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A Design of Smart Device for Detection of Oral Cancer using IoT

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***Abstract*: The mouth is viewed as a mirrored image of the overall strength of the body but there's no near home gadget accessible today which will be utilized reception to screen oral wellbeing. The target of this venture is to create a practical, multimodal, individual oral detecting gadget that naturally characterizes detected information and offers intelligent guidance about Oral malignancy and Periodontal. A handheld home gadget that coordinates picture for recognizing oral disease, smell, temperature, and 3D direction detecting, and speaks with a complicated portable by means of Wi-Fi.**

***Keywords*: Sensors, Arduino.**

1. Introduction

As per the general disease positioning the oral disease remains in eighth spot and its one in all the many reasons in causing the oral disease is that the threatening neoplasm. Oral epithelial cell carcinoma is seen as progressively dominating in those who accomplish additionally smoking alongside utilization of liquor. Likewise, with this factor when the sex of the patients is being considered wherein the boys is simply being more influenced than the women populace as a results of this factor. Another factor which is about to that is that the presentation to sun which disturbs the OSCC improvement particularly within the lips and therefore the event pace of loco provincial backslides even prompts failure and spending. Oral or mouth disease most typically includes on the ground of the mouth cheeks, gums, lips, or sense of taste top of the mouth. Most oral malignancies look fundamentally the identical as under the magnifying instrument and are called epithelial cell carcinoma The Signs and side effects are, for instance, on tongue and lips typically effortless at starting, burning sensation will happen if tumor gets propelled, Additional Problems are, for instance, gulping trouble, mouth bruises and then forth.

Biting betel, paan, gutka, snuff misri and areca is known to be solid hazard factor for creating oral malignant growth in India. It is unmistakably indicated the disease influenced district and appears about the malignant growth tumor arrangement. This paper will concentrate on the recognition and characterization of oral malignant growth cells.

The expectation and identification of the malignant growth is a critical and hazard included procedure. There is no close to home gadget accessible today that can be utilized at home to screen oral wellbeing. The target of this task is to make a savvy, multimodal, individual oral detecting gadget that consequently arranges detected information and gives intelligent counsel about oral disease and periodontal. A handheld home gadget that coordinates picture for distinguishing oral malignancy, smell, temperature, and 3D direction detecting, and speaks with a PDA by means of wi-fi.

2. Literature survey

Jung, W., Zhang, J., Chung, J., Wilder-Smith, P., Brenner, M., Nelson, J. S., and Chen, Z. Advances in oral malignant growth identification utilizing optical intelligibility tomography. The paper bargains about the oral disease recognition technique with the use of optical lucidness tomography. OCT is possibly valuable in numerous clinical applications. OCT is potential to allow a fast and noninvasive methods for early clinical identification, finding, screening, and checking of pre malignant growth and disease. The principle objective of this paper is to assess the practicality of OCT for the conclusion of various phases of oral malignancy movement with the use of 3-D volume pictures of ordinary and precancerous injuries. A definitive point of this paper is to differentiate the oral malignancy prior stage with the help of optical intelligibility tomography [1]

Scully, Crispian, et al. "Oral malignancy: current and future symptomatic strategies." during this paper we will see the oral disease analytic methods for momentum and future use. There are numerous analytic technique for oral disease there are of, for instance, possibly dangerous oral sores, Clinical analysis of OSCC, Occult essential oral malignant growths, Biopsy and histopathological assessment, indispensable recoloring, Brush biopsy, Optical frameworks, Saliva-based oral malignant growth diagnostics. These identification and determination can possibly aid early recognition, prompting early conclusion and improved treatment results [2].

Scully, Crispian, et al. "Oral cancer: current and future diagnostic techniques." In this paper we can view the oral cancer diagnostic techniques for current and future use. There are many diagnostic methods for oral cancer there are of such

as potentially malignant oral lesions, Clinical diagnosis of OSCC, occult primary oral cancers, Biopsy and histopathological examination, vital staining, Brush biopsy, Optical systems, Saliva-based oral cancer diagnostics. These detection and diagnosis have the potential to assist in early detection, leading to early diagnosis and improved treatment outcomes [3].

N. Kripa, R. Vasuki, Prasath Alias Surendhar, "Design of a choice network for Detection of carcinoma using Matlab." In this paper we will view the carcinoma can be detected using Artificial Neural Network (ANN) technique under the Neural formal logic Network . the foremost usual method is taking the histopathological evaluation by taking biopsy from the tissue to diagnose the carcinoma. This sometimes ends up in show the incorrect diagnostic symptom like asymptomatic lesion, in order that the patients are guided to determine the dentist for the treatment because, these oral cancers will normally doesn't show early signs of cancer. So most oral screening programs include the visual examination and therefore the usage of chemiluminesce, toluidine blue, brush biopsy and fluorescence imaging. Several classifiers are being developed within the neural network to detect the cancer images by image processing of the cell images of the patients. it's evident that we will differentiate by just looking, but it’s not accurate and that we can get it wrong, hence they have followed the methods like preprocessing, feature extraction, feature selection, classification [4].

