmitter, the evanescent waves can allow the energy to tunnel (specifically evanescent wave coupling, the electromagnetic equivalent of tunneling to the power drawing waveguide, where they can be rectified into DC power. Since the electromagnetic waves would tunnel, they would not propagate through the air to be absorbed or dissipated, and would not disrupt electronic devices. As long as both coils are out of range of one another, nothing will happen, since the fields around the coils aren't strong enough to affect much around them. Similarly, if the two coils resonate at different frequencies, nothing will happen. But if two resonating coils with the same frequency get within a few meters of each other, streams of energy move from the transmitting coil to the receiving coil. According to the theory, one coil can even send electricity to several receiving coils, as long as they all resonate at the same frequency. The researchers have named this non-radiative energy transfer since it involves stationary fields around the coils rather than fields that spread in all directions.

"Resonant inductive coupling" has key implications in solving the two main problems associated with non-resonant inductive coupling and electromagnetic radiation, one of which is caused by the other; distance and efficiency. Electromagnetic induction works on the principle of a primary coil generating a predominantly magnetic field and a secondary coil being within that field so a current is induced within its coils. This method help to recharge the sensor battery those are deployed in office washrooms.

Fig. 3. One coil can recharge any device that is in range

4. Need for wireless power transmission

Wireless transmission is employed in cases where instantaneous or continuous energy transfer is needed, but interconnecting wires are inconvenient, hazardous, or impossible.


Fig. 4. Power supply with wire

Fig. 4. The unmanned planes or robots (where wires cannot be involved viz oceans volcanic mountains etc.) which are run by the wireless power over an area, as they could fly for months at a time, could be used for research as well as a mini satellite. Number of household points receives electricity at the same frequency using single transmitting coil as long as they all are A few proposals even involve sending power to the Earth from space.

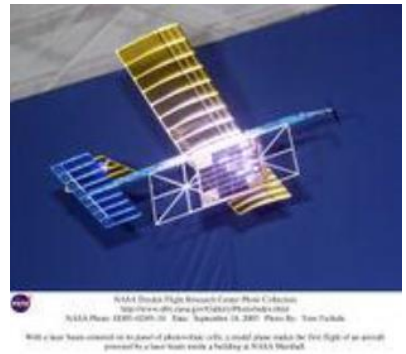
Fig. 5. Satellite

5. Conclusion

Now a day's most of the washrooms contain sensors. Example: Each water tap used as, if sensed the object then water released, if no sensed object then water not released from tap, this type work done by with some energy. Observed that many companies have smart washrooms and need to replace sensor's weak battery, such issue overcome by novel idea will be to deploy wireless rechargers to charge sensor battery in sensor network in washrooms

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