

# Development of Artificial Intelligence Based Counselling Assistant for Mental Wellness

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**Abstract-** This paper to develop an innovative AI-based counselling assistance system to address the growing challenges in mental health care. With mental health issues on the rise globally, there is a pressing need for accessible, effective, and personalized support systems. Traditional counselling services often face limitations in scalability, accessibility, and affordability, leading to gaps in care provision. The proposed system will leverage artificial intelligence techniques such as natural language processing (NLP), machine learning (ML), and affective computing to provide personalized counselling assistance. Users will interact with the system through a user-friendly interface, engaging in text or voice-based conversations. Key features of the system include real-time analysis and personalized coping strategies. By continuously learning from user interactions and feedback, the system will adapt and improve its recommendations over time, enhancing its effectiveness and relevance. Additionally, the system will prioritize user privacy and data security, adhering to stringent ethical standards and regulatory requirements. The impact of this project extends beyond individual users to encompass broader societal benefits. By providing accessible and stigma-free mental health support, the system aims to reduce the burden on traditional healthcare services, improve overall mental well-being, and contribute to destigmatizing discussions around mental health. Through collaboration with mental health professionals, researchers, and end-users, the project will ensure the development of a robust, evidence-based system that meets the diverse needs of its target audience. Ultimately, the AI-based counselling assistance system has the potential to revolutionize mental health care delivery, offering scalable, personalized support to individuals experiencing mental health challenges.

**Keywords:** NLP, ML, AI, Feedback.

## GENERALINTRODUCTION

Mental health issues are a pressing concern worldwide, with millions of individuals struggling to access timely and effective support. Traditional

counselling methods face various challenges, including limited accessibility, long waiting times, and stigma. To address these issues, this project proposes the development of an innovative solution: an Artificial Intelligence (AI)-based Counselling Assistance system designed to offer personalized, accessible, and stigma-free support for individuals experiencing mental health problems.

The proposed system will leverage advanced AI algorithms and Natural Language Processing (NLP) techniques to provide tailored counselling experiences. Users will interact with the system through a user-friendly interface, where they can express their thoughts, feelings, and concerns in a confidential and non-judgmental environment. The AI system will analyse the user's inputs, detecting patterns, emotions, and potential risk factors to provide personalized recommendations and interventions.

### Personalized Counselling Sessions:

The system will adapt its responses based on the user's unique profile, preferences, and mental health needs. By analyzing past interactions and feedback, the AI will continuously refine its approach to offer more effective support over time.

### 24/7 Accessibility:

Unlike traditional counselling services that operate within limited hours, the AI-based system will be available round-the-clock, allowing users to seek support whenever they need it. This accessibility is crucial for individuals experiencing crises or facing barriers to accessing in-person services

### Anonymity and Confidentiality:

To reduce stigma and promote openness, the system will ensure user anonymity and confidentiality. Users can feel safe expressing their thoughts and emotions

without the fear of judgment or disclosure of their identity.

Overall, the proposed AI-based Counselling Assistance system aims to democratize access to mental health support, empower individuals to take control of their well-being, and contribute to the destigmatization of seeking help for mental health problems. By harnessing the power of artificial intelligence, this project holds the potential to revolutionize the landscape of mental health care and improve outcomes for millions of people worldwide.

### METHODOLOGY

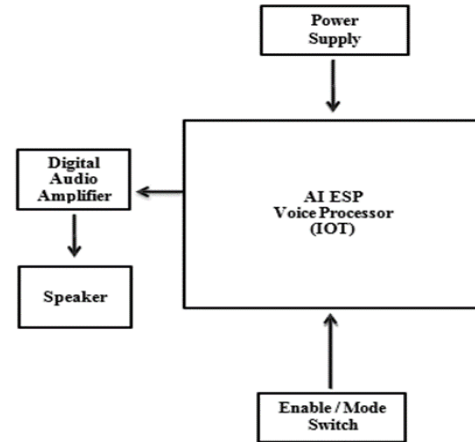
The methodology for designing an AI-based counselling assistance system for mental wellness involves several key steps. Firstly, a comprehensive review of existing literature and available AI technologies related to mental health counselling is conducted. This provides a foundation for understanding current approaches and identifying gaps. Next, data collection methods are established, which may include surveys, interviews, or data mining from existing mental health platforms. These data are used to train the AI model and develop algorithms for identifying patterns and providing personalized recommendations.

