

# Food and Eye Blink Monitoring System for Patient's

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**Abstract**— The difficult task in the field of medical is monitoring the coma patient's for their improvements by an individual medical care person. Since these patient's will stay unconscious for more than a years but they can return back to the conscious state at any moment. Thus leading for an erroneous humanitarian records. Our system is designed to monitor the coma patient's status and liquid food intake automatically in a designated timing. This device will monitor the liquid food intake of a coma patient's using an acoustic sensor, a wearable device worn over the patient's neck and a wearable eye blink sensor coolers to checks whether the patient's blinks their eyes. This motion is recognized as and when the set of recorded reading are out of the normal range. Finally obtained data are pre-processed and then sent to a smart phone via GSM, thus this system notify the consciousness of patient's and recognized food types.

**Keywords**— Food intake recognition, wearable eye blink sensor, wearable acoustic sensor, embedded system.

## I. INTRODUCTION

Coma is a state in which the person remain unconscious for an extended period of time. The patient's is totally unaware of both self and external environment. patient's in a coma are unable to react meaningfully to their external environment. Even though coma patient's could not respond to the external commands, A minority of coma patient's may be able to open their eyes occasionally. Recovery of  $36 \pm 3db$  emergence of clear behavioral milestones, but more often by subtle improvements. There are frequent fluctuations in both arousal and awareness Since these physical motion of coma state person are rare and unstable, thus there is a need for regular attention and care.

This papers involves in two major parts of (1) Food monitoring system, this systems track changes in people food situations. They aim to alert the humanitarian community when a situation detriotes and to ensure that assistance can be provided in a timely and appropriate way. For the healthy existence of the coma patient's there is a need for a individual medical care person for each to maintain the energy level and blood circulation

of the patient's every day. If no proper remedy isn't taken then severe disorders may additionally take vicinity. In hospitals doctors and nurse members have a difficulty in feeding food for the patient's at right time, especially for the patient's in coma. Auto-dietary system is a utilized to monitor the food intake of patient's in a non invasive manner (2) Eye blink monitoring system, this sensor is used to detect any blinks in a comatose. Eye blink sensor works by eliminating the infrared ray. When these rays are interrupted by any object the values gets deviates. Thus providing a alert to the medical care person

## II. SYSTEM ARCHITECTURE

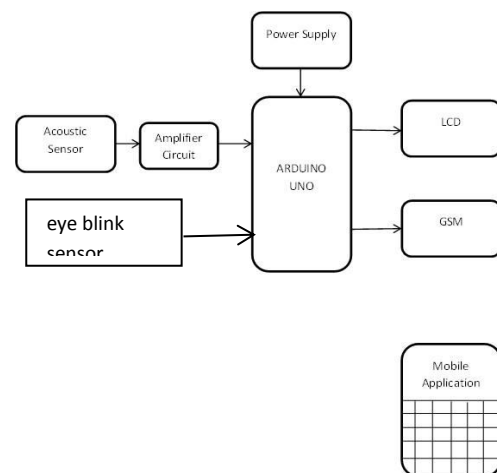


Fig. 1 System architecture of food monitoring

This system deals with complete monitoring of the coma patient's from the state of unconsciousness to consciousness. The system is mainly composed of two parts:

### 1. ACOUSTIC SENSOR:

Acoustic sensor is a high-fidelity microphone which senses the sound signals. These sensor is placed in throat near the jaw during eating, thus allowing the microphone to convert the throat vibration signal caused during the mastication from the skin surface to acoustic signal rather than picking the sound waves

pressures as common sensors does. Thus allowing only high quality specific signal to be taken as input. This sensor is precise makes a user to feel comfortable to wear. The throat microphone used allows dynamic range up-to  $36 \pm 3db$  and frequency range up-to 20Hz-20MHz.

