



Bharatiya Vidya Bhavan's
SARDAR PATEL INSTITUTE OF TECHNOLOGY
Munshi Nagar, Andheri (W), Mumbai – 400 058.
(Autonomous Institute Affiliated to University of Mumbai)

3.4: Research Publications and Awards

3.4.1: The Institution ensures implementation of its stated Code of Ethics for research.

Constitution of the ethics committee and its proceedings as approved by the appropriate body

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		AY 2019-20



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SARDAR PATEL INSTITUTE OF TECHNOLOGY (Autonomous Institute)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai - 400 058, India
E mail: principal@spit.ac.in Website: www.spit.ac.in

Ref.: SPIT/IEC/2020-21/1478-A

Date :01/04/2020

Institutional Ethics Committee (IEC)

An Institutional Ethics Committee (IEC) is being established to formalize and specify institution's commitment to the promotion of high scientific and ethical standards in patient care, professional education, clinical research, and community interests. All Research involving human subjects should be conducted in accordance with three basic ethical principles, which include

- Beneficence
- Respect for persons
- Justice

IEC members are appointed by the Head of the Institute, Dr. B.N. Chaudhari, Bhavan's S.P.I.T.

ROLES AND RESPONSIBILITIES OF THE IEC AND ITS MEMBERS

The IEC Committee shall:

- Provide independent and competent review of all ethical aspects of research proposals.
- Review research proposals submitted to it within a reasonable time and document its views in writing to the applicant(s).
- To assist in the development and education of a research community responsive to local health care requirements.
- Safeguard the dignity, rights, safety, and well-being of all study participants and communities paying special attention to investigations that may involve vulnerable participants.

- Request the Investigator(s) to explain any aspect of the study that may require personal appearance at its Committee meeting.
- Provide guidance to the Investigator on all aspects of the welfare and safety of research participants.
- Ensure scientific soundness of the proposed research.
- Make available acceptable standard format accepted by the committee for submissions of research proposals.
- Obtain relevant documents including but not limited to the following:
 - Trial Protocol (including protocol amendments)
 - Patient Information Sheet and Informed Consent Form (including updates if any)
 - Investigator's Brochure
 - Proposed methods for patient accrual including advertisement (s) etc. proposed to be used for the purpose.
 - Principal Investigator's current CV.
 - Insurance Policy / Compensation for participation and for serious adverse events occurring during the study participation.
 - Investigator's Agreement with the Sponsor.
 - Investigator's Undertaking
- Consider the suitability of the Investigator(s) for the proposed study with respect to relevant qualification, training and experience, as documented by current curriculum vitae and/or by any other relevant documentation.
- Review both the amount and type of benefit to participants to ensure that neither presents problems, coercion or undue influence on the study participants.
- Review and revise SOPs from time to time not exceeding 3 years.
- Review afresh proposals that have been submitted and approved elsewhere.
- Be trained and up to date on regulatory requirements

Following members are nominated to the Institutional Ethics Committee (IEC):

Sr.No	Name of members	Position on Ethics Committee	Designation and Affiliation	Qualification	Gender
1	Dr. B. N. Chaudhari	Chairman	Head of the Institute, Bhavan's S.P.I.T.	PhD	Male
2	Dr. Dhananjay R Kalbande	Member Secretary	Dean(Industry Relation), Professor & Head, (Computer Engg.)	PDF, PhD	Male
3	Dr. Avinash Rao	Basic Medical Scientist	Doctor- Paediatric Intensivist	MBBS,MD, DCH	Male
4	Mr. Asif Mulla	Legal Expert	Lawyer	M.A., LLM	Male
5	Mrs. Deepa Krishnan	Social Worker	Adjunct Associate Professor Head of Abhyudaya, Project, SPJIMR	PGDM	Female
6	Mr. Anand Gondhalekar	Layperson	Govt. Servant	B.A.	Male
7	Dr. Y.S.Rao	Faculty Member	Dean (R & D) Professor & Head (Electronics & Tele.).	Ph.D	Male

All shall take charge of the responsibilities of the cell with immediate effect and same shall remain in force till further order.

(Dr. B. N. Chaudhari)

Principal, Chairman(IEC-SPIT)

CC to :

1. All Members,
2. Registrar
3. Deans ,Heads and Deputy Heads.
4. Exam section.
5. Account section
6. HR section



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આ નો મદ્રા : કૃતવો ચન્તુ વિશ્વત : /

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Ref.: SPIT/IEC/2019-20/519-A

Date :01/07/2019

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2	Dr. Dhananjay R Kalbande	Member Secretary	Dean(Industry Relation), Professor & Head, (Computer Engg.)	PDF, PhD	Male
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(Dr. Y.S. Rao)

Incharge Principal, Chairman(IEC-SPIT)

CC to :

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- 2.Registrar
- 3.Deans ,Heads and Deputy Heads.
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INSTITUTIONAL ETHICS COMMITTEE (IEC)

SPIT 17/18 | 2816

2816
Ref. SP 17/17-18/
Date: 13/4/18

OFFICE ORDER

An Institutional Ethics Committee (IEC) is being established to formalize and specify institution's commitment to the promotion of high scientific and ethical standards in patient care, professional education, clinical research, and community interests. All Research involving human subjects should be conducted in accordance with three basic ethical principles, which include

- Beneficence
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- Justice

IEC members are appointed by the Head of the Institute, Dr. Prachi Gharpure, SPIT.

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1	Dr.Prachi Gharpure	Chairman	Head of the Institute,S.P.I.T.	PhD	Female
2	Dr. Dhananjay R Kalbande	Member Secretary	Dean(Industry Relation), Professor & Head, (Computer Engg.)	PDF, PhD	Male
3	Dr. Avinash Rao	Basic Medical Scientist	Doctor-Paediatric Intensivist	MBBS,MD, DCH	Male
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 Dr. Prachi Gharpure
 Principal, Chairman(IEC-SPIT)

CC to :

- 1.All Members,
- 2.Registrar
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Date : 25th Nov 2021.

Dr. Dhananjay R. Kalbande
Principal Investigator,
Professor ,Department of Computer Engineering,
Bharatiya Vidya Bhavan's Sardar Patel Institute of Technology.

Subject : - Approval of Project “An Intelligent Life Companion - “Design and development of AI based Solution to assist in daily chores of elderly and children with disabilities”.to be submitted to TIDE, DST.

Dear Dr. Kalbande Dhananjay,

We are pleased to inform you that the above referenced Project “An Intelligent Life Companion - “Design and development of AI based Solution to assist in daily chores of elderly and children with disabilities” has been approved on behalf of the Institutional Ethics Committee (IEC). This approval is in effect for three years from the above-mentioned date. Any changes in the procedures affecting interaction with human subjects should be reported to IEC. Significant changes will require the submission of revised Request for Approval of the Project.

Best wishes for success in this project.

Sincerely,

Dr.B.N.Chaudhari
Chairman
Institutional Ethics Committee



INSTITUTIONAL ETHICS COMMITTEE (IEC)

Bharatiya Vidya Bhavans Sardar Patel Institute of Technology
Munshi Nagar, Andheri (West), Mumbai 400 058
(91)-(022)-26707440, 26287250

Annexure 1

Project submission application form for initial review for all academic (non-sponsored) studies.

Please fill in the details in legible hand writing

Tick ✓ in the box for the appropriate answer/ Write NA if question is not applicable

IEC Protocol no. 01

Title of the project

Educative Games for Autistic Children

	Name	Qualification Designation	Department and Institution
Principal Investigator	Dr. Dhananjay R. Kalbande	Post-Doctorate(TISS), Ph.D. Dean (Industry Relations) Professor & Head Department of Computer Engineering	Department of Computer Engineering Bharatiya Vidya Bhavan's Sardar Patel Institute of Technology
Co-Investigator	Dr. Surendra Singh Rathod	Ph.D. Dean Academics, Head of Electronic Engineering Department and Professor of Electronics Engg.	Electronics Engineering , Sardar Patel Institute of Technology, Andheri (West), Mumbai

"Principal investigator must be a faculty / employee of Sardar Patel Institute of Technology and have appropriate post graduate qualification approved by respective statutory council".