Ethical considerations, such as privacy and bias mitigation, are carefully addressed throughout the development process. The AI system is then iteratively tested and refined using real-world feedback from mental health professionals and users. Finally, the efficacy of the system is evaluated through quantitative and qualitative measures, comparing its performance to traditional counselling methods. This methodology ensures a systematic and ethical approach to designing an AI-based counselling assistance system for addressing mental wellness.

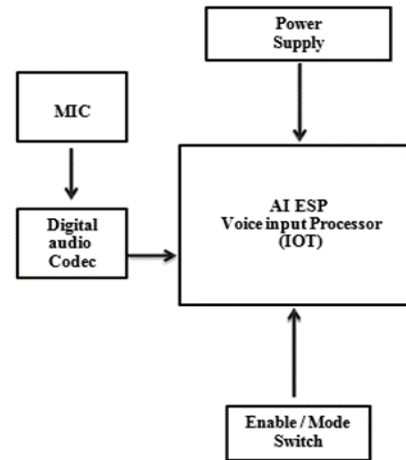
### ARCHITECTURE

#### BLOCK DIAGRAM:

#### AI VOICE OUTPUT PROCESSOR



#### AI VOICE INPUT PROCESSOR



#### Hardware Requirements:

1. AI-IOT VOICE processor
2. ATmega328 controller
3. MIC and audio codec
4. Speaker and digital amp
5. Relay with driver module
6. LCD
7. Mode switches
8. Power Supply

#### Software Requirements:

1. Arduino IDE
2. Embedded C language

#### Existing System:

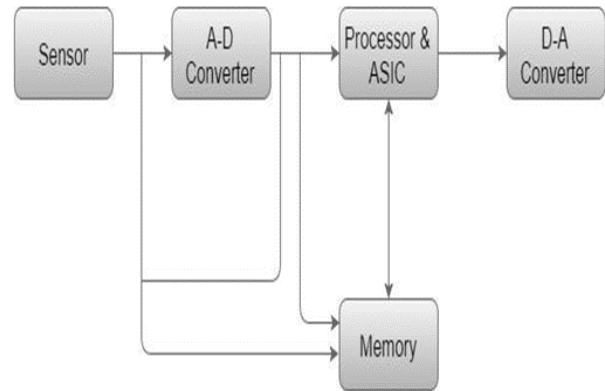
- Only software-based AI are using now a days.

- It requires the proper application installation and access procedure to follow.
- No real-time hardware-based application.

Proposed System:

- It's the very first-time hardware AI processed for a project research implementation.
- The expert micro hardware available for all IOT, AI and also to integrate with AI server.
- The AI processor has its own ability to access pair and control with Slave devices.
- An expert system aims to counsels the thought processes of humans and to automate problem-solving procedures.

BASIC STRUCTURE OF AN EMBEDDED SYSTEM



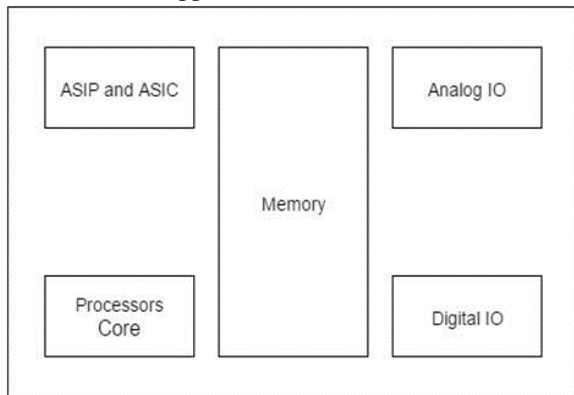
EMBEDDED SYSTEMS

COMPONENTS OF EMBEDDED SYSTEM

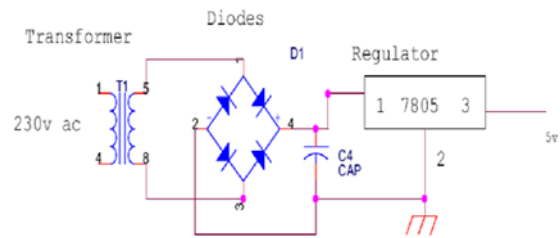
Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor-based system which is designed to perform a specific task. For example, a fire alarm is an embedded smoke.