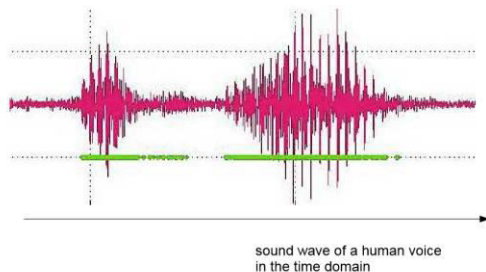


Fig 1.2 acoustic signal frequency

### 1.2 EYE BLINK SENSOR:

This sensor is used to detect any blinks in a comatose. This sensor works on IR principle. This sensor works by illuminating IR rays in an eye area. It has a transmitter and a receiver. The transmitter is used to transmit an infrared light that is used for illuminating the eye area. The reflected light is obtained at the receiver. When there is an eye blink infrared light received at the receiver end will be flicked at the time of blinking thus varying in their normal range. And allowing the medical care to receive the notification this make the medical care person to recognize the patient's a given a positive response. This can be verified at any time as the notification is received by means of message

### 1.3 HARDWARE BOARD:

An embedded hardware board is designed for data pre- processing and transmission. As eye blink sensor and the acoustic data are collected, the throat microphone (acoustic sensor) signal amplified and filtered for high- quality and then the analog signal are converted into digital signal for further process. The amplifier adopted is LM386 IC as they have high gain which can be modified up-to 200milli-watts by adjusting the resistor and capacitor. The obtained digital signal are then send to the micro-controller via I<sup>2</sup>C interface. The sound signals are compared with listed range of values that are processed to recognize the food items on consumption the obtained results are then send to mobile application using the GSM

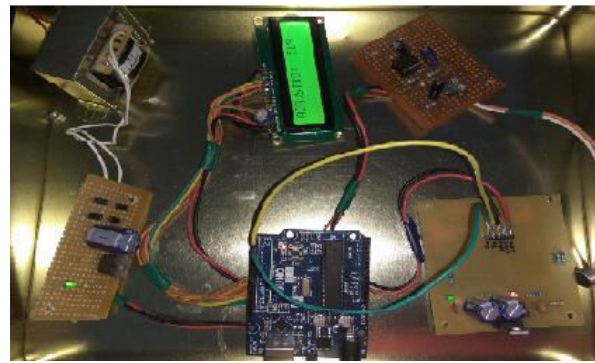


Fig 1.3 a hardware board

## 2. SMART-PHONE APPLICATION:

The data are then transmitted via GSM to a smart phone, where food intake is recognized

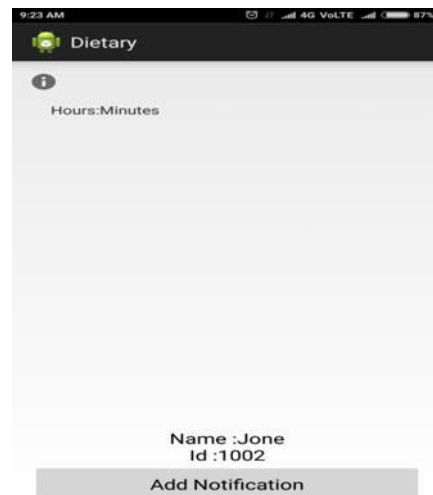


Fig 1.4 Smart-phone application

Food type recognition is done by identifying the frequency for each and every food items individually, these limits are taken as a parameter for identifying the food. Due to variation of throat frequency in different individual and less accuracy rate of sensors the values are taken in form of range (i.e) person taking liquid food, the range is being identified from 100 to 150 thus these frequency limits are fixed to be liquid food. After the identification of the food it is being send to the customer mobile phone in form of message. These messages are being send by means of GSM to the designed mobile application. Here the messages are being stored and can be referred for future enhanced of the recovered patient's health. Likewise when eyes are blinked by the patient's alert message is sent to the required number through GSM.

## 3 GSM :

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.



Fig 1.5 GSM module

### III DISCUSSION AND FUTURE SCOPE:

From the experimental results we can see that food recognition and eye blink sensor have high performance, especially liquid foods and solid food are recognized easily. Similarly eye blinking is being implemented with basic infrastructure. In future eye blink sensor can be modified to eye motion sensor as

there are come patient's with an eye ball motion but no response is given by these second grade coma patient's. Food detection can be made more accurate by which the calorie of food intake is identified thus other nutrition lacking and dietary patient's can also be made benefit-able.

### IV. CONCLUSIONS

In this paper we have presented a comprehensive and preliminary solution for monitoring the coma patient's and their food intake. We developed an embedded hardware to recognize the consciousness of the coma patient's using their eye blink and check their nutrition on their daily liquid food intake using throat microphone in a non-invasive manner thus the system not only monitor the patient's improvements but also the nutrition to be taken after their recovery from the coma state

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