UPES UNIVERSITY OF TOMORROW | RESEARCH & DEVELOPMENT

PROPOSAL FOR शोध SUPPORT FOR STUDENTS

(Under the SHODH program for research)

(A) SUMMARY SHEET:

Project proposal submitted under (tick mark the शोध scheme)

☐ **RISE (Research & Innovation for Science and Engineering)**

☑ **RISoCS (Research & Innovation for Students of Computer Science)**

☐ **RISoM (Research & Innovation for Students of Management)**

☐ **RISoL (Research & Innovation for Students of Law)**

☐ **RISoD (Research & Innovation for Students of Design)**

☐ **RISoL (Research & Innovation for Students of School for Life)**

☐ **RISoHS (Research & Innovation for Students of School Health Sciences)**

☐ **RISoMM (Research & Innovation for Students of School for Modern Media)**

☐ **RISoLS (Research & Innovation for Students of School for Liberal Sciences)**

Title: Saksham / Communication solution for disabled			**OFFICE PURPOSE** DATE RECEIVED (in R&D Office): PROPOSAL No.
	Duration (Months) 10	Amount ₹ 55,600	

2. Name and Department of applicants with contact details (email and phone):

*Applicant(s) (Name/Course/Department/SAP ID) & Signature	Mentor(s) (Name/Department) & Signature
(i) Utkarsh Gupta / B. Tech CSE - AI & ML / 500075374 8938914511, u8karshgupta@gmail.com	Prof. Bikram Pritim Bhuyan Department of Informatics BBhuyan
(ii) Aradhya Singh/ B. Tech CSE - AI & ML / 500075358 8938822481, saaradhya0125@gmail.com	
(iii) Priyal Gupta / B. Tech CSE - AI & ML / 500076110 9415209873, priyalgupta804@gmail.com	
(iv)	
(v)	

* A SHODH team will have minimum 2 students and a maximum of 5 students. SHODH team can have a maximum of 2 mentors (For SoE, there is no limit on number of mentors)

Do not put any identifying information in Section (B)

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(B) DETAILS OF PROPOSAL:

OFFICE PURPOSE
DATE RECEIVED (in R&D Office):

PROPOSAL No.

1. Title (Title should be concise & specific)

   Saksham / Communication solution for disabled

2. Objectives of the proposal demonstrating contribution to excellence at national level (List pointwise) #

   To develop remote communication software accessible to normal, blind, dumb and deaf people, and construct hardware i.e., an interactive, wireless refreshable Braille device that would be connected to the software to facilitate communication for blind people.

3. Expected deliverables of the Proposal (Products/Publications/Patents/ New concept/Spinoff etc.) #

   Copyright (software), Patent(hardware), Research Paper

4. Importance/highlights (3-5 bullet points) #

   - Communication software for normal, blind, deaf and dumb people.
   - A remote communication solution.
   - Interactive, refreshable, wireless Braille device for communication.

5. Literature Review and advancement: Demonstrate knowledge of (with references (IEEE format) and contribution to the national state-of-the-art in the relevant area#

   Annexure I

6. Alignment to School specific priorities (SoE: State specifically how the proposal supports the Flagship Projects and expected impacts at Cluster and School levels)#

   (v) Integration of AI and Machine Learning with Devices

7. Methodology#

   Annexure II

8. Gantt chart of the activities#

   Annexure III

9. Budget with justification:

   Annexure IV

10. Additional information (as per requirement)

Note: 1) Please attach one-page CVs of Mentors.
2) If required, annexures may be used for items 2-8.

ANNEXURE I

Paper [1] demonstrates the use of Convolutional Neural Network to process the images. First the images are preprocessed for identifying the hand gestures. This process reduces the chances of error by a huge margin. These images are fed directly to Convolutional Neural Network. The model then identifies the gesture of the hand and predict the label for the gesture. Further those labels are transferred to text to speech engine.

Paper [2] uses a sensor-based approach. It uses a series of motion sensors deployed in a hand glove. The motion sensed by the sensors will be transmitted to a nearby computer. The computer will then preprocess the data received for any redundant movement. Then this data will be sent to RNN for prediction of the label. Further the output label will be handed over to the text engine.

Paper [3] uses a vibrator-based approach for braille communication. The system consists of six vibration motors in a 3x2 matrix. The system receives a text message from a computer through serial communication. The received text will then be converted to the braille script. Now the braille script having a 3x2 matrix in the form of true falls will be used for output. In the matrix if a value is true, the vibration motor will be turned on.

