

*BE Project*  
*CE Department*  
*Project ID: BUKC-CE-2020-08*  
*June 2021*



**Bahria University**  
Discovering Knowledge

# **Gyro Accelerometer Robotic Arm for Bomb Defusing**

**Muhammad Altaf**  
**Fouzia Bibi**  
**Haseeb Khan**

**Department of Computer Engineering**

**Bahria University, Karachi Campus**

## Submission Performa

Name (1) ..... Muhammad Altaf  
(2) ..... Fouzia Bibi  
(3) ..... Haseeb Khan

Address (1) ..... House 559 Chisti Nagar Gulistan e Jauhar Block 10 Karachi  
(2) ..... House # KS-801 Qalandrabad Gulistan- e Jauhar Block 10, Karachi  
(3) ..... House S-249 Sabir SRE Near PNS Shifa Defence Phase 1 Karachi

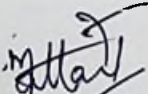
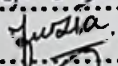
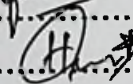
Title of Report: Gyro Accelerometer Robotic Arm for Bomb Defusing

Project Supervisor's Name: Engr. Usra Sami

This report is submitted as required for the Project in accordance with the rules laid down by the Bahria University as part of the requirements for the award of the degree of Bachelor of Engineering. I/We declare that the work presented in this report is my/our own except where due reference or acknowledgement is given to the work of others.

Signatures of students

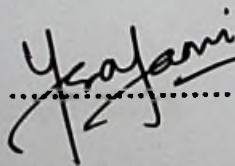
Date

(1) .....   
(2) .....   
(3) ..... 

1-7-2021  
.....  
1-7-2021  
.....  
1-7-2021  
.....

Signature of Supervisor

Date

  
.....

1/7/2021  
.....



## Intellectual Property Right Declaration

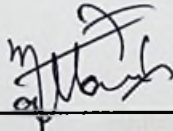
This is to declare that the work done under the supervision of **Engr. Usra Sami** having title “**Gyro Accelerometer Robotic Arm for Bomb Defusing**” carried out in partial fulfillment of the requirements of Bachelors of Engineering in Computer Engineering, is the sole property of Bahria University and is protected under the Intellectual Property right laws and conventions. Bahria University asserts legal and beneficial ownership rights over all Intellectual Property developed as a result of support either directly from or channeled through Bahria University, or created at the request or direction of Bahria University, or developed as a result of utilization of Bahria University Resources including copyright in any material. It can only be considered/ used for purposes like extension for further enhancement, product development, adoption for commercial/organizational usage, etc., with the permission of the university and in adherence to its policies.

The above statements apply to all students and faculty members.

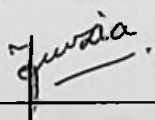
Date: June, 18<sup>th</sup> 2021

**Author(s):**

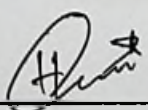
Name: Muhammad Altaf

Signature: 

Name: Fouzia Bibi

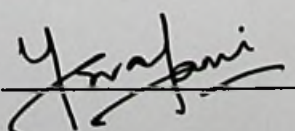
Signature: 

Name: Haseeb Khan

Signature: 

**Supervisor(s):**

Name: Engr. Usra Sami

Signature: 



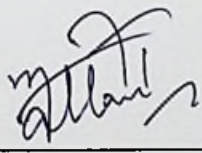
## Anti-Plagiarism Declaration

This is to declare that the above publication produced under the supervision of **Engr. Usra Sami** having title “**Gyro Accelerometer Robotic Arm for Bomb Defusing**” is the sole contribution of the author(s) and no part hereof has been reproduced illegally (cut and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. We will be responsible and liable for any consequence if violation of this declaration is proven.

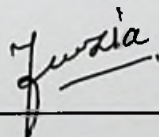
Date: June 20<sup>th</sup>,2021

**Author(s):**

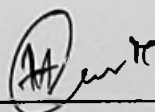
Name: Muhammad Altaf

Signature: 

Name: Fouzia Bibi

Signature: 

Name: Haseeb Khan

Signature: 

## Acknowledgments

Final Year Project is a demonstration for undergraduate students which is combination of teamwork and implementation of theoretical and practical knowledge. It enhances abilities of students to step up in their field. With this willingness, we affiliated with this project.

In the successful accomplishment of our project, we would like to express our sincere gratitude and appreciate those people who are actively involved in our project.

Foremost, all thanks to **Allah (S. W. T)** for being able to compete with a great feat in these endeavors and helped out to make our project successful in this pandemic situation.

Next, we are highly obliged in taking the opportunity to sincerely thank our project Coordinator **Dr. Rizwan Iqbal** for helping us in managing and other project tasks. We also want our deepest thanks to the Head of CE department **Dr. Shoaib Mughal** for his support and kind cooperation in our difficult phases. Lastly, all of our team express great appreciation and special thanks to our project supervisor **Engr. Usra Sami** for guiding, monitoring, and support us throughout the project lifecycle with his great experience and knowledge.

## **Abstract**

Human lives are becoming more dependent on robotics and the reason behind this is, robots can perform such daily activities with spectacular speed, precision and skill despite. Remote controlled bomb defusing robot will do the job to disable the explosive devices as it lowers down the chances of injury and defused the bomb manually. Our project will be used for bomb defusing and reduce the human interaction near to bomb. It helps the bomb squad to defuse the bomb without risking their lives.

