

A HIGH RESOLUTION OF HUMAN BREATH GAS SENSOR AND THE ANALYSIS OF HYPERVENTILATION FOR RESCUE ROBOTICS IN DISASTER ZONES (IRIS2010)

Hideki Toda and Genci Capi

Department of Electrical and Electronic Systems,

Faculty of Engineering University of Toyama,

3190 Gofuku, Toyama, 930-8555, Japan

Email: toda@eng.u-toyama.ac.jp

Abstract- This paper presents a new type of ultrasonic gas molecule concentration sensor for rescue robotics and the performance of developed sensor is investigated by applying as human breath gas measurement sensor. This devise can measure the change of the gas concentration with a sampling rate of 400 kHz. Ideal gas experiment results show that the proposed sensor could detect the difference between 5% CO₂ and pure air over 50 dB S/N and could discriminate humidified air and pure air with 55 dB S/N. Another important result is that our proposed respiratory sensor could detect the "dead space" distributed from lungs to mouth, which could not be detected by previously proposed commercial use gas concentration sensors. Therefore, this sensor can detect a human-specific small-amount of molecular gas change of the survivors in a disaster zones. In addition, we measured the hyperventilation state, in which it is assumed that the survivor is in critical conditions.

Index terms: Human breath sensor, high sampling speed, rescue robotics, hyper-ventilation.