The hardware discussed in paper [4] is using a combination of servos for creating a 3x2 matrix for braille scripts. The internal processing of the system is quite similar to that of paper [3]. The only difference is that this system is using a servo for providing a sense of touch instead of a vibration motor.

Paper [5] demonstrate a use of Gradient decent for Text to Speech engine. Stochastic differential equation is used along with forward differential neural network is used for conversion of text to speech.

Paper [6] discusses about a software that allows users to use their voices to control computer functions and dictate text so this system is made up of two parts: the first part is for processing acoustic signals acquired by a microphone, and the second part is for interpreting the processed signals and then mapping them to words. They have used Hidden Markov Models to create models for each letter (HMM) and Mel Frequency Cepstral Coefficients will be used to extract features (MFCC). Their dataset's features will be trained using vector quantization, and the dataset's features will be tested using the Viterbi algorithm. A speech recognition technology will be used only for home automation.

[1] Ankit Ojha, Ayush Pandey, Shubham Maurya, Abhishek Thakur, Dr. Dayananda P 2020. Sign Language to Text and Speech Translation in Real Time Using Convolutional Neural Network

[2] Mirza, S. F., & Al-Talabani, A. K. (2021). Efficient Kinect Sensor-based Kurdish Sign Language Recognition Using Echo System Network.

[3] Y. Neeraja,D.Susritha Reddy, J.Kalpana, K.Subhasri, D. Lokesh 2021, AN ADVANCED BRAILLE SYSTEM-COMMUNICATION DEVICE FOR BLIND-DEAF PEOPLE

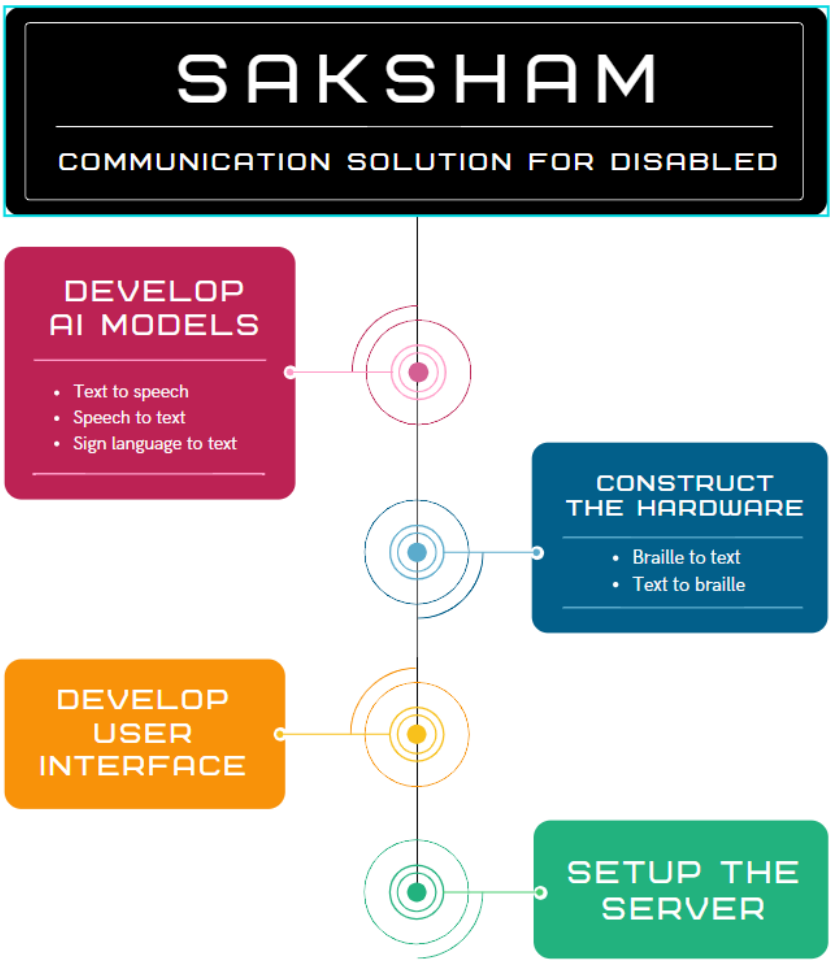
[4] Himanshu Gautam, Prerna Gaur 2020, DRISHYAM: Real-Time Text to Braille Conversion and Realization

[5] Vadim Popov, Ivan Vovk, Vladimir Gogoryan, Tasnima Sadekova, Mikhail Kudinov 2021. Grad-TTS: A Diffusion Probabilistic Model for Text-to-Speech