Is the study in collaboration with a Medical Institute/Hospital/Practitioner? If yes, give details



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Non-sponsored study <input type="checkbox"/>		Sponsored study <input type="checkbox"/>
If Non-Sponsored Study:		
Type of study : Thesis/dissertation <input type="checkbox"/>	Other Academic <input type="checkbox"/>	
Duration of study _____	Approx. Completion date (MM/YY) _____	
If sponsored,		
Total Budget : Rs. _____		
From where is the study being funded		
a) Research fund is being utilized from DST <input checked="" type="checkbox"/>	Research Society <input type="checkbox"/>	AICTE <input type="checkbox"/>
Others		
If any other, please give details _____		
1. Type of Study : Prospective <input type="checkbox"/> Retrospective <input checked="" type="checkbox"/> Cross-sectional <input type="checkbox"/>		
Is the study observational/ Interventional? _____		
If interventional, does the study involve any deviation from routine/standard practices? _____		



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2. Research Proposal: Relevant background Information

The Project focuses on the design & implementation of an intelligent, serious game for individuals with Autism Spectrum Disorder using Artificial Intelligence and ICT (Information and Communication Technology). Unlike entertainment games which are designed for playing purposes only, serious games foster learning of targeted skills that are particularly difficult. We feel that computerized interventions for individuals with autism may be much more successful if motivation can be improved and learning can be personalized, rather than building on the already existing generic games and tools. For this purpose, we shall use the Indian Scale for Assessment of Autism which will help to assign individualized starting points.

(Please Attached separate sheet for more information)

3. Research Proposal: Main objectives

- I. To develop an adaptive, educative game
- II. To focus on individualized goals and objectives
- III. To help the individuals perform day to day activities
- IV. To maintain the appeal of the game while keeping it serious

4. Methodology and Technical approach of the proposal

Since autistic children have the right to live a normal life but are unable to do so, this game presents an economic and excellent opportunity to aid them in the process. In the process we can get a further insight on how autistic children react to adaptive games. Since repetitive behavior is one of the major problems, the game will have a special focus towards that.



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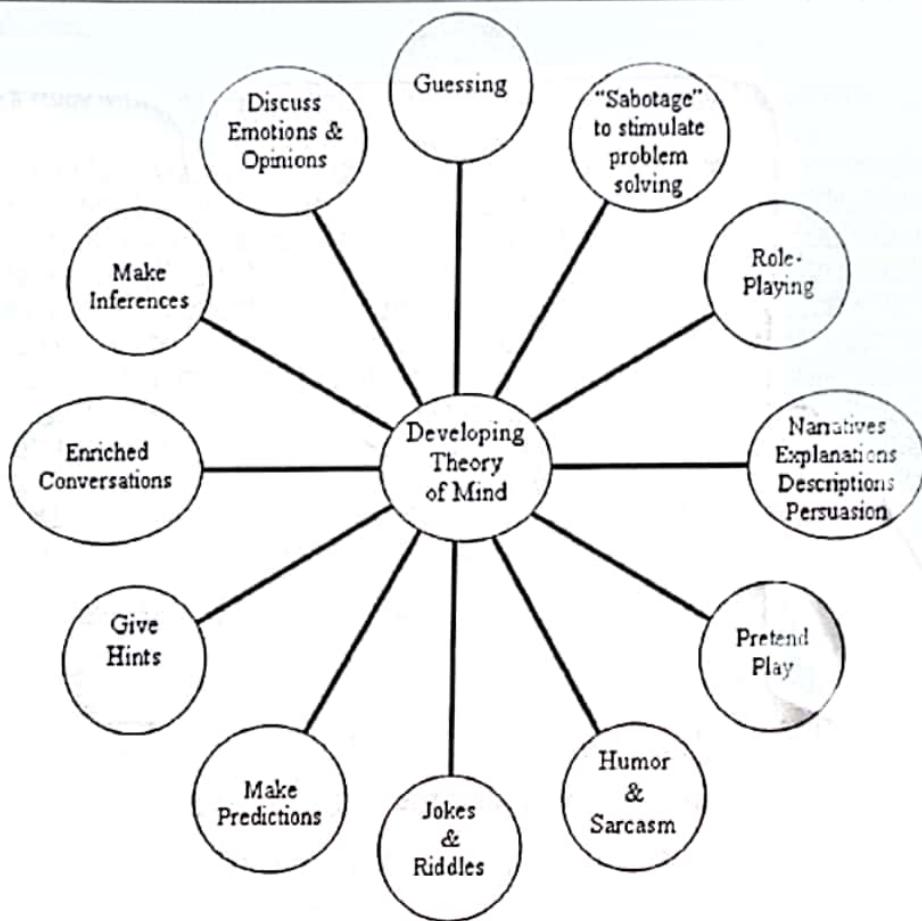


Figure : Methodology

The above diagram represents the various developmental phases of the mind. We will try and incorporate each and every one of these to aid in the all round development of the autistic children.



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5. Subject selection:

Justify why a study with human participants is needed to answer the research questions.

Studied the various issues and problems including wide range of social and communication problems faced by autistic children in Maharashtra state. Based on the research article, Identified the main challenge for them is to be able to perform day-to-day activities and to be able to respond to change, something which they're unable to do on their own. Analysis has been done to study the advances in technology over the course of time with respect to intervention in Autism, along with their merits and demerits. Today, there are more than one million apps available that aid autistic individuals, and the number continues to grow daily. The apps vary in price from free to several hundred dollars. There is an app for anything and everything. However, caution must be exercised. Like every other strategy used for the treatment of (Autism Spectrum Disorders) ASD, the selection of the technology and/or the apps must be personalized to meet the individual needs of the learner. Individualized assessment and data are necessary before making a decision about any technology to be used. Research is needed to gather the consumer inputs and new technology to be developed.

Also justify the number of participants required.—

i) Number of subjects

at this centre if multicentric, total number of subjects .

ii) Vulnerable subjects Yes No (If yes, tick the appropriate boxes)

pregnant women illiterate seriously/terminally ill

children neonates mentally challenged

elderly handicapped economically/socially backward

institutional employees / students any other

If other, please specify _____

Relevant annexures filled Yes No

6. Will any advertising be done for recruitment of Subjects? (Posters, flyers, brochures, etc.) If yes, kindly attach a copy for IEC review. Participant recruitment process, inclusion and exclusion criteria for selection of participants.

Yes

No

7. Usefulness of the project / trial

Current solutions available to fight Autism are games which are not personalised according the individual needs. The game applications that are available to help the Autistic children improve their skills are not



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intelligent. These applications either focus on a single skill, which is not personalised according to the abilities of the children. With advancing technology there is an urgent need to make learning individualised. The proposed application will be an intelligent system, which learns the actions of the user to target the skill in which the user is weak in. The log and record of the children's action is recorded for future reference by the child's doctor. This can help the doctor determine the skill in which the child is weak.

8 Explain the plans to maintain confidentiality of records / data

9. Explain the plans of publication of results (positive or negative) while maintaining confidentiality of personal information/identity

10. How does the PI propose to store and maintain the human material or data obtained from the study.

11. Specific ethical issues, as identified by the investigating team



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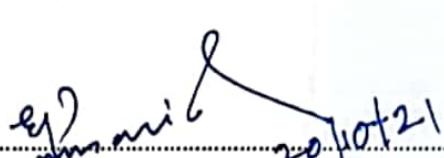
12. Do you have any conflict of interest in the present study?

(financial / non – financial/ any other)

If yes, specify:

13. Is any other department involved in participant recruitment/investigation, but not co-investigators or collaborators ? Yes/No

If yes, specify

Name and signature of concerned HOD  10/21

We hereby declare the information given above is true. A copy of the study report will be submitted at the end of the study.

Signature of Principal Investigator: D . R . Kalkanale 

Sr

Signatures of Co- investigators: 1. Surendra Rathod

3. _____

4. _____

Forwarded by Heads of Department(s) _____

Stamp/Seal of the Department(s)

Please fill the form in legible handwriting or type the information.

Write 'Not Applicable' (NA) wherever necessary.

Incompletely filled form will not be accepted.



