

EMG-ARMBAND

SHAFIA IQBAL SIDDIQUI MUHAMMAD RIZWAN MUHAMMAD WAJAHAT AZHER

A project report submitted in partial fulfilment of the requirements for the award of the degree of Bachelors of Electrical Engineering

Electrical Engineering
Bahria University, Karachi Campus

ACKNOWLEDGEMENTS

We would like to thank everyone who contributed to the successful completion of this project. We would like to express our gratitude to our research supervisor, Sir Faisal Siddiqui, for his invaluable advice, guidance and his enormous patience throughout the development of the research.

In addition, we would also like to express our gratitude to our loving parents for funding our project and always believing in our idea and making all efforts so that we can complete this project.

EMG-ARMBAND

ABSTRACT

This project explores the field of EMG signals and how they can be used in controlling devices or applications. The objective of this project is to control various electronic devices using EMG and Bluetooth communication. The user will be able to control the device by wearing an EMG Armband that reads muscle signals. The Armband will respond accordingly to the "Muscle movement" of the user i.e. if the user wants to control the required device, he/she will do it by forming certain gestures. For us it is a revolution in technology but for the physically disabled, it is a life changer. People with Paresis, in which one half of their body is working, but the other half of the body is paralyzed or others with some sort of physical disability will be able to control their own devices without the help of any attendant by using the wave of their hand. EMG Armband can change the lives of paralyzed and physically disabled people by giving them independence and freedom of controlling their own work through the Armband.

TABLE OF CONTENTS

DECLARA	TION			ii			
APPROVA	iii						
ACKNOW	vi						
ABSTRAC	vii						
TABLE OF	CONTE	NTS		viii			
LIST OF FI	xi						
LIST OF TA	xiii						
LIST OF A	xiv						
LIST OF SYMBOLS/ABBREVIATIONS							
CHAPTER	1			16			
1	INTRO	DDUC	TION	16			
	1.1	Back	ground	16			
	1.2	Prob	lem Statements	16			
	1.3	Aims	s and Objectives	17			
	1.4	Scop	e of Project	17			
CHAPTER :	2			19			
2	LITER	RATUI	RE REVIEW	19			
	2.1	2.1 EMG					
	2.2	2.2 Bluetooth Communication					
	2.2.	.1	HC-05 Bluetooth module	20			
	2.3	22					
	2.3.	.1	Arduino IDE	27			
	2.3.		Arduino Software	27			
	2.3. 2.3.		Opening Window Standard Tools	27 29			

	2.3.5 2.3.6		Sketchbook Concept Libraries	29 30
		3.7	Additional Hardware Compatibility Serial Plotter	30
	2.3.8 2.3.9		Software Window	30 32
	2.:	3.10	Closing of Arduino	33
	2.:	3.11	Using Arduino IDE	33
	2.4	Flex S	Sensors	34
	2.5	Musc	le Sensor	36
	2.6	Electi	rodes	37
	2.7	Gyro	Sensor	40
		7.1 7.2	Working with Gyro 6-Axis Vs 3-Axis Gyro	41 41
	2.8	Accel	erometer	42
	2.9	MPU-	-6050 Gyro+Accelerometer	43
	2.10		soft Visual Studio	44
	2.1	1.1	Code Editor	45
	2.1	0.2	Supported Products 46	
	2.1	0.3	Using Microsoft Visual Studio	46
CHAPTER 3				47
DESIGN AN	D MET	CHODO	LOGY	47
	3.1	Startin	ng with the Project	47
	3.1	.1	Designing the circuit diagram	48
	3.1	.2	Fabrication of the muscle sensor	48
	3.1	.3	Designing the Moving Average filter	49
	3.1	.4	Working with MPU-6050	50
	3.1	.5	Designing Application for Controller	52

IMPLMENT	[ATIO]	N		53		
	3.2.1	Interfacing muscle sense	53			
	3.2.2 Connecting The MPU-6050 with arduino3.2.3 Interfacing HC-05 Module					
	3.2.4	Applying Filters on Mus	55			
CHAPTER 4	4			56		
4.1	RESU	IS	56			
	4.2	Cost Analysis		57		
CHAPTER 5	5			58		
CONCLUSIO	ON AN	D RECOMMENDATIO	NS	58		
	5.1	Conclusion		58		
	5.2	Recommendations	Error! Bookmark no	ot defined.		
		•				
APPENDICE				61		
APPENDIX A	A			61		
APPENDIX E	3			62		
REFERENC	ES			68		