An embedded system has three components:

- It has hardware.
- It has application software.



- It has Real Time Operating system (RTOS) that supervises the application software and provide mechanism to let the processor run a process as per scheduling by following a plan to control the latencies. RTOS defines the way the system works. It sets the rules during the execution of application program. A small-scale embedded system may not have RTOS.



POWER SUPPLY UNIT

Power supply unit consists of following units:

- 1) Step down transformer
- 2) Rectifier unit
- 3) Input filter
- 4) Regulator unit
- 5) Output filter

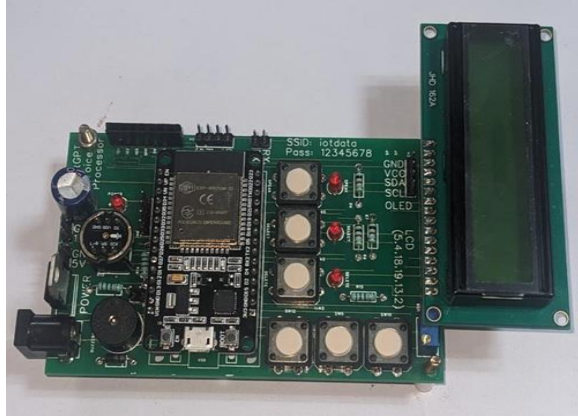
AI VOICE PROCESSOR

TENSILICA'S PROCESSOR-WROOM-32 is a powerful, generic Wi-Fi + BT + BLE MCU module that targets a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding.

At the core of this module is the TENSILICA'S PROCESSOR-D0WDQ6 chip. The chip embedded is designed to be scalable and adaptive. There are two CPU cores that can be individually controlled, and the CPU clock frequency is adjustable from 80 MHz to 240 MHz, the user may also power off the CPU and make use of the low-power co-processor to constantly monitor the peripherals for changes or crossing of thresholds. TENSILICA'S PROCESSOR integrates a rich set of peripherals, ranging from capacitive touch

sensors, Hall sensors, SD card interface, Ethernet, high-speed SPI, UART, I2S and I2C.

**AI BOARD**  
**TENSILICA'S PROCESSOR Peripherals Features**



- 18 Analog-to-Digital Converter (ADC) channels
- 10 Capacitive sensing GPIOs
- 3 UART interfaces
- 3 SPI interfaces
- 2 I2C interfaces
- 16 PWM output channels
- 2 Digital-to-Analog Converters (DAC)
- 2 I2S interfaces

**Input Only Pins**

- GPIO 34
- GPIO 35
- GPIO 36
- GPIO 39

**Pins with internal pull up INPUT\_PULLUP**

- GPIO14
- GPIO16
- GPIO17
- GPIO18
- GPIO19
- GPIO21
- GPIO22
- GPIO23

**Pins without internal pull up**

- GPIO13
- GPIO25
- GPIO26
- GPIO27
- GPIO32

- GPIO33

**SENSORS DESCRIPTION**  
**GENERAL DESCRIPTION**

The INMP441 is a high-performance, low-power, digital output, omnidirectional MEMS microphone with a bottom port. The complete INMP441 solution consists of a MEMS sensor, signal conditioning, analog to digital converter, anti-aliasing filter, power management, and industry-standard 24-bit I2S interface.

The I2S interface allows the INMP441 to be directly connected to digital processors such as DSPs and microcontrollers without the need for an audio codec for use in the system. The INMP441 has a high signal-to-noise ratio and is an excellent choice for near-field applications. The INMP441 has a flat wideband frequency response that results in a high definition of natural sound.