Bharatiya Vidya
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E mail: principal@spit.ac.in website: www.spit.ac.in

Date : 23/07/2020

To,

Dr.Sudhir Dhage,
Principal Investigator,
Department of Computer Engineering,
Bharatiya Vidya Bhavan's Sardar Patel Institute of Technology

and

Ms.Deepti Pawar
Co-Investigator
Ph.D. Research Scholar
Department of Computer Engineering,
Bharatiya Vidya Bhavan's Sardar Patel Institute of Technology.

Subject : - Approval of Project "A Speech model for unvoiced speech recognition based on EEG".

Dear Investigators,

We are pleased to inform you that the above referenced Project "**A Speech model for unvoiced speech recognition based on EEG**" has been approved on behalf of the Institutional Ethics Committee (IEC). Further the IEC-SPIT recommends to follow the Institutional Ethics Committee rules of the respective Research Centre/Institute from where the clinical trials is planned to do. This approval is in effect for one year from the above mentioned date. Any changes in the procedures affecting interaction with human subjects should be reported to IEC-SPIT. Significant changes will require the submission of revised Request for Approval of the Project.

Best wishes for success in this project.

Sincerely,

S. Chaudhary
Chairman,
Institutional Ethics Committee (IEC-SPIT)

Date: 29/01/2020

To,
The Secretary,
Institutional Ethics Committee,
Sardar Patel Institute of Technology, Andheri (West),
Mumbai-400 058

Subject: Regarding Institutional Ethics Committee approval for Research Project Title: "A Speech Model for Unvoiced Speech Recognition based on EEG.

Dear Sir

We the undersigned wish to take the ethics committee approval for the project titled 'A Speech Model for Unvoiced Speech Recognition based on Electroencephalography'; since the project is based on the silent speech EEG trials of human participants. The acquisition of trials will be in consult with doctors. The required annexures with supporting documents are attached.

Anticipating your cooperation.

Thanking You.

Dr. Sudhir N. Dhage, PhD (Technology) in Computer Engineering
Professor,
Department of Computer Engineering
Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology, Andheri (West), Mumbai-400 058

Dipti Pawar
Ph.D. Research Scholar,
Department of Computer Engineering
Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology, Andheri (West), Mumbai-400 058



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Annexure 1

Project submission application form for initial review for all academic (non-sponsored) studies.

Please fill in the details in legible hand writing

Tick √ in the box for the appropriate answer/ Write NA if question is not applicable

IEC Protocol no. _____

Title of the project

A Speech Model for Unvoiced Speech Recognition
based on Electroencephalography.

	Name	Qualification Designation	Department and Institution
Principal Investigator	Dr. Sudhir Dhave	PhD (Technology) Comp. Engg.	Dept. of Comp. Enqg.; SPIT, Mumbai.
Co-Investigator	Dipti Pawar	PhD Research Scholar (comp. Enqg.)	Dept. of Comp. Enqg.; SPIT, Mumbai.
Co-Investigator			
Co-Investigator			
Co-Investigator			

"Principal investigator must be a faculty / employee of Sardar Patel Institute of Technology and have appropriate post graduate qualification approved by respective statutory council".

Is the study in collaboration with a Medical Institute/Hospital/Practitioner? If yes, give details

No



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Non-sponsored study	<input checked="" type="checkbox"/>	Sponsored study	<input type="checkbox"/>
If Non-Sponsored Study:			
Type of study : Thesis/dissertation	<input checked="" type="checkbox"/> Other Academic <input type="checkbox"/>		
Duration of study _____	Approx. Completion date (MM/YY) _____		
If sponsored, Self Sponsored			
Total Budget : Rs. _____			
From where is the study being funded			
a) Research fund is being utilized from DST	<input type="checkbox"/>	Research Society	<input type="checkbox"/> AICTE <input type="checkbox"/>
Others			
If any other, please give details _____			
1. Type of Study : Prospective <input type="checkbox"/> Retrospective <input checked="" type="checkbox"/> Cross-sectional <input type="checkbox"/>			
Is the study observational/ Interventional? Observational			
If interventional, does the study involve any deviation from routine/standard practices?			
2. Research Proposal: Relevant background Information In non-invasive BCI EEG is the most popular technique due to its portability, high temporal resolution, relatively low cost & less risk. The EEG was used in prior studies to recognize restricted no. of images, words or syllables. The EEG signals classification based on motor imagery BCI has been studied extensively. Researchers successfully implemented motor imagery BCI systems based on the imagination of limb movement paradigm. The imagined speech EEG signals without any mouth or tongue movement are still difficult to classify. (Please Attach separate sheet for more information)			



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3. Research Proposal: Main objectives

1. To investigate most important electrode positions for the recognition of silent speech.
2. To improve the speech model performance by extracting relevant and meaningful features from EEG.
3. To analyse the performance of classifier.
4. To build model for silent speech recognition of words.

4. Methodology and Technical approach of the proposal

1. EEG based neural signal acquisition for the words.
2. EEG signal preprocessing.
3. Feature extraction.
4. Build the classification model to discriminate words.

5. Subject selection:

Justify why a study with human participants is needed to answer the research questions. The EEG signals of human beings for words need to be acquired for the development of silent speech recognition system

Also justify the number of participants required.—

i) Number of subjects

at this centre if multicentric, total number of subjects 06

ii) Vulnerable subjects Yes No (If yes, tick the appropriate boxes)

pregnant women illiterate seriously/terminally ill

children neonates mentally challenged

elderly handicapped economically/socially backward

institutional employees / students any other

If other, please specify students from other college

Relevant annexures filled Yes No



INSTITUTIONAL ETHICS COMMITTEE (IEC)

Bharatya Vidya Bhawan Bardar Patel Institute of Technology
Munshi Nagar, Andheri (West), Mumbai 400 068
(01)- (022)-26707440, 26287260

6. Will any advertising be done for recruitment of Subjects? (Posters, flyers, brochures, etc.) If yes, kindly attach a copy for IEC review. Participant recruitment process, inclusion and exclusion criteria for selection of participants.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
---	------------------------------	-----------------------------

7. Usefulness of the project / trial

The proposed research will lead to the development of efficient and effective silent speech recognition system using EEG based Brain computer interface. This research would enable fast and natural communication with the help of silent speech & give voice to otherwise mute people.

8. Explain the plans to maintain confidentiality of records / data

We don't reveal the identity of person.
We will maintain the proper confidentiality of records

9. Explain the plans of publication of results (positive or negative) while maintaining confidentiality of personal information/identity

We won't reveal the identity of person in any publications.

10. How does the PI propose to store and maintain the human material or data obtained from the study.

The EEG data obtained from the study will get stored on Hard disk & secured.
We won't publish the data online

11. Specific ethical issues, as identified by the investigating team



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(91)-(022)-26707440, 26287250

12. Do you have any conflict of interest in the present study? No

(financial / non – financial/ any other)

If yes, specify: _____

13. Is any other department involved in participant recruitment/investigation, but not co-investigator(s) or collaborators ? Yes/No

If yes, specify _____

Name and signature of concerned HOD Dr. Anant V. Nimbark
H. O. D. COMPUTER ENGG. DEPT.
Sardar Patel Institute of Technology
Munshi Nagar, Bhavans Campus,
Andheri (W), Mumbai - 400 058.

We hereby declare the information given above is true. A copy of the study report will be submitted at the end of the study.

Signature of Principal Investigator: _____

(Dr. Sudhir Dhage)

Signatures of Co- investigators: 1. _____

DPS (Dipti Pawar)

2. _____

3. _____

4. 29/01/2020

Forwarded by Heads of Department(s)

H. O. D. COMPUTER ENGG. DEPT.

Sardar Patel Institute of Technology
Munshi Nagar, Bhavans Campus,
Andheri (W), Mumbai - 400 058.

Stamp/Seal of the Department(s)

Please fill the form in legible handwriting or type the information.

Write 'Not Applicable' (NA) wherever necessary.

Incompletely filled form will not be accepted.



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Annexure 2

Check List for Protocol Submission

Check List of Documents for Protocol Submission to the Institutional Ethics Committee to be filled in by the study team.

Protocol submission for initial review.

(Tick accordingly, compulsory documents have to be submitted by ticking in the box marked as 'Yes') *

Compulsory documents for initial review.

