

Functional Description: Autonomous Vehicle Control Utilizing GPS

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This project will use a GPS receiver to determine the coordinates of the vehicle to which it is attached. Using this signal information and destination coordinates entered by the user, the system will navigate the vehicle relative to an internal map to reach its destination.

INPUTS	OUTPUTS
1) GPS Signal 2) Keypad Interface	1) LCD Display 2) Map or Graphic Display 3) Speed

Three modes of operation will be implemented and are as follows. Refer to Fig. 1-1 on the following page.

Autonomous mode

In this mode the vehicle will navigate from a starting point to the destination point that was entered in programming mode.

Steering will be controlled via external hardware and control signals from the CPU. In order to minimize error, the system will limit steering angle to 10 degrees between waypoints¹ since the waypoints are set up to have straight-line paths between them. Full steering control will be allowed when waypoints are near to allow for necessary adjustments.

Forward speed will be either maximum or zero and controlled by the CPU and external hardware. The vehicle will have no reverse direction.

If the GPS signal is lost, the system will continue on its current course for three seconds and then shut down. If the signal is reacquired before three seconds, the vehicle will not alter its operation.

Programming mode

This mode allows the user to select between desired destinations. For example, the user may select "Library" or "Jobst Hall." The actual coordinates will already be preprogrammed into the CPU. After the destination is selected, the receiver will retrieve the starting coordinates and then choose a route via straight-line paths between waypoints. The route will then be displayed on the LCD display and user may then edit route or accept route.

Diagnostics mode

This mode will be used to check the status of the system components to ensure functionality and troubleshoot system malfunctions. Diagnostic mode will display:

- 1) Number of satellites receiver has locked onto
- 2) Distance to destination
- 3) Number of waypoints in route
- 4) Estimated time left on battery
- 5) Coordinates

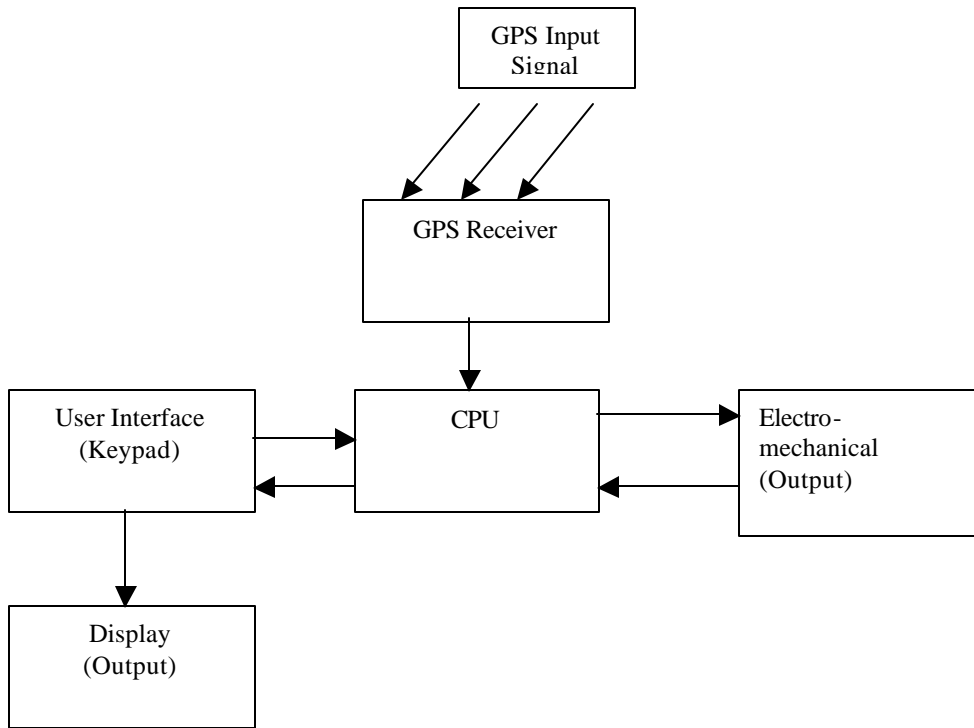


Fig 1-1 The Functional Block Diagram

1. Waypoints are the reference points entered by the user or programmer to define the piecewise linear path of the vehicle guided by the GPS receiver