**A MEMS BASED WIRELESS MULTI SENSOR MODULE FOR ENVIRONMENTAL MONITORING**

**Abstract:**

Recent progress in data processing, communications and electronics miniaturization is now enabling the development of low-cost wireless sensor networks (WSN), which consist of spatially distributed autonomous sensor modules that collaborate to monitor real-time environmental conditions unobtrusively and with appropriate levels of spatial and temporal granularity. Recent and future applications of this technology range from preventative maintenance and quality control to environmental modelling and failure analysis. In order to fabricate these low-cost, low-power reliable monitoring platforms, it is necessary to improve the level of sensor integration available today. This paper outlines the microfabrication and characterization results of a multifunctional multisensory unit. An existing fabrication process for Complementary Metal Oxide Semiconductor CMOS-compatible microelectromechanical systems (MEMS) structures has been modified and extended to manufacture temperature, relative humidity, corrosion, gas thermal conductivity, and gas flow velocity sensors on a single silicon substrate. A dedicated signal conditioning circuit layer has been built around this MEMS multisensor die for integration on an existing low-power WSN module. The final unit enables accurate readings and cross-sensitivity compensation thanks to a combination of simultaneous readings from multiple sensors. Real-time communication to the outside world is ensured via radio-frequency rotocols, and data collection in a serial memory is also made possible for diagnostics applications.

The aim of the project is to design and construction of a module for environmental monitoring like temperature, humidity etc. The project was divided into three phases. The First phase is to demonstrate the application of MEMS. The second phase of the project attempts controlling and capturing data from temperature and humidity sensors and the third phase of the project is to control the appliances.

MEMS-based sensors are a class of devices that builds very small electrical and mechanical components on a single chip. MEMS-based sensors are a crucial component in automotive electronics, medical equipment, smart portable electronics such as cell phones, PDAs, and hard disk drives, computer peripherals, and wireless devices. These sensors began in the automotive industry especially for crash detection in airbag systems. Throughout the 1990s to today, the airbag sensor market has proved to be a huge success using MEMS technology. MEMS-based sensors are now becoming pervasive in everything from inkjet cartridges to cell phones. Every major market has now embraced the technology.

Inertial sensors have been used in aircraft and navigation systems for a long time. It is not until recently that new technology has caused the price and size of gyroscopes and accelerometers to make them available in consumer electronics. Of particular importance is the MEMS (micro-electro-mechanical-systems) technology that has allowed small, cheap and robust sensors to enter the market, ”recent advances in micro-electromechanical system (MEMS) technologies have enabled inertial sensors to become available on the small size and price scales associated with such commonplace devices as consumer appliances,. Accelerometers measure the transactional force encountered due to their acceleration. To convert this to a velocity this output would need to be integrated once and to convert this to a position, integrated twice.

**Block diagram**