Sr. No.	Document	Yes	No	Date by which it will be submitted if pending	NA
1	*Project submission application form duly filled.	✓	—	_____	—
2	*Letter to Member Secretary/ Chairperson.	✓	—	_____	—
3	*Summary of protocol (in not more than 500 words).	✓	—	_____	—
4	*Protocol.	✓	—	_____	—
5	*Informed consent document in English,	✓	—	_____	—
6	*Informed consent documents in Regional languages (Total No:-) Hindi, Marathi.	—	—	_____	✓
7.	*Case Record Form.	—	—	_____	—
8.	*Research participants recruitment procedures: advertisement, notices (If applicable).	—	—	_____	✓
9.	*Research participants Questionnaire/s (If applicable).	—	—	_____	✓
10.	Undertaking by Principal Investigator regarding compensation for study related injury (applicable for academic interventional studies).	—	—	_____	—
11	*Clinical Trial Agreement for drug trial / Memorandum Of Understanding, as applicable, for collaborator & Govt sponsored trials (draft if final not ready)	—	—	_____	✓



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	(Final MOU: On Rs. 100/- stamp paper, tripartite with terms of agreements specified clearly).			
12	*Signed and dated brief current curriculum vitae of the entire study team members. (for regulatory studies and for non regulatory if needed)	— <input checked="" type="checkbox"/>	—	—
13	Valid MMC registration certificate of medical faculty	—	—	—
14	*Ethics Committee clearance of other centers (Total No _____)	—	—	✓
15	*Log of delegation of responsibility of the study team members - Annexure3)	— <input checked="" type="checkbox"/>	—	—
16	*Document Receipt Form (Annexure5)	✓	—	—
16	*Current Status of Ongoing Studies approved by IEC and conducted by principal investigator (Attach separate sheet including information as Project registration number, title, no of participant approved by IEC, no of participants recruited, SAE at the site)	—	—	✓
17	*GCP training certificates of study team members (last 3years, for regulatory studies and for non regulatory if needed)	✓	—	—
18	HMSC permission for International collaboration (required in case of studies involving collaborations with foreign Laboratory/ Clinic/Institution)	—	—	—
19	Any other Documents submitted	—	—	—



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To be filled in by the IEC – Checklist for EC form:

- | | |
|--|--------------------------|
| 1. Contact Address of Sponsor | <input type="checkbox"/> |
| 2. Total Budget | <input type="checkbox"/> |
| 3. Information on Clinical Trials | <input type="checkbox"/> |
| 4. Information on Protocol of the proposal | <input type="checkbox"/> |
| 5. Research participants selection | <input type="checkbox"/> |
| 6. Privacy and confidentiality | <input type="checkbox"/> |
| 7. Use of biological/ hazardous materials | <input type="checkbox"/> |
| 8. Consent | <input type="checkbox"/> |
| 9. Risks & Benefits | <input type="checkbox"/> |
| 10. Data Monitoring | <input type="checkbox"/> |
| 11. Compensation for participation | <input type="checkbox"/> |
| 12. Compensation for injury | <input type="checkbox"/> |
| 13. Statement on conflict of interest | <input type="checkbox"/> |



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Annexure 3 Delegation of Responsibilities of Study team

Date: 29/1/2020

Study Title:

A Speech Model for Unvoiced Speech Recognition based on Electroencephalography.

Name	Role	No.
Dr. Sudhir Dhage	Principal Investigator	1
Dipti Pawar	Co-Investigator	2
	Co-Investigator	3
	Co-investigator	4
	Co-Investigator	5
Dr. Nandini Nikam	Study co-ordinator *	6
Dr. Ashwini Rangne	Study co-ordinator *	7
	Laboratory Technician	7
		8

* Study coordinator may preferably be a person specifically appointed for coordinating the clinical trial; other than the staff member (assistant / associate professor).



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(Please place tick marks against assigned duties for each member in the following table).

Code	TASKS	Role 1	Role 2	Role 3	Role 4	Role 5	Role 6	Role 7	Role 8
A	All relevant documents pertaining to protect blinding.		✓						
B	Research participants selection/ Screening.		✓						
C	Obtain informed consent.		✓						
D	Evaluate inclusion/ exclusion criteria.	✓							
E	Conduct the visit assessments.						✓		
F	Physical examination.						✓		
G	Complete the source documents.		✓						
H	Complete Case Record Form .							✓	
I	Final review and sign Case Record Form.						✓		
J	Collect laboratory safety test samples.		✓						
K	Review & sign of the lab reports.						✓		
L	Person to whom research participants should contact in case of adverse event.							✓	
M	Report all serious adverse events	✓							
N	Follow up of Serious Adverse Event	✓							
O	Maintaining study site master file		✓						
P	In-charge of inventory & supplies	✓							
Q	Archiving of study documents		✓						
R	Resolution of queries		✓						
S	Overall coordination and supervision	✓							

Signature with date of Principal Investigator:

(Dr. Sudhir Phage)
29/01/2020

(Dipti Pawar)
29/01/2020

Page 2 of 2

Introduction

Oral communication is the natural way in which humans interact. However, in some circumstances, it is not possible to emit an intelligible acoustic signal, or it is desired to communicate without making sounds. In these conditions systems that enable spoken communication in the absence of an acoustic signal are desirable. This kind of systems is part of a recent research area called silent speech interfaces (SSI). Human brain and external world communication makes an attractive way for paralyzed people to carry out their daily activities easily. This excites researchers to build interface between brain and external tools by following non-muscular path. Last few decades work focused on designing impeccable Brain Computer Interface (BCI) system. Although there are significant achievements in the field, BCI applications for speechless people has not been considered much. Designing BCI system for unvoiced speech recognition from electroencephalography (EEG) signals would be a major step toward the extension of BCI applications.

EEG signals fluctuate rapidly and are subject to various sources of noise including environmental noise such as lighting and electronic equipment. Thus, the key issue concerning an EEG-based BCI system is to accurately interpret EEG signals so as to accurately understand the users intent. More specifically, the design of a practical and effective BCI system is faced with the following major challenges. First, EEG signals usually have very low signal to noise ratio. EEG signals inherently lack sufficient spatial resolution and insight on activities of deep brain structures. Second, data pre-processing, parameter selection (e.g. filter type, pass band, segment window, and overlapping), and feature engineering (e.g. feature selection and extraction both in time domain and frequency domain) are all time-consuming and highly dependent on human expertise in the domain. Third, the state of the art approaches can achieve an less accuracy, which is not sufficient for widespread adoption of this technology. Intuitively, the more scenarios an EEG-based control system can distinguish, the wider is its applicability in the real-world.

Motivation

Some severe muscular disorders, such as amyotrophic lateral sclerosis, advanced stages of multiple sclerosis, and brainstem stroke can make the usual pathways employed for speech communication unavailable. The patients suffering from these conditions found themselves in a locked-in state, because of lack of control over voluntary muscles. Even though their intellectual capabilities are intact, they cannot interact with their environment. Brain Computer Interfaces have been developed for the purpose of bringing a new communication path, allowing the use of brain signals.

Silent Speech Systems with natural speech production without using sound, can be used by a person who has lost the voice, but can produce subvocal visible speech with articulatory movement without air emission. During imagined speech, the subjects have to imagine pronouncing the word without moving muscles or producing sounds. Imagined speech concept based on the task that can be named as "Speak What You Thought".

The EEG is chosen as a measure of brain activity because it is a noninvasive technique.

It has a relatively low cost when compared to others like functional magnetic resonance imaging. It is portable due to the simple equipment needed for its acquisition system. Hence, it would be very convenient to have an unvoiced speech recognition system based on EEG based speech.

Objectives

The major objective of the proposed research is to investigate the feasibility of unvoiced speech recognition using EEG. Brain signal acquisition is done by employing EEG equipment at the human scalp. The fundamental idea is each muscle movement is preceded by an activation of central nervous system. The research in the speech BCI [1] shows that there is relation between the speech production and EEG data. The proposed research will lead to investigate whether this is also true for unvoiced speech.