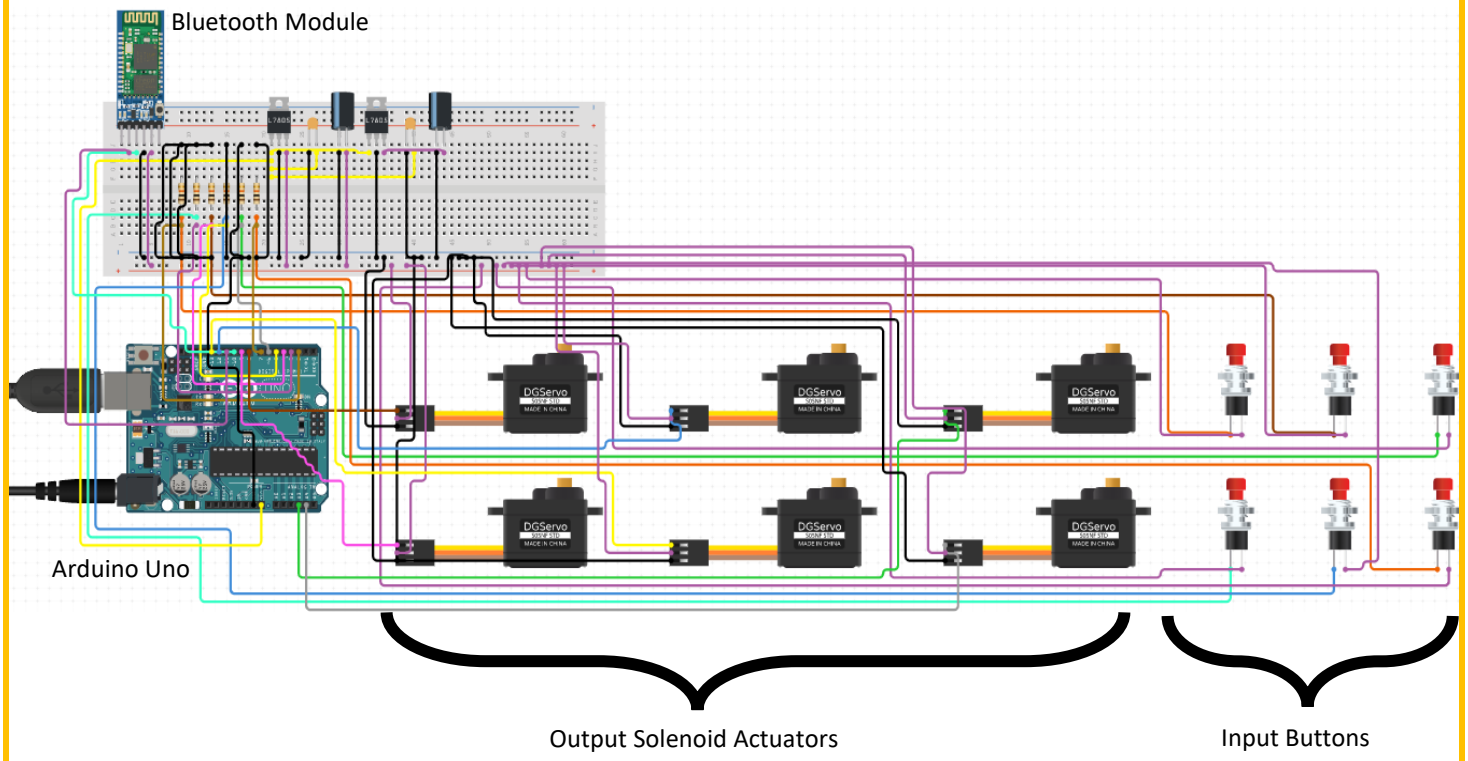
[6] Prerana Das, Kakali Acharjee, Pranab Das and Vijay Prasad 2015, VOICE RECOGNITION SYSTEM: SPEECH-TO-TEXT

