

Aim is to design and construct a Microcontroller-based Autonomous Robotic Vehicle (MAVE) capable of navigating through a maze.

Microcontroller can be any type and any language.

MAZE has 3 sub-systems:

- (1) Sensor (SS)
- (2) Start-and-Navigation Control (SNC)
- (3) Motor Driver and Power Supply (MDS).

Each subsystem must communicate via serial to:

- (1) each other in an integrated system
- (2) Hub given

Hub

Pygame based simulation evaluation of the 3 systems.

Allows individual testing and evaluation.

Main Sub-system focus:

This My section is the SNC sub-system.

SNC High level overview

- Responsible for state transitioning.
- Display critical system diagnostics from other sub-systems.
- Facilitate Human Machine Interface (HMI) = will be discussed.
- Implement navigation control algorithm.
- Encompasses: communication necessary MAZE movement to MDS.

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HMI components:

- Must be extremely responsive and no delay
- Excessive low latency.
- touch-activated sensor (App based or capacitive touch).
- Pure tone sensor
- Critical system diagnostic indicator / display.

SNC Must:

- Quick to respond and not make the communication slow due to processing done
- Operate from 3.3V, 5V, 9V and not exceed 0.5A pull.
- Able to SCS (will be discussed)
- Manage and communicate all state transitions
- await end-of-callibration (EOC) signals from SS and MDS within 1s
- 1st touch sensor to transition from AL to MAZE start.
- Make decisions needed to navigate the maze (navigation specifications).
- Detect a pure tone at the frequency given.
- Receive and display critical system diagnostic information / data
- Must fit on a 10cm by 10cm board

Pure Tone detection:

Maximum volume of 60 dB with minimum distance of 10cm. from microphone.

Must operate from 3.3V from the ESP32 PIN. and feed back 0-33V. detecting 2 tones with duration of 0.5 to 1 second, within 2 seconds of each other. Transition from MAZE state into SOS state

↳ Remain until another set of 2 tones are detected.

- No digital filter are allowed.
- Must ensure capable in a noisy environment.
- Group 45 – 2600 Hz needs to be detected, with 5% tolerance

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