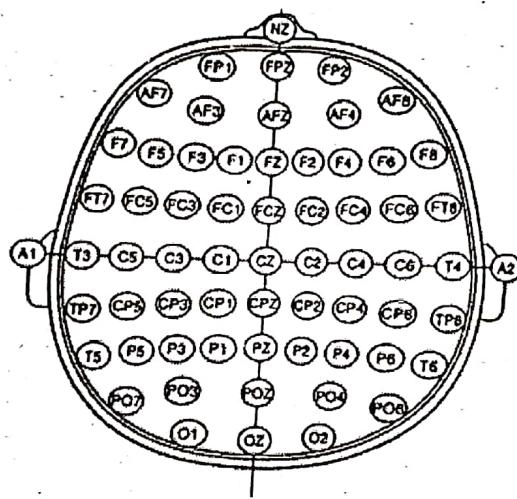


Figure 1: The international 10-20 electrode positioning system for EEG recordings[2].

The proposed work will carry out to address three objectives:

1. To investigate most important electrode positions for the recognition of Silent and Imagery speech.
2. To improve the speech model performance by extracting relevant and meaningful features from EEG.
3. To analyze the performance of classifier for different speech modalities.

A brief discussion of the three objectives is provided below.

1. *To investigate most important electrode positions for the recognition of Silent and Imagery speech:*

Brain signal acquisition by using EEG is a method to record the brain produced electrical potentials by electrodes positioning on the scalp. International 10-20 electrode positioning system is depicted in Figure 1. Different brain areas are activated in the speech production and speech perception. The proposed research focused on the investigation of brain regions i.e the speech production and perception area (Brocas area and Wernickes area) and region that is responsible for muscle movement (homunculus) are adequate to recognize silent and imagery speech. The outcome of this research objective is computational complexity is reduced.

2. *To improve the speech model performance by extracting relevant and meaningful features from EEG:*

The important information in brain signals is hidden in extremely noisy environment. Brain signals comprise the undesired signals i.e artifacts. The removal of artifacts and noise is an important issue in EEG signal processing. Since EEG signals are intrinsically nonstationary, the extraction of relevant and meaningful features is very important step. It is important to understand which channel information is relevant for particular phenomenon of interest. The redundant and irrelevant information can be removed by applying dimension reduction technique. It reduces computational cost. Effective pattern recognition can be achieved by selection of superior discriminative features to interpret users intentions.

3. *To analyze the performance of classifier for different speech modalities:*

Classifiers have two main problems i.e the bias-variance tradeoff and curse of dimensionality related to pattern recognition tasks. The bias-variance tradeoff represents the usual trend of the classifiers towards low bias and high variance and vice versa. Unstable classifiers characterized by high variance with low bias and stable classifiers have high bias with low variance. Bias and variance should be low for better classification rate. The curse of dimensionality means that the training data should get increased exponentially with the feature vector dimension. Unfortunately, in BCI research small training sets are available due to time consuming and tiring training process. Hence, it is very challenging to choose appropriate classifier for accurate and fast recognition of speech imagery. It should be investigated the performance of classifier for different speech modalities i.e Silent Speech and Imaginary Speech.

Literature Survey

speech imagery is reasonably consistent and easier to perform as compare to motor imagery and visual imagery. In [4], T. Schultz and Herff presented a review of many techniques regarding decoding of neural signals for automatic speech recognition. The techniques are categorized based on neural signal acquisition method. These methods include metabolic signals or EEG signals. Functional Near Infrared Spectroscopy (fNIRS) and Functional Magnetic Resonance Imaging (fMRI) are key approaches to collect metabolic signals. These techniques are inadequate to clinical environment only. Electrophysiological signals can be acquired using microarray, MagnetoEncephaloGraphy (MEG), ElectroEncephaloGraphy (EEG), and ElectroCorticoGraphy (ECOG). EEG is more suitable as compare to others due to noninvasiveness and portability. The others techniques are either invasive or not portable. Denby et. al. [5] and Schultz [6] proposed work based on facial ElectroMyoGraphic (EMG) based silent speech recognition. EEG based BCI applications can be enhanced by deploying Imagined speech recognition from EEG signals in conjunction with other tasks, such as visual imagery or motor imagery. The significant application of Imaginary speech recognition is for locked-in syndrome patients, for those it is not possible to use facial EMG based system.

Previous work has been done for BCI communication applications using EEG based on P300 signal [8][9], steady state visual evoke potential (SSVEP) [10][11], and sensorimotor rhythms (SMR) [12][13]. These techniques provide silent communication to paralyzed users, but they are not capable to operate at very fast speed. These techniques can produce one word or less per minute. Since for these interfaces user has to choose letter from a graphical display, it requires precise visual perceptual ability for the user. The graphical displays with keyboard letters where user choose a letter from a finite choice. These visually dependent systems are impractical for severe paralysis users having visual disability. EEG based Imagined speech recognition is challenging and an open problem.

As EEG is in the form of multi-channel electrical signal, feature extraction methods for EEG can be divided to three classes, extracting temporal features, frequency features and spatial features [14]-[17], according to the signal attributes they care about. Most of the extraction methods focus on only one attribute and care little about the other two. Zmura D. et. al. [18] performed experiment for imagined-speech having 4 human subjects. The research was focused on Hilbert transform where brainwave bands in theta, alpha and beta were extracted as features. The results show beat band as most discriminant band. While alpha band as most discriminant band by Kim et. al.[19] research work. The experiments were focused on Common Spatial Patterns (CSP) and ANOVA test. Kumar and Brigham [20] proposed speech imagery work for 2 syllables, /a/ and /u/. In [21], [22], DaSalla et. al. conducted experiments for the classification of /a/, /u/ and rest. The results computed by using CSP pointed out the discriminant channels are Cz, C3, C4 and Fz. It is inferred from the results that motor cortex having influence than speech imagery. Deng et. al. [23] used adaptive frequency transform by using Huang-Hilbert transform (HHT). Since EEG is nonstationary signal, HHT is suitable than Fourier or Wavelet Transform. Idrees and Farooq [24] research is focused on Linear Discriminant Analysis classifier and statistical features as mean, skewness, kurtosis, variance, harmonic mean, interquartile range, geometric mean, entropy , waveform length, standard deviation, energy. The work proposed on Mel Frequency Cepstral Coefficients (MFCCs) [25] and

Gabor Filter [26] also gave encouraging results.

The literature is more limited for imagey speech classification for words. In [27] experiments were performed for classification of 7 words using EEG signals. Out of seven subjects five subjects were performing imagination of speech with auditory comprehension task. The research focused on sentences is elaborated in [28]. In [29], Gonzalez et. al. conducted experiments for the classification of different imagined words, like up, left ,down, Select and right. In [30], Salama et. al. did the experiments to classify imagined words, Yes and No by applying variety of different classifiers such as Self Organizing Map (SOM), Support Vector Machines (SVM), Discriminant Analysis (DA), FeedForward BackPropagation (FFBP) and by combination of various classifiers. The above mentioned research works have indicated that unvoiced speech recognition using silent speech and imaginary speech is very challenging, and the designing of effective speech model can be achieved by selecting prominent features and appropriate classifiers[31].

Methodology

Unvoiced Speech BCI system based on EEG consists of following steps i.e neural signal acquisition, preprocessing, feature extraction and classification as shown in Figure 2.

1. *Neural Signal Acquisition:*

In the Neural signal acquisition step, the electrical signals generated by brain activity are recorded from the scalp, the brain surface, or through the neural activity. This can take two general forms, either invasive techniques such as implanted electrode arrays or non-invasive techniques such as the EEG. The electrical fields produced by neurons for brain activity are recorded by EEG. EEG signals have relatively high temporal resolution and low spatial resolution. EEG is cheap, portable and easy to use equipment. Hence, EEG is a appropriate choice for signal acquisition for BCI applications.

2. *Signal Pre-Processing:*

EEG signals are very noisy and consists of artifacts like Ocular artifact, Muscle artifact and Cardiac artifact. Preprocessing can be done by using filtering techniques . However, the general aim is always to increase the signal to noise ratio with respect to the features of the signal that are of most interesting and usable for our purposes.

