

# **AUDIO NOISE CANCELLATION HEARING AID USING DEEP LEARNING (GAN/AUTOENCODER)**

By Team 1



# PROJECT BACKGROUND

- Hearing loss is the 4th leading cause of disability worldwide.
- Current solutions (hearing aids, implants) are costly and sometimes unsafe for surgery patients.
- Need: Affordable, intelligent noise-cancelling hearing aid for real-world use.

# OBJECTIVES & NECESSITY

- Design and develop a cost-effective hearing aid circuit.
- Apply deep learning models (GAN, Autoencoder) for real-time audio noise reduction
- Evaluate with PSQ (Perceptual Speech Quality) and STOI (Intelligibility) metrics.
- Expected PSQ  $\geq 2.6$  (vs. 1.7–2.5 in typical devices).

# PROJECT CONTENT & APPROACH

## 1. Two Main Goals:

- a. Hardware: Hearing aid prototype (input → amplification → output).
- b. Software: Deep learning model for noise cancellation.

## 2. System Flow:

Mic Input → HW Amplifier → Audio Processing (GAN/Autoencoder) → Noise-reduced Output

# TECHNOLOGY STACK & TOOLS

- Programming: Python
- Frameworks: TensorFlow
- Development Tools: GitHub (collaboration), Notion (project management), Docker (containerization)
- Hardware: Arduino / PCB for hearing aid prototype
- Testing Tools: PSQ & STOI

# PROJECT SCHEDULE (GANTT CHART)

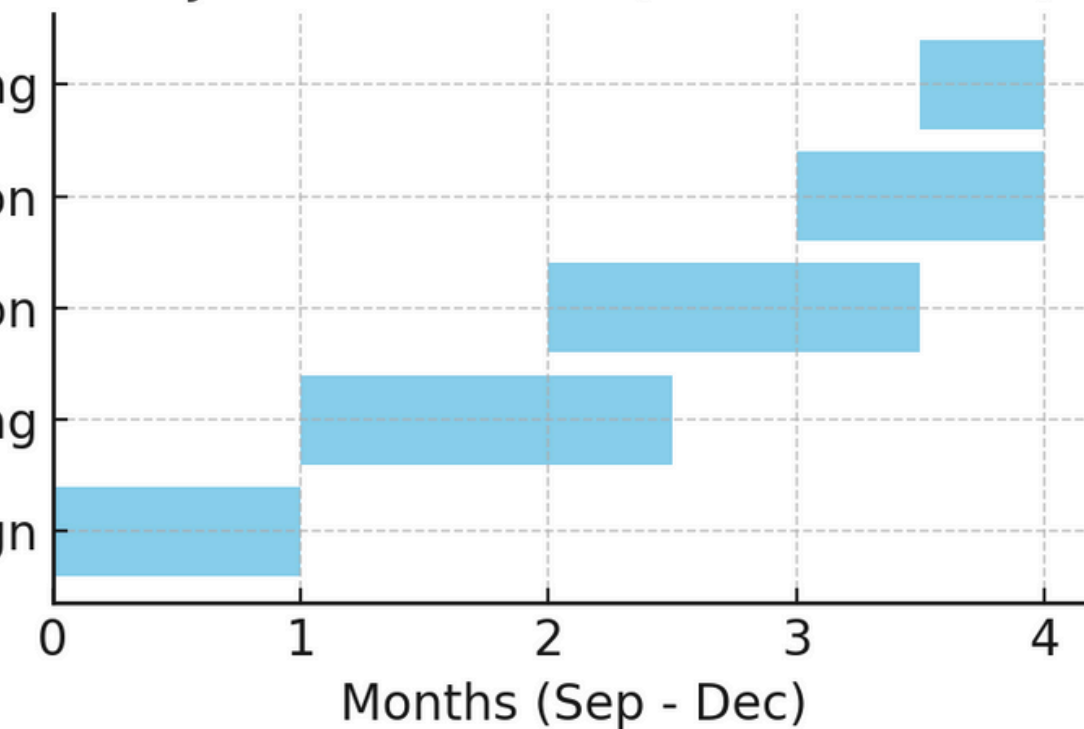
## Tasks & Roles:

- GAN Model Development → 성윤 , 시아 , Angela
- Hardware Design → 시아, 김우휘
- Testing & Evaluation → 권오송 , 김우휘
- Integration → ( between HW + GAN team)
- Documentation/Paper → (to be assigned)

Tasks

Paper Writing  
Testing & Evaluation  
System Integration  
GAN Model Training  
Planning & HW Design

Project Timeline (Gantt Chart)



# COLLABORATION & MEETINGS

- Weekly team meetings (online/offline)
- Bi-weekly mentor check-ins
- Tools for collaboration: GitHub (code), Notion (notes, docs), KakaoTalk (communication)

# EXPECTED RESULTS

- Working noise-cancelling hearing aid prototype
- Trained GAN/Autoencoder model with improved PSQ/STOI scores
- Publications & Deliverables:
  - Academic paper / conference submission
  - Technical documentation



# EXPECTED IMPACT & UTILIZATION

- Beneficiaries: People with hearing loss, healthcare industry
- Applications: Medical assistive devices, smart hearing aids, future AI-based audio enhancement systems
- Potential for commercialization + further academic research



**THANK YOU**