Affordable Detection of Microplastics in Water Using Optical Light Scattering

Bommera Shiva
Student, Vardhaman College of Engineering, Shamshabad, Hyderabad, Telangana, India

Rampalli Architha
Student, Vardhaman College of Engineering, Shamshabad, Hyderabad, Telangana, India

Bollela Tejasri
Student, Vardhaman College of Engineering, Shamshabad, Hyderabad, Telangana, India

Pawar Anil
Student, Vardhaman College of Engineering, Shamshabad, Hyderabad, Telangana, India

Abstract

Microplastics are small plastic fragments below 5 mm in size and are now commonly detected in aquatic environments, where their ingestion has been linked to inflammation and cell damage. Recent studies suggest that people ingest several grams of microplastics every week, and it is estimated that over 80% of tap water contains microplastics, indicating a significant environmental challenge. Although techniques such as FTIR spectroscopy, Raman spectroscopy, and microscopy are commonly used for microplastic detection, they are mostly expensive, laboratory-based, and require skilled operators. In this work, a compact and low-cost Arduino-based microplastic detection system is proposed that operates on the principle of optical scattering. The proposed system costs less than ₹1300 INR, and preliminary experimental tests show an accuracy of approximately 85%.

Keywords

Microplastic detection, water quality monitoring, optical sensing, light scattering, low-cost sensor system.