3. *Feature Extraction:*

The aim of the feature extraction step is to extract the discriminative information from EEG brain signal. The extraction of relevant and meaningful features is a very challenging task. Recorded brain signals through EEG are mixed with other signals coming from a brain activities that overlap in space and time. The EEG signal is nonstationary, stochastic signal and also be distorted by artifacts such as electromyography (EMG), electrooculography (EOG). Short Term Fourier Transform (STFT), adaptive autoregressive components or Wavelet transform are preferred to deal with the nonstationary brain signals. The major difficulty in BCI design is selecting relevant features from the huge number of features. Due to the classifiers curse of dimensionality problem high dimen-

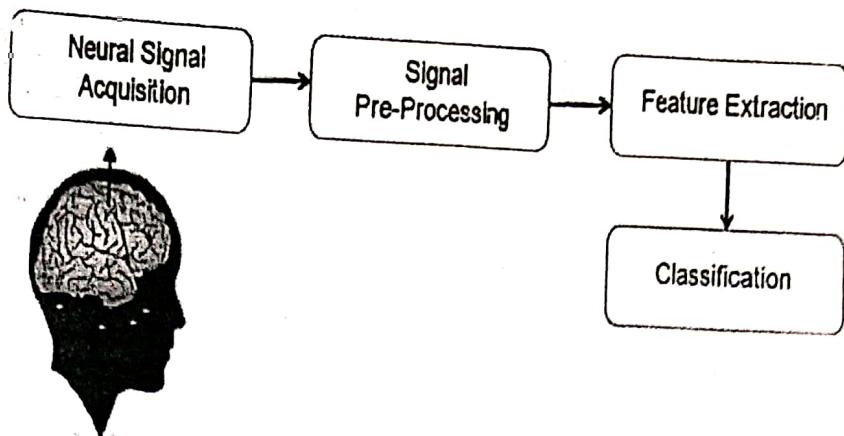


Figure 2: The Principle of Speech BCI.

sional feature vectors are not desirable. Hence, dimension reduction techniques, such as principal component analysis can be used.

4. *Classification:*

The basic aim of the classification in a unvoiced speech BCI system is to recognize users intent speech. The design of the classification step involves the choice of one or several classification algorithms from many alternatives. Several classification algorithms have been proposed such as k-nearest neighbour classifiers, support vector machines, linear classifiers and neural networks. In general the preference is from simple classifiers to complex alternatives. As compare to complex classifiers simple classifiers adoption to the brain signal features is intrinsically simpler and effective. However, to improve performance in offline and online evaluations, simple classifiers should be replaced by more complex classifiers.

Outcomes of the Research

The proposed research will lead to the development of efficient and effective unvoiced speech recognition system using EEG based brain computer interface. The overall outcome of this research would enable fast and natural communication with the help of silent and imaginary speech and would give a voice to otherwise mute people.

References

- [1] Mohanchandra K., Saha S., Lingaraju G. M. , 'EEG Based Brain Computer Interface for Speech Communication: Principles and Applications', *Springer International Publishing Switzerland*, pp. 273-293, 2015.
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Experimental Protocol:

The subjects will comfortably seat in an armchair and covert speech EEG trials for words 'left', 'right', 'up', 'down' will be acquired in pseudorandom order. Fig.1 depicts the experimental paradigm of the covert speech trial. The subjects will get coached beforehand. At first, the question appeared on-screen i.e what is the direction of the arrow with one of the direction arrows (left, right, up, down). Subsequently, two beeps will be given to maintain a consistent time cue to covertly speak the words. Approximately 2 s after the second beep, the subject will start the mental repetition of the answer which is among the words 'left', 'right', 'up', 'down' for 10 s. Trials will get separated with an appropriate rest time cue. For each word total, 50 to 100 EEG responses will be recorded for every subject during separate sessions.

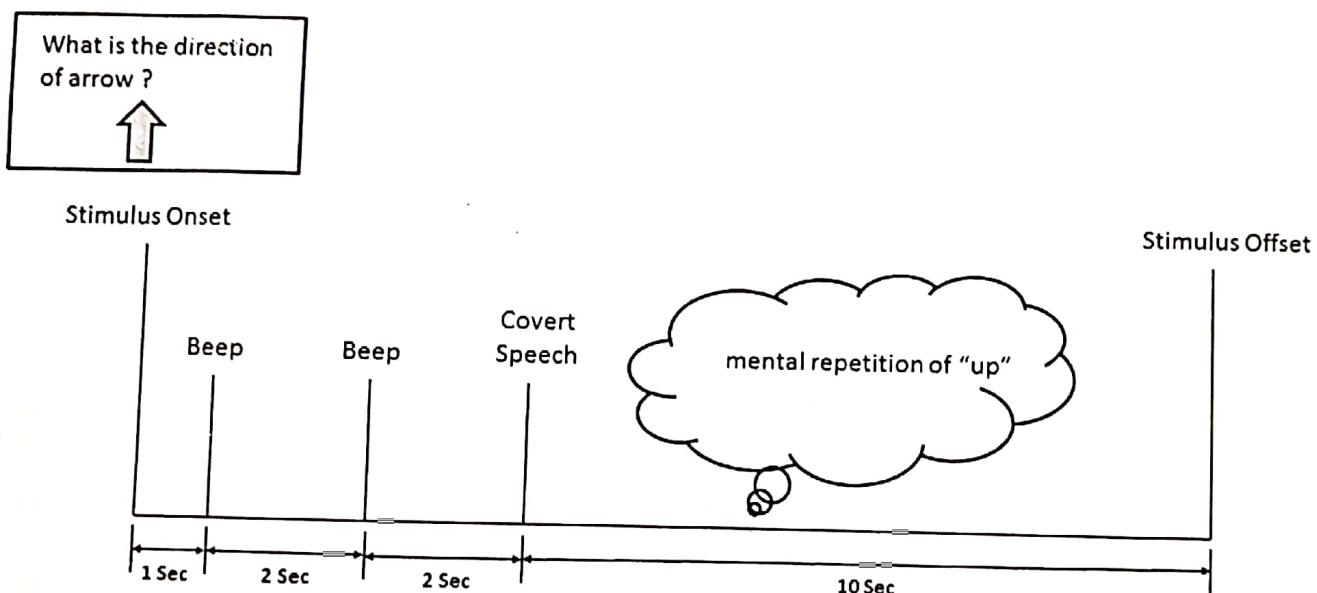


Fig.1: Schematic sequence of the experimental paradigm. The diagram shows capturing of a single covert trial of a particular word

Curriculum Vitae

Name : Sudhir Namdeo rao Dhage
Designation : Professor, Department of Computer Engineering
Office Addresss : Bharatiya Vidya Bhavan's, Sardar Patel Institute of Technology,
Munshi Nagar, Andheri (West), Mumbai-400 058.

Educational Qualification

1. Ph.D. (Technology) in Computer Engineering from VJTI (Autonomous Institute) Affiliated to University of Mumbai, Matunga, Mumbai.
2. M.E. Computer Science and Engineering, from Govt. Aided Walchand College of Engineering, Sangli, Affiliated to Shivaji University, Kolhapur, with First Class.
3. B.E. Computer Science and Engineering, From Govt. College of Engineering, Amravati, Affiliated to Amravati University, Amravati, with First Class.

Publications Summary:

Publications	Total Numbers
Books	02
International Journals	10
International Conferences	47
Minor Project R & D Grants	02
Total Publications	57
Publications in last 5 Years	41

Awards and Recognitions :

1. "Best Ph.D. Thesis Award" presented by Computer Society of India at National Convention at Science City, Kolkata-700 046 on 21/01/2018.
2. "RASHTRIYA SANMAN AWARD" presented by National Education and Human Resource Development Department in Oct-2012.
3. "CSI Longest Continuous SBC Award" presented by CSI at National Convention at Science city, J.B.S. Haldane Avenue, Kolkata-700 046 in Dec 2012.
4. "CSI Longest Continuous SBC Award" presented by CSI at IITB, Mumbai in Dec 2014.

5. "Paper Presenter Award at International Conference" Presented by CSI at National Convention at Science city, J.B.S. Haldane Avenue, Kolkata-700 046 in Dec 2012.
6. "Second prize for poster presentation on Research work", at VJTI Mumbai in 2012
7. Recognition of Excellent Performance certificate for motivated and enthusiastic teacher, guide, researcher and administrator from Principal Sardar Patel Institute of Technology.
8. Letter of Appreciation for contribution and efforts during the process for application for new M.E. Electronics and Telecommunication and MCA course in SPIT from Principal Sardar Patel Institute of Technology.

