VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama" Belagavi – 590 010

PROJECT REPORT ON

"DESIGN AND SIMULATION OF A SURFACE ACOUSTIC WAVE (SAW) BIOSENSOR FOR CANCER DETECTION"

Submitted in partial fulfillment of the requirements for the award of the degree

BACHELOR OF ENGINEERING
IN
ELECTRONICS & COMMUNICATION ENGINEERING

Submitted By

Name	USN
PRABHAKARA	4AL14EC064
RAINA BENITA LOBO	4AL14EC068
SATISH NAYAK	4AL14EC075
VARSHITHA C R	4AL14EC097

Under the Guidance of
Dr. D V Manjunatha
Sr. Professor & Head
Department of E&C Engineering

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

MOODBIDRI – 574 225.

2017-2018

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

MOODBIDRI – 574 225

(Affiliated to VTU, **BELAGAVI**)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the project work entitled **"DESIGN AND SIMULATION OF A SURFACE ACOUSTIC WAVE (SAW) BIOSENSOR FOR CANCER DETECTION"** *is a bona fide work carried out by*

PRABHAKARA	**4AL14EC064**
RAINA BENITA LOBO	**4AL14EC068**
SATISH NAYAK	**4AL14EC075**
VARSHITHA C R	**4AL14EC097**

in partial fulfillment for the award of BACHELOR of ENGINEERING in **ELECTRONICS & COMMUNICATION ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2017–2018. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering degree.

D.V.M 21.05.18	D.V.M 21.05.18	
Signature of the Guide	**Signature of the H.O.D**	**Signature of the Principal**
Dr. D V Manjunatha	**Dr. D V Manjunatha** **H. O. D.**	**Dr. Peter Fernandes** **PRINCIPAL**

Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

Alva's Institute of Engg. & Technology,
Mijar, MOODBIDRI - 574 225, D.K.

EXTERNAL VIVA

Name of the Examiners	Signature with date
1.....	.....
2.....	.....

ABSTRACT

Cancer is deadly disease which is caused due to uncontrolled growth of the cells and forms from the extra mass tissue known as tumour. Smoking, drinking more than one alcoholic drink a day (for women of all ages and men older than age 65) or two drinks a day (for men age 65 and younger), excessive exposure to the sun or frequent blistering sunburns, being obese, and having unsafe sex can contribute to cancer. The earlier cancer can be detected, the better the chance of a cure. In terms of cancer, the analyte being detected by the biosensor is a tumour biomarker. Thus, by measuring levels of certain proteins expressed and/or secreted by tumour cells, biosensors can detect whether a tumour is present, whether it is benign or cancerous, and whether treatment has been effective in reducing or eliminating cancerous cells. The biosensors can be designed to detect emerging cancer biomarkers and to determine drug effectiveness at various target sites. The designed biosensor has the potential to provide fast and accurate detection, reliable imaging of cancer cells, and monitoring of angiogenesis and cancer metastasis, and the ability to determine the effectiveness of anticancer chemotherapy agents.

The biosensor is designed using SAW devices which have the inter-digitated transducers excitation electrodes fabricated on the one side of the piezoelectric film. The sensor can transform an input electrical signal into a mechanical wave which can be easily influenced by physical phenomena. Then, the changed mechanical wave is transduced back into an electrical signal. The presence of the desired phenomenon can be detected through the difference between the input and output electrical signal (amplitude, phase, frequency, or time delay). As a result, the SAW devices have the acoustic waves propagating along the surface of the piezoelectric substrate. For SAW resonators the IDTs are fabricated in a central position and reflectors are added on both sides of the input and output IDTs to trap the acoustic energy within a cavity. The surface between the IDTs is coated with antibodies sensitive to the analyte to be detected. The analyte molecules binding to the immobilized antibodies on the sensor surface influence the velocity of the SAW and hence the output signal generated by the driving electronics. For biosensors it is necessary to take care of toxicity, reliability of the device, so in this work biodegradable and non-toxic polymer, PVDF is used.