ANNEXURE II

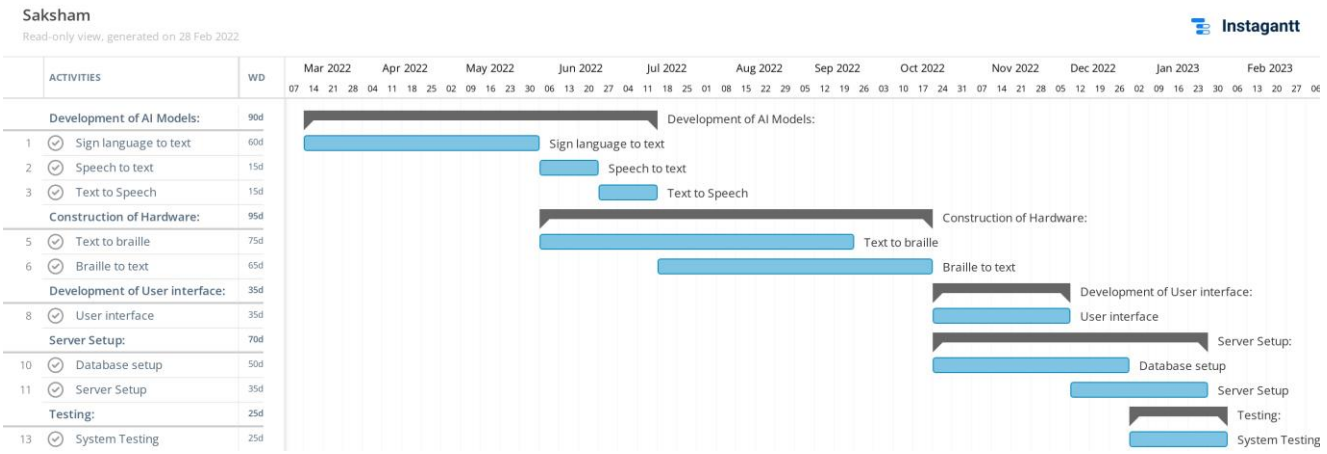
Workflow: -



Hardware: -



ANNEXURE III



ANNEXURE IV

Justification item wise:

Proposed expenditure	Quantity	Value	**Total**
Consumables • Arduino Uno • Bluetooth HC05 • Actuator • Buttons • PCB Bread Board	 2 2 12 16 2	 1000 500 2000 100 1000	 2000 1000 24000 1600 2000
Equipment • 3D Printer	1	25,000	25,000
Characterization	0	0	0
Any other (please specify)	0	0	0
Total Budget			₹ 55,600

Bikram Pratim Bhuyan

Curriculum Vitae

Personal Information

Surname, Given Name	Bhuyan, Bikram Pratim
Email address	bikram23bhuyan@gmail.com, bpbhuyan@ddn.upes.ac.in
Telephone Number	(+91)8761007582
Date of Birth	23 November 1988
Place of Birth	India
Citizenship	Indian

Education

2014–2016 **Master of Technology(M.Tech.) in Information Technology**,
Tezpur University, India
Focus: Design and Analysis of Algorithms, Knowledge Representation and Reasoning, Pattern Recognition, Data Mining and Data Warehousing, Game Theory.
M.Tech Thesis: "Approximation of Stability and its relationship with similarity in Formal Concept Analysis", supervised by Prof. Dr. Shyamanta M Hazarika and Dr. Arindam Karmakar

2007–2011 **Bachelor of Engineering(B.E.) in Information Technology**,
Nagpur University(R.T.M.N.U.), India
Focus: Algorithms and Data Structure, Theory of Computation.

2005–2007 **Higher Secondary School Education (12th Standard)**,
Cotton College, India
Focus: English, Physics, Mathematics, Chemistry.

–2005 **High School Education (10th Standard)**,
Disneyland High School, Guwahati, Assam, India
Focus: English, General Science, Social Studies, Mathematics, Assamese.

Work Experience

September 2018–till date **Assistant Professor**,
Department of Informatics, School of Computer Science, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India
- Conducted assigned undergraduate and graduate courses and seminars.
- Teaching IBM specialized subjects.
- Seed money of 1,00,000 INR sanctioned for the project titled "River water pollution detection using microfluidic based paper analytical device using geospatial and temporal analysis".

August 2017–September 2018 **Assistant Professor**,
Department of Computer Science and Engineering, Kaziranga University, Jorhat, Assam, India
- Conducted assigned undergraduate and graduate courses and seminars.
- Provided expert lessons on GATE(Graduate Aptitude Test in Engineering)
- Laboratory in-charge.

July 2016–August 2017 **Assistant Professor**,
Asian Institute of Management and Technology, Guwahati, Assam, India
- Conducted assigned undergraduate and graduate courses and seminars.
- Acted as an examiner and scrutinizer for Gauhati University, Assam, India.
- Coordinator of the Research and Development cell of the institute.

August 2014–May 2016 **Teaching Assistant**,
Tezpur University, India
- Acted as a T.A. for assigned undergraduate and graduate courses.
- Member of the syllabus preparation and review committee.

