

# Development an affordable portable ozone gas generator for research and education in agricultural and food applications

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## INTRODUCTION & AIM

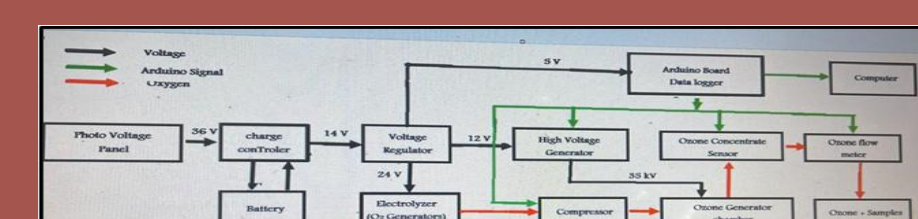
Ozone (O<sub>3</sub>), which is known for its powerful oxidizing powers, is utilized extensively as ozone treatment in the food and horticulture product capitalization sectors. This is completely safe for human use based on the most recent rules of the relevant authorities. When it comes to these operations, high-voltage ozone generators [Liao et al., 2011], which achieve the production of ozone through the use of electrical discharges, play an essential part. Ozone production can be accomplished through various circuit configurations that utilize high-voltage electrical discharges (Prombud et al., 2025). Although different studies (Singh et al., 2022; E-Mashede et al., 2021) have explored different facets of ozone generation, the ozone generation faces challenges related to high investment and operational costs. These challenges must be overcome to enable its broader application, especially in small communities (de Carvalho Costa et al., 2025). Despite their usefulness, their expensive

cost prevents them from being widely available in research and educational institutions in underdeveloped nations, which limits practical training and the creation of local applications to support the capacities of the food and agriculture sectors. At the same time, there has been a startling rise in electronic components worldwide, and the cheap prices have raised financial concerns.

The objective is to create a working prototype of an ozone (O<sub>3</sub>) generator utilizing inexpensive parts for research and education in agricultural and food applications.

## METHOD

The ozone generator consists of three units (ozone production unit, power unit, and measurement and control unit) as shown in Figure 1. However, the block diagram of the working flow of the developed ozone generator setup is depicted in Figure 2. To calibrate the Arduino ozone sensor, it was exposed to a known, clean air environment to obtain a baseline resistance value (R<sub>0</sub>), which depends on temperature and humidity. The sensor was then exposed to various known ozone concentrations using the portable multi-function ozone analyzer, O<sub>3</sub> ozone meter, air detector, smart sensor, ozone meter, air quality, and pollution monitor shown in Figure 4. The calibration was implemented in the code in Figure 5 to convert the sensor readings to an accurate ozone concentration, integrating temperature and humidity readings for greater accuracy.



## RESULTS & DISCUSSION

Performance was assessed in accordance with the calibration procedure outlined for such produced devices or comparable ones.

## CONCLUSION

The findings provide credence to the viability of constructing an inexpensive ozone generator using inexpensive parts, hence promoting sustainable technological advancement.

## FUTURE WORK / REFERENCES

Liao, R.J.; Yang, L.J.; Li, J.; Grzybowski, S. Aging Condition Assessment of Transformer Oil-Paper Insulation Model Based on Partial Discharge Analysis. IEEE Trans. Dielectr. Electr. Insul. 2011, 18, 303–311