Institute received Following Awards under my coordination/Leadership

1. "Highest Committed Student Branch Activity Award" Presented by CSI at National Convention at Science city, J.B.S. Haldane Avenue, Kolkata-700 046 in Dec 2012.
2. Best CSI Student Branch Award" Presented by CSI at National Convention at Chennai in Dec 2016.
3. Best CSI Student Branch Award" Presented by CSI at National Convention at Bharatiya Vidyapeeth, Delhi in Dec 2015.
4. Best CSI Student Branch Award" Presented by CSI at National Convention at Jaipur in Dec 2014.
5. Best CSI Student Branch Award" Presented by CSI at National Convention at Science city, J.B.S. Haldane Avenue, Kolkata-700 046 in Dec 2013.
6. Best CSI Student Branch Award" Presented by CSI at National Convention at Science city, J.B.S. Haldane Avenue, Kolkata-700 046 in Dec 2012.

Research Grants fetched

1. Received Research Grant from Mumbai University for the project of "Data Security in Cloud Computing" in 2015.
2. Received Research Grant from Mumbai University for the project of "Design and Implementation of Aspect Based Emotion Classification Framework to Improve Consumer's Decision Making Behavior" in 2018.

Professional Memberships:

1. Life Member of CSI (Life Membership No. 00095116)
2. Member of IEEE (Membership No. 92933769)

Executive Summary:

(Administrative responsibilities carried out at Institute/University/DTE/AICTE/UPSE/MPSC)

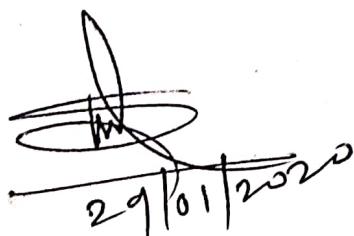
1. I was the Member of University syllabus revision committee appointed by Board Of studies in Computer Engineering, Electronic and Telecommunication Engineering, Electronics Engineering and Information Technology, University of Mumbai.
2. I was the Member of various committee of University of Mumbai such as LIC, UGC, Vigilance Squad, Result Moderation etc.
3. Conducted orientation Programme on Theoretical Computer Science, OOPM, Operating Systems, Computer Communication & Networks and Cryptography & System Security organized by University of Mumbai.
4. Regional Student Coordinator: Computer Society of India (CSI), CSI Region VI: Maharashtra and Goa.
5. Programme Coordinator of IGNOU, MCA, BCA and CIC for 3 Years.
6. Handled the responsibility of Head of Department (Computer Engg.) at KGCE and ACPCE
7. Handled the responsibility of Deputy Head of Department (Computer Engg) at SPIT for 2 Years
8. Handled the responsibility of Examination Controller for SPIT 2 years.
9. Single handed successfully done new courses Proposal MCA and M.E. EXTC in prescribed format given by AICTE, DTE and University of Mumbai.
10. Received Research grant from Mumbai University.
11. Member of Nomination committee of CSI Mumbai chapter.
12. Faculty Coordinator of CSI-SPIT student branch since 2009.
13. Advisor of UPSC since 2012.
14. ME/M.Tech. Computer Engineering Coordinator for 2 years.
15. Invited Talk on Network Performance in NCATM conference at A.C. Patil College of Engg., Navi Mumbai.
16. Member of Autonomous Examination committee in 2016-17
17. Member of RPC of Computer Engineering VJTI.
18. Reviewer of Elsevier Egyptian Informatics Journal
19. Conducted lecture on Research Methodology as a part of Ph.D. Work in RGIT and VJTI
20. Expert of Academic and administrative Audit of School of Biotechnology and Bioinformatics (2019-20).
21. Expert member in BOS of SIES (2019-20).
22. Member of Advisory Board, School of Computer Engineering and Technology, Under MIT World Peace University, Kothrud, Pune, Maharashtra (2019-20).

Recognized Ph.D./M.Tech/M.E. Teacher/Guide for

1. Ph.D. Programme in Computer Engineering, recognized teacher/Guide in Mumbai University.
2. Ph.D. Programme in Information Technology, recognized teacher/Guide in Mumbai University
3. M.E./M.Tech. Programme in Computer Engineering, Information Technology and EXTC
recognized PG teacher/Guide in Mumbai University.

Personal Details:

Date of Birth : 25 May, 1971.
Marital Status : Married
Wife : late Mrs. Archana Dhage, Age: 42 years
Children : 1. Ms. Dakshita Dhage, Age: 14 years 2. Ms. Manali Dhage, Age: 8 years
Residential Address : Flat No. 502, Building No. 23 D, Palazzio CHS, Near S.M. Shetty School,
Hiranandani, Powai, Mumbai-400 076
Mother Tongue : Marathi
E-mail : sudhir_dhage@spit.ac.in
Mobile : +91-9869318074



29/01/2020

A handwritten signature in black ink, appearing to read "Sudhir Dhage". Below the signature, the date "29/01/2020" is written in a similar cursive style.

Dipti Rohan Pawar
B1-603,SunEmpire,
Sinhgad Road,
Pune – 411 051.

Mobile No: 9922603212
Email: diptishitole@yahoo.co.in
Github- <https://github.com/diptipawar>
Blog- <http://learningdeepai.blogspot.com>
Linkedin Profile: <https://www.linkedin.com/in/dipti-pawar-a653a1158>

SUMMARY

Presently working as Data Scientist-Team Lead (Artificial Intelligence) at AccelTree Software Private Ltd.,Pune; where exploring knowledge in industrial research projects based on Machine Learning, Deep Learning. I cleared GATE 2006 exam and completed full-time M.E in 2008 from VIT, Pune University. The M.E thesis was based on machine learning techniques where I got in-depth knowledge of Artificial Intelligence, Neural networks, Fuzzy-Neural networks, Pattern Recognition, etc. Currently pursuing PhD in Artificial Intelligence from SPIT, Mumbai. Published various research papers in the reputed journals and conferences like IEEE, Scopus. Successfully completed two funded research projects based on Video Surveillance applications by BCUD, Pune University and GCOE, IIT Bombay.

EDUCATIONAL QUALIFICATION

- Pursuing PhD- Computer Engineering- Sardar Patel Institute of Technology, Mumbai.
- Masters of Engineering-Computer Engineering- Vishwakarma Institute of Technology, Pune, 70.03%, 2008.
- Bachelor of Engineering – Information Technology - Shivaji University, 68%, 2004.

CERTIFICATION

- IBM Data Science Professional Certification
- Data Science A-Z™: Real-life Data Science Exercises

SPECIAL ACHIEVEMENTS

- Qualified in GATE 2006- All India Rank 809
- Indian Patent Filed in 2013- Patent No: 3171/MUM/2013
- Funded Research Project- By BCUD,SPPU Pune.- [2016-2018]
- Funded Research Project- By GPU Centre of Excellence, IIT Bombay.
- GIAN Course Exam Brain Computer Interface for Speech Communication: Theory and Applications- Successfully Completed at IIT Guvahati,2018.

WORK EXPERIENCE

- **Data Scientist – Team Lead (Artificial Intelligence) – AccelTree Software Private Ltd., Pune**
(May 2018 to till date)
- **AI/ML Training – Assistant Professor, Sinhgad College of Engineering, Pune (12 years)**

INDUSTRIAL PROJECTS (Machine Learning)

Major Libraries Used: TensorFlow, Scikit-Learn, Numpy, Keras, Jupyter Notebook, SciPy, Theano, Pandas, Flask, Gunicorn, Nginx , OpenCV etc.