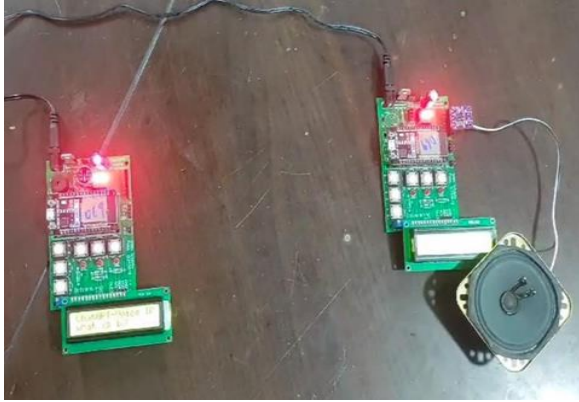
**INTERFACE DESCRIPTION**

1. SCK: Serial data clock for I2S interface
2. WS: Serial data word selection for I2S interface
3. L/R: Left/Right channel selection.
4. When set to low, the microphone outputs a signal on the left channel of the I2S frame.
5. When set to high level, the microphone outputs signal on the right channel
6. SD: Serial data output of the I2S interface.
7. VCC: Input power, 1.8V to 3.3V.
8. GND: power ground

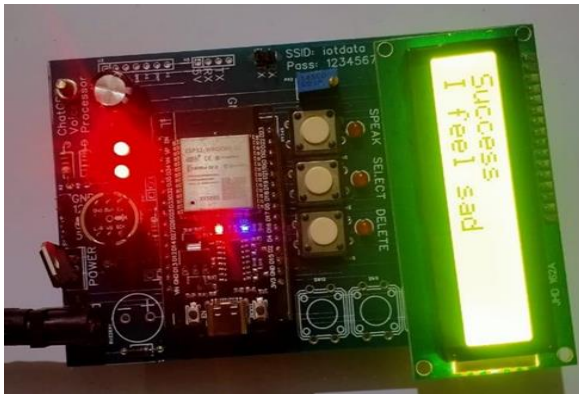
**FEATURES**

- Digital I2S interface with high precision 24-bit data
- High signal to noise ratio is 61 dBA
- High sensitivity – 26 dBFS
- Stable frequency response from 60 Hz to 15 kHz
- Low power consumption: low current consumption 1.4 mA
- High PSR: -75 dBFS

**HARDWARE OUTPUT KIT IMAGE**



SPEECH INPUT TRANSMITTER AI



### CONCLUSION

The development of an Artificial Intelligence-based counselling assistant for mental wellness holds promise as a transformative tool in the field of mental health care. Through this project, we aimed to create a platform that bridges the gap between individuals seeking support for their mental well-being and the limited resources available in traditional counselling settings. Our research and development process culminated in the creation of an intelligent system capable of providing personalized support, guidance, and resources to users in need. Our AI-based counselling assistant is designed to be user-friendly, accessible, and non-intrusive, respecting the privacy and autonomy of individuals seeking assistance. Through natural language processing and machine learning algorithms, the assistant can engage in meaningful conversations with users, assess their mental health status, and offer relevant insights and recommendations. By leveraging data from various sources, including user input, clinical guidelines, and psychological literature, the assistant can provide

tailored advice and interventions tailored to the unique needs of each individual.

One of the key strengths of our AI-based counselling assistant is its ability to scale mental health support services to reach a larger audience. With the increasing demand for mental health resources and the shortage of trained professionals, technology-driven solutions like ours have the potential to extend the reach of counselling services to communities that are underserved or lack access to traditional mental health care. By harnessing the power of AI, we can democratize access to mental health support and empower individuals to take control of their well-being. Moreover, our AI-based counselling assistant is not intended to replace human therapists but rather to complement their work. By automating routine tasks, such as initial assessments and psychoeducation, the assistant frees up therapists' time to focus on more complex cases and provides them with valuable insights into their clients' progress and needs. In this way, our technology enhances the efficiency and effectiveness of mental health care delivery, enabling therapists to deliver more personalized and responsive interventions. Additionally, ongoing research and evaluation are needed to continuously improve the accuracy, effectiveness, and safety of our AI-based counselling assistant and to validate its impact on mental health outcomes.

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