

**IMPLEMENTATION OF WATER PURIFICATION BY UV  
STERILIZATION SYSTEM****A.R.Sri Harsha<sup>1</sup>, A.Srija Reddy<sup>2</sup>**<sup>1,2</sup>B.Tech Student, Dept of EEE, Mahatma Gandhi Institute of Technology, Hyderabad, T.S, India**ABSTRACT:**

Ultraviolet light is one energy region of electromagnetic spectrum, which lies among x-ray region and visible region. Ultraviolet is a way of killing or rendering nontoxic microorganisms in a committed environment which ranges from bacteria to protozoa. A major benefit of UV treatment is that it is measured safer and more consistent in support of disinfection concerning water than chemical substitutes, whereas level of disinfection is much superior. UV sterilization is a confirmed solution to destructive waterborne pathogens usually linked with aquatic recirculating systems. Achieving of successful germicidal disinfection can be accomplished by exposing living target microorganism to particular spectral area concerning UV-C in support of a predetermined time. With consumers fetching more concerned about chlorine and additional chemical contamination of drinking water, additional dealers are prescribing ultraviolet elucidation appropriate for small flow residential applications in addition to outsized flow projects of Commercial. Realizing profit as well as limitations of UV disinfection set up a foundation for its booming application.

**Keywords:** *Ultraviolet light, Microorganism, Spectral area, UV sterilization.*

**1. INTRODUCTION:**

Electromagnetic radiation with a wavelength among 380 nm and 760 nm is detected by human eye moreover perceived

as visible light [1]. Other wavelengths, particularly near infrared (longer than 760 nm) as well as ultraviolet (shorter than 380 nm) are in addition sometimes referred

to as light, in particular when visibility to humans is not applicable. The band width of UV rays is 10nm to 400nm. UV in extremely shortest range is competent even of ionizing atoms, seriously altering their physical actions. Successful ultraviolet disinfection demands severe adherence to Established Engineering Guidelines. Our approach is easy. Ultraviolet sterilization is matchless in its competence, ease, and reliability when functional as a microorganism disinfectant but does contain its limitations. Realizing profit as well as limitations of UV disinfection set up a foundation for its booming application. The requirement for ultraviolet sterilization products are set up in virtually all areas in residential as well as commercial applications alike [2][3]. Its basic design, ease of continuance and small capital and operating costs put together UV disinfection the ideal option in situations of contaminated water. Because of its benefits UV irradiation is on way to turn out to be most accepted choice for disinfection of water supplies.

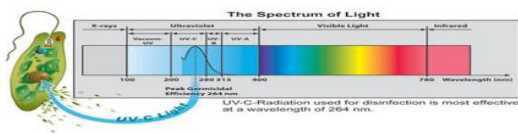


Fig1: An overview of spectral area concerning UV-C in support of a predetermined time.

## 2. AN EXPOSURE TOWARDS UV STERILIZATION:

Ultraviolet light is one energy region of electromagnetic spectrum, which lies among x-ray region and visible region. Ultraviolet technology as well as its effectiveness has been well documented scientifically as well as commercially [4]. It is nature's own disinfection or purification technique. With consumers fetching more concerned about chlorine and additional chemical contamination of drinking water, additional dealers are prescribing ultraviolet elucidation appropriate for small flow residential applications in addition to outsized flow projects of Commercial. Ultraviolet rays kill nontoxic microorganisms in a committed environment which ranges from bacteria to protozoa. UV disinfection is employed in air as well as water purification, sewage treatment, fortification of food and beverages, and numerous other disinfection as well as sterilization applications. A major benefit of UV treatment is that it is measured safer and more consistent in support of disinfection concerning water than chemical substitutes, whereas level of disinfection is much superior. UV treatment systems are moreover cost proficient and necessitate less

space than unconventional disinfection systems. UV treatment takes place only in the interior of UV exposure chamber and leaves no outstanding downstream consequently, it is not dangerous to animals in the pool. UV sterilization is a confirmed solution to destructive waterborne pathogens usually linked with aquatic re-circulating systems. Because UV does not put down any assessable residual in water, it is suggested that the UV sterilizer be installed as concluding step of treatment and positioned as close as promising to the concluding distribution system. Pre-filtration is a necessity on all UV applications to successfully wipe out microorganisms to a 99.9% kill rate. Advantages of UV sterilization are Low initial capital cost in addition to condensed operating expenses when evaluated with like technologies for instance ozone, chlorine, etc. Instantaneous treatment process and no need for holding tanks, and has extended retention times [5]. It has regular operation devoid of special consideration operator responsive. Ease of safeguarding, periodic cleaning. Compatible with the other water processes specifically filtration, ion exchange, RO, and so on. UV dosage is the major critical function of UV disinfection, since extent of inactivation is

proportional to dose applied to water. As individual UV lamps discharge a set quantity of ultraviolet energy, it is significant that a system be sized properly. Flow rates are determining factor and should not be overstated. Contact time, which is time water is inside the sterilization chamber, is directly proportional toward dosages, which are quantity of energy per unit area and consequently the overall efficiency of microbial destruction in system. For uppermost UV transmission hard glass quartz sleeve is suggested for two main reasons. It isolates lamp from water to put forward more consistent operating temperatures as well as allows for superior UV output into water.