February 2012–January 2014 **Consultant**,
ECIL Rapiscan Ltd., Assam, India
- Designed a part of the local Adhar Card project(SSN equivalent in U.S.) database and trained engineers.
- Prepared reports and delivered presentations after data analysis.

July 2011–February 2012 **IT Engineer**,
Integrated Systems and Services., Assam, India
- Developed, tested, installed, configured and troubleshooted computer hardware and software for Government projects.
- Installation of OS and required service packages: both open source and proprietary.

Skills & Abilities

Languages	Hindi, Assamese	Native, C2
	English	Fluent, C1
	French, German	Basic, A1
Programming Languages	C, C++, Java, MATLAB, Python, R, MySQL - (Advanced)	
Operating System	Windows, Linux (Ubuntu, CentOS), Mac OS - (Intermediate)	
Software	LaTeX, MS Word, MS Excel, MS Power-point, ConExp, FCART, FcaStone, IBM Cognos Insight - (Advanced)	

Publications

Paper Titled: "Relative Similarity and Stability in FCA Pattern Structures Using Game Theory",
2017 IEEE sponsored 2nd International Conference on Communication Systems, Computing and IT Applications (CSCITA), 208-213.

Paper Titled: "Bounding Stability in Formal Concept Analysis",
2018 Bhattacharyya S., Chaki N., Konar D., Chakraborty U., Singh C. (eds) Advanced Computational and Communication Paradigms. Advances in Intelligent Systems and Computing, vol 706. Springer, Singapore

Paper Titled: "Machine learning in predicting Hemoglobin variants",
Monalisha Saikia Borah, Bikram Pratim Bhuyan, Mauchumi Saikia Pathak, and P. K. Bhattacharya; International Journal of Machine Learning and Computing vol. 8, no. 2, pp. 140-143, 2018.

Paper Titled: "Panel Data - Representation and Learning",
Bikram Pratim Bhuyan; International Conference on Recent Advances in Pure and Applied Mathematics (ICRAPAM-2018), to be published with Springer

Paper Titled: "Selection Of Mobile Node Using Game And Graph Theory For Video Streaming Application",
Bikram Pratim Bhuyan, Sajal Saha; International Conference on Advances and Applications of Artificial Intelligence and Machine Learning (ICAAAIML-2020), published with Springer

Paper Titled: "Decision Intelligence Analytics: Making Decisions through Data Pattern and Segmented Analytics",
Bikram Pratim Bhuyan; Decision Intelligence Analytics and the Implementation of Strategic Business Management (DIASBM-2020), published with Springer

Paper Titled: "An Ontological Knowledge Representation for Smart Agriculture",
B. P. Bhuyan, R. Tomar, M. Gupta and A. Ramdane-Cherif, "An Ontological Knowledge Representation for Smart Agriculture," 2021 IEEE International Conference on Big Data (Big Data), 2021, pp. 3400-3406, doi: 10.1109/BigData52589.2021.9672020.

Professional Membership

June 2017 - till today — Member of ACM (Association for Computing Machinery)

June 2017 - till today — Member of ICSES (International Computer Science and Engineering Society))

October 2017 - till today — Member of ILA (International Literacy Association)

Professional Service

Peer Review Panel Member
- 3rd IEEE International Conference on Computational Intelligence and Networks (CINE 2017)
- 7th IEEE International Conference on Control Systems, Computing and Engineering (ICCSCE2017)
- International Conference on Computer Intelligent Systems and Networking (ICCISN 2017)
- Asian Journal of Fuzzy and Applied Mathematics

Areas Of Interest

- Formal Concept Analysis (Artificial Intelligence, KR&R)
- Graph Theory
- Game Theory
- Data Mining

Scholarships/Awards

2005-2007 — Recipient of scholarship from Govt. of Assam under Anundoram Borooah Award Scheme for securing the State Highest marks in Mathematics.

2014-2016 — Recipient of GATE scholarship from MHRD India during the M.Tech. tenure (Rs. 12400 per month).

April 2017 — Recipient of Best Paper Award for the paper titled "Relative Similarity and Stability in FCA Pattern Structures Using Game Theory" in CSCITA (Rs. 4500).

June 2018 — Qualified NET (Assistant Professor).

March 2018 GATE qualified (2 times)

Hobbies and Sports

Hobbies Traveling, Photography, Music, Acting, Guitar playing, Cooking

Sports Football, Cricket, Badminton, Cycling, Hiking

Declaration

I hereby declare that all the above mentioned facts and information are true to the best of my knowledge. I will solely be responsible for any discrepancy found in them.