3. Existing system

- Doctor usually examine the mouth and lips to appear for any abnormalities.
- Doctor do biopsy to get rid of the damaged tissue and use small camera to look at the throat.
- The existing system isn't user-friendly because only in hospital or some clinic we've that machines.
- Even there are several applications available but it doesn’t contain the features during a simple way.
- The current system consumes more time and man power and the cost is high

A. Drawback

- The current system is not user friendly and time consuming
- It is hard to predict at earlier stage and may cause to death
- People need to visit the doctor for all small problem
- There is no device which sends a notification to user.

4. Objective of the study

The main objective of this paper is to design a smart device which can be used by all people in home to predict and detect the oral cancer at very early stage. The main idea is to replace the existing manual method. This will save the time and also keeps people without worrying for small problem. This will help the doctor and also the user.

A. Abbreviation and Acronyms

MQQT-Message Queuing Telemetry Transport
XML-Extended Markup Language
OSCC-Oral squamous cell carcinoma

B. Product Features

This device enables the user to detect the oral cancer by using the sensor. If any sensor value reaches the threshold value it will detect and sends a notification to the user through message. This device can also detect the asthma by detecting the flow using MQ135 sensor.

C. User Characteristics

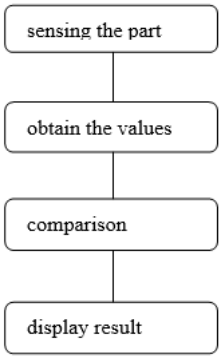
- There are n number of user who visits dentist every month for their checkup. Each time they cannot go to hospital for small problems. Some people predicts wrong by seeing the lumps in mouth.
- This device will help the user to detect the problem in home and also can detect the oral cancer at very early stage and can be cured.
- This application can be accessed with the internet connection anytime and anywhere.

D. Constraints

- The languages used in the project are embedded C, XML.
- MQQT algorithm for sending value to cloud
- Internet connection is must to access this application without which it can only be viewed.

5. Proposed methodology

This device detects the possibilities of oral cancer (or) mouth cancer by sensing the part which is infected. This follows the below methodology to detect the oral cancer.



A. Sensing the part

This uses three sensors to sense the part which the user wants to examine in mouth. The sensors are temperature sensor,

flow sensor, pH sensor. Once the device is on the sensors show the null value. Temperature sensor will sense the temperature inside the mouth. Flow sensor will sense the flow of the breath. The pH sensor will sense the pH level of the infected part in mouth. Once the sensor sense the value of the part it will start obtain the value from the sensors.

B. Obtain the value

The sensor will start sensing and obtain the value from each sensor and start calculating the values. The values then check the condition in the given code.

C. Comparison

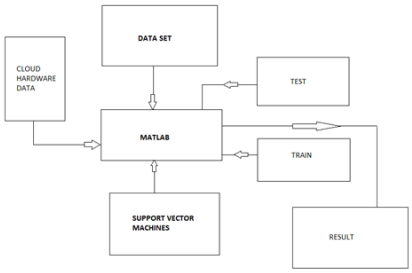
The values which is obtained will get compared with the threshold value .Temperature sensor will check the obtained value with its threshold value here the threshold value if between 280c to 380c .The flow sensor will get the acetone value here the threshold value is >250c.The pH sensor will check the value is between 36.5 to 38.9.The sensor will start comparing the obtained value with their threshold value and analyses if there any value exceed from their threshold value and detects the possibility of cancer.

D. Display the result

Once the values get compared the reading will send to the cloud using MQTT algorithm. The reading gets reflected to user mobile application. The values get updated every time the user takes reading. If there is any abnormal condition the user gets notification message. The will get integrated with Wi-Fi so the user can use the device anywhere and at any time. All the collected data from hardware is sent to cloud and the data is fetched from cloud through Matlab .The SVM algorithm is one of the algorithm in Machine learning and Artificial Intelligence groups Which is used to detect oral cancer and Asthma .Here we are creating the dataset of affected parameters and normal parameters to Matlab and imported to SVM then it reads the data set and waits for hardware data from cloud once the hardware data arrives the SVM starts comparing the existing parameters with hardware parameter and picks up all affected values through testing and training process finally it calculates the results and provide decision to the user.

E. Block Diagram

The block diagram represents the over view of the proposed system



F. Flow chart

This flowchart represents overall view of the proposed system

6. SVM Algorithm

Support Vector Machines is a directed AI calculation which can be utilized for both order or relapse difficulties. Be that as it may, it is for the most part utilized in characterization issues. In the SVM calculation, we plot every datum thing as a point in n-dimensional space (where n is number of highlights you have) with the estimation of each element being the estimation of a specific facilitate. At that point, we perform grouping by finding the hyper-plane that separates the two classes well overall. SVM will add a new feature for nonlinear hyper-plane z=x^2+y^2.

7. Experimental result

This device uses the Arduino and sensors to detect the value of the affected part in mouth. It detects the accurate value and ensure the user to know the possibility of cancer. The values are updated automatically in cloud and the user can view the result in mobile.

8. Conclusion

The aftereffect of this venture is to identify the malignant growth influenced cells in the mouth or oral pit and to order the disease influenced part to give results, for example, in warning message to client for their simpler way to deal with the specialists to begin their treatment proficiently. This gadget will distinguish the disease influenced cell at absolute first stage. The venture utilizes different procedures in the field of PC innovation utilizing the web of things and our future angles is to confirm whether the disease cells are spreading to different pieces of the framework.

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