### **3. SUCCESSFUL GERMICIDAL DISINFECTION IN CONTINUOUS- FLOW LIFE SUPPORT SYSTEM:**

Achieving of successful germicidal disinfection can be accomplished by exposing living target microorganism to particular spectral area concerning UV-C in support of a predetermined time as shown in fig1. Ultraviolet light consists of four particular spectral areas such as Vacuum UV, UV-C, UV-B as well as UV-A on the other hand, established Germicidal Action Spectrum lies among 240-280 nm. The peak

wavelength of 264 nm is mainly lethal to an existing organism's DNA, and avoids it from reproducing. Water is permitted to pass all the way through a UV tube which purifies water by killing bacteria. This procedure is recognized as UV sterilization. But we can't observe the UV rays by means of our naked eyes, as it is away from visible spectrum. So we are introducing an UV light sensor in UV tube which notices the UV rays consequently at any time the UV lamp fails to make the UV rays subsequently a buzzer will be blown. Here buzzers as well as UV light sensor are interfaced by means of micro-controller. Consequently we can get purified water all time. The magnetic sensors are supportive for sensing of level of water. First when tank is unfilled motor gets ON as well as water gets sprinkled out in the tank, then as water in tank is reached 100% motor gets OFF automatically. Once application has been determined, you must discover a location that offers simple access for service. You will require containing access toward pre-filters, to UV chamber in support of annual lamp changes and normal maintenance on quartz sleeve. Using a UV system as well as a pump on similar electrical line might cause problems and cut down the life of UV lamp as well as

ballast. A surge protector by means of a rating of not less than 3600 Joules ought to be installed to defend electronic ballast from being damaged due to lightning strikes. UV units are installed on cold water line earlier than any branch lines and ought to be last point of treatment. Authorization for lamp change has to be measured during installation [6]. All points of distribution system after sterilizer ought to be chemically shocked to make sure that system is open from downstream microbial infectivity. Lamp changes ought to be done not less than once every year. Filter changes are finished consistent with situation concerning feed water. Do not leave fingerprints on glass. It is imperative to go after manufacturer's guidelines on feed water excellence and operational measures.

#### 4. CONCLUSION:

Ultraviolet technology as well as its effectiveness has been well documented scientifically as well as commercially. Ultraviolet sterilization is matchless in its competence, ease, and reliability when functional as a microorganism disinfectant but does contain its limitations. UV disinfection is employed in air as well as water purification, sewage treatment,

fortification of food and beverages, and numerous other disinfection as well as sterilization applications. UV treatment systems are moreover cost proficient and necessitate less space than unconventional disinfection systems. Pre-filtration is a necessity on all UV applications to successfully wipe out microorganisms to a 99.9% kill rate. Advantages of UV sterilization are Low initial capital cost in addition to condensed operating expenses when evaluated with like technologies for instance ozone, chlorine, etc. Instantaneous treatment process and no need for holding tanks, and has extended retention times. It has regular operation devoid of special consideration operator responsive.

## REFERENCES

- [1]. L. Gu, D. Jia, P. Vicaire, T. Yan, L. Luo, A. Tirumala, Q. Cao, T. He, J. Stankovic, T. Abdelzaher, et al., "Lightweight detection and classification for wireless sensor networks in realistic environments," in Proceedings of the 3rd International Conference on Embedded Networked Sensor Systems, 2005, pp. 217
- [2]. F. Zhao, J. Shin, and J. Reich, "Information-driven dynamic sensor collaboration for tracking applications," IEEE Signal Processing Magazine, Vol. 19, 2002, pp. 61-72.
- [3]. S. Cheung, S. Coleri, B. Dunder, S. Ganesh, C. Tan, and P. Varaiya, "Traffic measurement and vehicle classification with single magnetic sensor," Transportation Research Record: Journal of the Transportation Research Board, Vol. 1917, 2005, pp. 173-181.
- [4]. D. Li, K. Wong, Y. Hu, and A. Sayeed, "Detection, classification and tracking of targets in distributed sensor

networks," IEEE Signal Processing Magazine, Vol. 19, 2002, pp. 17-29.

[5]. A. Haoui, R. Kavalier, and P. Varaiya, "Wireless magnetic sensors for traffic surveillance," Transportation Research Part C: Emerging Technologies, Vol. 16, 2007, pp. 294-306.

[6]. N. Ding, G. Z. Tan, H. L. Ma, M. W. Lin, and Y. Shang, "Low power vehicle speed estimation algorithm based on WSN," in Proceedings of IEEE 11th International Conference on Intelligent Transportation Systems, 2008, pp. 1015-1020.