**“Gyro Accelerometer Robotic Arm for Bomb Defusing”** is a linear robot which helps in bomb diffusing activities. Robotic arm is controlled by human hand motions. We placed a cutter at the edge of robotic arm which cuts the wire of bomb. It only cuts those wires that are human instructed. Camera is placed on robotic arm and human can see those activities through mobile and mobile is placed on VR glasses which shows complete location of robot.

## Table of Contents

### Contents

<b>1. INTRODUCTION.....</b>	<b>1</b>
1.1 PROBLEMS STATEMENT.....	1
1.2 OBJECTIVES OF THE PROJECT .....	2
1.3 SCOPE OF THE PROJECT .....	2
1.4 PURPOSE OF THE DOCUMENT .....	3
1.5 DIFFERENT HARDWARE BEING USED.....	4
1.6 OVERVIEW OF THIS DOCUMENT .....	5
<b>2. BACKGROUND AND LITERATURE REVIEW .....</b>	<b>7</b>
2.1 EXISTING SYSTEMS DESCRIPTION .....	7
2.2 PROBLEMS IN THE EXISTING SYSTEMS .....	8
<b>3. SYSTEM ANALYSIS.....</b>	<b>9</b>
3.1 WORK ANALYSIS .....	9
3.1.1 <i>Work Flow Diagram</i> .....	9
3.1.2 <i>Working Of Robotic Arm Diffusion Components</i> .....	10
3.1.3 <i>Work Breakdown Structure</i> .....	11
3.2 TECHNICAL DESIGN .....	12
3.3 PROJECT MANAGEMENT.....	13
3.4 PROJECT MANAGEMENT STRATEGIES .....	13
3.5 PROJECT SCHEDULE .....	14
3.6 GANTT CHART .....	15
3.7 PERFORMANCE OF ACTIVITY BY GROUP MEMBERS .....	16
3.8 FLOW CHART .....	17
3.8.1 <i>Project Planing</i> .....	18
3.9 SYSTEM REQUIREMENT.....	19
3.9.1 <i>Resource Requirements</i> .....	19
3.10 PERFORMANCE REQUIREMENT .....	20
3.11 MAINTAINABILITY REQUIREMENTS .....	20
3.12 SECURITY REQUIREMENTS .....	20
3.13 PROPOSED SOLUTION .....	21
<b>4. SYSTEM DESIGN.....</b>	<b>22</b>
4.1 INTRODUCTION.....	22
4.2 PROJECT MANAGEMENT STRATEGIES .....	22
4.3 DEVELOPMENT METHOD.....	22
4.4 SYSTEM DESIGN .....	22
4.4.1 <i>System Architecture</i> .....	22
4.4.2 <i>Harware and Software Modules:</i> .....	23
4.4.3 <i>Detailed System Design</i> .....	24
4.4.4 <i>Detailed Component Description</i> .....	25

4.4.5	<i>Block Diagram</i> .....	35
4.5	END-USER CHARACTERISTICS .....	36
4.6	ASSUMPTIONS / CONSTRAINTS .....	36
<b>5.</b>	<b>IMPLEMENTATION</b> .....	<b>37</b>
5.1	FEATURES OF ARDUINO UNO .....	37
5.1.1	<i>Arduino Programming</i> .....	39
5.1.2	<i>Voltage Protection of USB</i> .....	40
5.1.3	<i>Physical Characteristics</i> .....	40
5.1.4	<i>Benefits of Using Arduino Uno</i> .....	40
<b>6.</b>	<b>TESTING</b> .....	<b>45</b>
6.1	INTRODUCTION.....	45
6.2	FUNCTIONAL TESTING.....	45
6.3	TEST RISK/ ISSUES .....	45
6.3.1	<i>Items To Be Tested</i> .....	46
6.3.2	<i>Test Approaches</i> .....	47
6.3.3	<i>Test Deliverables</i> .....	47
6.4	SYSTEM TESTING .....	48
6.4.1	<i>Test Risks/ Issues</i> .....	48
6.4.2	<i>Test Pass/ Fail Criteria</i> .....	48
6.4.3	<i>Test Deliverables</i> .....	48
<b>7.</b>	<b>RESULTS AND DISCUSSION</b> .....	<b>49</b>
7.1	INTRODUCTION.....	49
7.2	RESULTS OF ALL COMPONENTS AND SENSORS .....	49
7.3	APPLICATIONS OF GYRO ACCLEROMETER ROBOTIC ARM FOR BOMB DEFUSING ROBOT .....	49
7.4	DISADVANTAGES OF GYRO ACCLEROMETER ROBOTIC ARM FOR BOMB DEFUSING ROBOT .....	50
<b>8.</b>	<b>CONCLUSIONS AND FUTURE WORK</b> .....	<b>51</b>
8.1	CONCLUSION .....	51
8.2	FUTURE WORK.....	51
<b>9.</b>	<b>REFERENCES</b> .....	<b>52</b>
<b>10.</b>	<b>APPENDICES</b> .....	<b>53</b>
	APPENDIX A.....	53