- **Document Classification Using Deep Learning:**
Convolutional neural network (CNN) – a pillar algorithm of deep learning -- has been one of the most influential innovations in the field of computer vision. CNN performed a lot better than traditional computer vision algorithms. Convolution Neural Network enjoyed great success for Image Classification. There exist large domain differences between natural images and document images. For example, in natural image, the object of interest can appear in any region of the image. In contrast, many document images are 2D entities that occupy the whole image. So the question arises whether the same architecture of CNN is also optimal for document images. The answer is big ‘YES’. Thanks to the beauty of CNN we can use it for natural image classification as well as document image classification.
- **Named Entity Recognition:**
NER is a part of natural language processing (NLP) and information retrieval (IR). The task in NER is to find the entity-type of words. Entities can, for example, be locations or names. Conditional Random Field machine learning algorithm is used to recognize the named entities.
- **Novelty Detection:**
The objective of novelty detection is to decide new observation belongs to same distribution as existing observation or should be considered as different (Outlier). It is the Open set recognition, where all incomplete knowledge of the world is present at the training time and unknown samples can be submitted during testing. The novelty detection is the process where the training data is not polluted by outliers and we are interested in detecting anomalies in new observation. One-class Support Vector Machine is used for Novelty detection.
- **Multi-Object Recognition using Deep Learning:**
The objective of this project is focused on multiple object detection and recognition from single image. YOLO (You Only Look Once) and SSD (Single Shot Detector) are used for this purpose. YOLO and SSD are based on Deep Learning.
- **Face Recognition and Matching:**
In this project multiple face detection and recognition is possible. The project is also enhanced to detect the face from the document and matching can be done among faces from two different documents. The implementation is done in python using two libraries dlib and Face Recognition.

[Signature]

➤ **Image Caption Generation:**

Image Caption Generation is a challenging Artificial Intelligent problem. It generates the textual description of image. It requires methods from computer vision to understand the content of image and Language model from the field of natural language processing to turn the understanding of image into words in right order. To understand the content of image VGG-16 model is used. VGG-16 is the trained model developed by Oxford's Visual Geometry Group. Recurrent Neural Network is used for the generation of Language model.

Note: All the Projects implemented in Python.

RESEARCH WORK

➤ **Ph.D Research Work**

Research Title: Brain Computer Interface for Silent Speech Recognition

Description: Silent Speech Systems with natural speech production without using sound, can be used by a person who has lost the voice, but can produce subvocal visible speech with articulatory movement without air emission. During imagined speech, the subjects have to imagine pronouncing the word without moving muscles or producing sounds. Imagined speech concept based on the task that can be named as “Speak What You Thought”.

➤ **Funded Research Work**

Research Title: Unattended Object Intelligent Detection in Complex Scene

Description: The research work focuses on the problem of finding the unattended object in public places such as shopping malls, airports, railway stations etc. The automated analysis of unattended objects in relation to human behavior in the surrounding area is the subject of this project, with the aim to explore efficient algorithms. The system consists of three major components i.e Video Acquisition, Video Processing and Unattended object detection.

➤ **Master's of Engineering Research Work**

Research Title: Handwritten Character Recognition using Modified Fuzzy Hyperline Segment Neural Network

Description: The research deals with simple and effective set of features for character representation. These features are computed within regularly placed windows spanning the character bitmap, consist of a combination of average pixel density and measures of local alignment along some directions. NIST database and Devnagari digit databases are used for experimentation. These features used in conjunction with Modified Fuzzy Hyperline Segment Neural network.

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PAPER PUBLICATION

1. Dipti Pawar, Sudhir Dhage, "DWT-based Imagined Speech Recognition based on Electroencephalography", International Journal of Biomedical Engineering and Technology (IJBET-Inderscience), 2019.
2. Dipti Pawar, "Recognition of Unvoiced Human Utterances Using Brain-Computer Interface", IEEE ICIIP, 2017.
3. Dipti Pawar, "GPU based Background Subtraction using CUDA:State of the Art", IEEE WISPNET, 2017.
4. Snehal Wagh, Dipti Pawar, "GPU Parallelization of Back-Propagation Neural Network", International Journal of Engineering Science and Innovative Technology, vol.6, issue 1, pp. 98-102, 2017.
5. Dipti Pawar, "Fuzzy Min-Max Neural Network with Compensatory Neuron Architecture for Invariant Object Recognition", IEEE IC4, 2015.
6. Paras Tolia, Dipti Pawar, "Object Recognition using Compensatory Fuzzy Min-Max Neural Network Architecture", IJARCCE, vol.2, No.10, July 2013.
7. Shilpa Bane, DR Pawar, "Survey on Feature Extraction methods in Object Recognition", International Journal of Computer Science and Information Technologies, vol.5.
8. Shilpa Bane, D.R.Pawar, "Color Object Recognition using General Fuzzy Min-Max Neural network", IJCCN, Vol. 3, No.6, 2014.
9. Dipti Pawar, "Extended Fuzzy Hyperline Segment Neural Network for Handwritten Character Recognition", IMECS- IAENG, pp.43-46, 2012.

WORKSHOPS/ STTP/ FDP/SEMINAR ATTENDED

- One Week GIAN – workshop on Brain Computer Interfaces for Speech Communication: Theory and Applications by IIT, Guvahati, 2018.
- Two days FDP on 'Emerging Research Trends in Computing, Communication and Storage', by ZCOE, Pune, 2017.
- One day FDP on 'Smart System Design and Applications', by JSPM, Pune, 2016.
- Two days Workshop on 'Advanced Statistical Methods and Software tools for the Analysis of Data', by BVCOE, Pune, 2016.
- One week TEQIP sponsored STTP on 'Privacy Preserving Data Mining' by SVNIT Surat, 2015.

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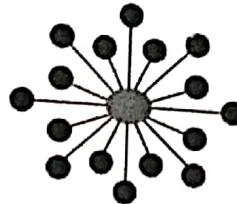
- One week TEQIP sponsored STTP on 'Image Processing and Machine Learning' by SCOE Pune, 2015.
- One day Workshop on 'Latex', by SCOE, Pune, 2014.
- One week TEQIP sponsored STTP on 'Embedded Image Processing' by SCOE Pune, 2013.
- One week workshop on 'Research in Engineering', by SCOE, Pune, 2012.
- One day Seminar on 'Current Research Trends in Computer Engineering', by MESCOE, Pune, 2012.
- One week International workshop on 'Information Security', Bits Pilani, 2012.
- Two weeks AICTE sponsored workshop on 'Machine Learning', 2011.
- One week workshop on 'Scilab', by Bits Pilani, 2011.

INTERACTION WITH OUTSIDE WORLD

- As a speaker - various topics like Machine Learning, Deep Learning in training programs.
- As a reviewer for the various Journals and Conferences.

PERSONAL DETAILS

Gender	:	Female
Skills Known	:	Python, R, Matlab
Languages Known	:	Hindi, Marathi and English (Read, Write and Speak)
Contact number	:	9922603212
E-Mail ID	:	<u>diptishitole@yahoo.co.in</u>



NIDA Clinical Trials Network

Certificate of Completion

is hereby granted to

Dipti Pawar

to certify your completion of the six-hour required course on:

GOOD CLINICAL PRACTICE

MODULE:

Introduction
Institutional Review Boards
Informed Consent
Confidentiality & Privacy
Participant Safety & Adverse Events
Quality Assurance
The Research Protocol
Documentation & Record-Keeping
Research Misconduct
Roles & Responsibilities
Recruitment & Retention
Investigational New Drugs

STATUS:

N/A
Passed
Passed

Course Completion Date: 18 December 2019

CTN Expiration Date: 18 December 2022

Tracee Williams, Training Coordinator
NIDA Clinical Coordinating Center

Good Clinical Practice, Version 5, effective 03-Mar-2017

This training has been funded in whole or in part with Federal funds from the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, under Contract No. HHSN27201201000024C.

Consent**Informed Consent form to participate in a clinical trial/research**

Study Title:

Registration Number:

Participant' Initials: _____

Participant's Name: _____

Date of Birth / Age: _____

1. I understand that I am being invited to take part in the research study. I confirm that I have read/ been read to and understood the information sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
3. I understand the risks and potential benefits of this research study that were explained to me. I freely give my consent to take part in research study described in this form.
4. I understand that the Sponsor of the research study, others working on the Sponsor's behalf, IEC and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.
5. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).
6. I agree to take part in the above study.

I have read/have been read the above information and agreed to participate in this study. I have received a copy of this form.

Participant's name:	
Participant's Signature/Thumb impression	
Address :	

Occupation: Student / Self-Employed / Service / Housewife /Others	
Phone Nos:	
Impartial Witness's name :	
Impartial Witness's signature & date :	
Address:	
Phone Nos:	
Name of Researcher:	
Sign of Researcher & date:	