



Final Year Project Showcase Batch-2019 Year 2023

Department: Biomedical Engineering Programme: Biomedical Engineering	
1	Project Idea Enhancing Working Memory in Alzheimer’s Patients by Modified Binaural Beat Stimulation.
2	Process Twenty-five (25) AD individuals (16 males, 9 females 69.96 ± 8.66 years old) included in this study, were divided into Experimental (n=15) and Control (n=10) group. The experimental group was provided BB stimulation of 10 Hz difference (Left ear: 400 Hz and Right ear: 410 Hz) whereas control group received a created tone comprising the frequency of 400 Hz in both left and right ears. The experimental protocol comprises of 14 days with pre and post psychometric and neurological assessment. On day 1 the protocol is commenced with EEG recording for five minutes each in closed and opened eyes states. Following with MMSE and DASS-21 questionnaires with some general questions. Throughout days 2 to 13, the experimental group received BB stimulation, while the control group received a created tone. On the day 14 both groups adhere to the identical protocol as on the day 1.
3	Outcome The study shows that binaural beat stimulation has potential benefits for individuals with AD and dementia, improving emotional well-being and cognitive functions. The behavioral results highlight the positive impact of binaural beat stimulation on emotional wellbeing as demonstrated by declines in depression and stress scores as well as increases in cognitive processes, as shown by improvements in orientation, recollection and language skills. Neural mechanisms revealed increased theta band power, associated with working memory enhancement, providing further support for the results.
4	Evidence (Theoretical Basis) Experimental Group individuals showed reduced depression, anxiety and stress scores (DASS-21) and improved cognitive functions (MMSE). Enhanced daily performance trends were observed, distinguishing from the Control Group. EEG recordings revealed increased theta band power and decreased alpha band power in the Experimental Group. This study underscores binaural beat stimulation's promise as a non-invasive intervention for enhancing emotional and cognitive well-being in AD patients, urging further research given the escalating dementia prevalence.
5	Competitive Advantage or Unique Selling Proposition (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence



a	<p>Attainment of any SDG (e.g. How it is achieved and why it is necessary for the region)</p> <p>1. Good health and wellbeing: By enhancing cognitive and emotional well-being in AD patients.</p> <p>2. Sustainable Cities and Communities : It is a non-Invasive and cost effective intervention which may reduce medication dependency in AD patients.</p>	
b	<p>Any Environmental Aspect (e.g. carbon reduction, energy-efficient, etc.)</p> <p>Contrasts with certain pharmaceutical interventions that generate hazardous waste and require resource-intensive production processes.</p>	
c	<p>Cost Reduction of Existing Product</p> <p>Compared to traditional pharmaceutical treatments for AD, binaural beat stimulation is likely to be more cost-effective.</p>	
d	<p>Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process (e.g. What is the issue is current process and what improvement you suggests)</p> <p>Future research should aim to incorporate these insights by building upon more robust control conditions, extending follow-up periods and involving a more diverse range of individuals. By exploring the potential long-term effects and broader applicability of binaural beat stimulation, we can enhance our comprehension of non-invasive interventions that hold potential for the well-being of individuals with dementia and implement BB setups in clinical settings.</p>	
e	<p>Capture New Market (e.g. Niche market or unaddressed segment)</p> <p>It addresses the pressing need for non pharmacological, cost effective and accessible interventions for AD patients.</p>	
6	<p>Target Market</p> <p>Target market may be healthcare institutions, Old Age Homes, neuro scientists, caregivers, and families of AD patients in Pakistan and beyond.</p>	
7	<p>Team Members (Names along with email address)</p>	<p>Faryal Siddiq Shaheera Shoaib Syeda Sehar Hussain Syedah Sarah Vasty</p> <p style="text-align: right;">bm19035ned@gmail.com shaheerashoaib89@gmail.com seharhussain003@gmail.com bm19012ned@gmail.com</p>
8	<p>Supervisor Name (along with email address)</p>	<p>Dr. Muhammad Danish Mujib</p> <p style="text-align: right;">muhammaddanishmujib@gmail.com</p>

<p>1 0</p>	<p>Pictures (If any)</p>	
<p>1 1</p>	<p>Video (If any)</p>	<p>https://drive.google.com/drive/folders/1OKkNXoBztyoVICNwMwhy1qYFLQbaXGQk?usp=sharing</p>