Functional Description for:

Robotic Navigation Distance Control Platform

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Objective

The objective of this capstone project is design and build a robotic platform that will be able maintain a fixed safety distance behind another moving object. If time permits a steering, and variable distance controls will be incorporated. The steering control will allow the robotic platform change direction to follow the moving object. The variable distance control will allow the robotic platform to maintain a specified time safety distance behind the moving object. The robotic platform will also contain a EMAC microcontroller that will interface sensors

Modes of Operation

Fixed Navigation Mode:
All systems are powered and robotic platform waits for user to enter a fixed safety distance in feet to follow the object. First the user will be asked to enter either user or auto out of range mode. Secondly the user will enter the desired distance, and then press activation button on keypad to activate the robotic platform navigation controls. The robotic platform will then proceed to navigate behind a moving object.

Time Navigation Mode:
Similar to fixed navigation mode except the robotic platform waits for user to enter a time in seconds to safety follow the object.

User Out of Range Mode:
If the object being followed is out of range or there is no signal from sensors the robotic platform will enter an out of range mode in which the robotic platform will stop. The EMAC microcontroller will display 'Out of Range'. The robotic platform will then wait for user to reactivate the navigation controls, which will also clear the 'Out of Range' message on the LCD screen.

Auto Out of Range Mode:
Similar to user out of range mode except the robotic platform will continue navigation once an object is place back within range of the sensors. The EMAC microcontroller will clear the 'Out of Range' message on LCD screen.

Stop/Start Mode:
User is able to stop and start the current navigation mode.

System I/O

Inputs to EMAC Microcontroller:

User Input:
When in navigation mode user will enter required fixed following distance and activates robotic platform using keypad. If the robotic platform enters out of range mode the user specifies to activate robotic platform or to return to navigation mode.

Sensors:
The distance and navigation sensors will be mounted on the robotic platform. The distance sensor will point straightforward and parallel to the ground, which will determine distance behind moving object. The navigation sensors will be pointing slightly outward, which will allow the EMAC to control the steering of the robotic platform to navigate behind the moving object.

Outputs from EMAC Microcontroller:

LCD Display:
LCD display will display the mode of operation the robotic platform is performing. The LCD display will also provide information to user to be able to enter different modes of operation as well as what input is required from user.

Robotic Platform Motor:
The EMAC microcontroller will control motor speed allow the robotic platform maintain a fixed distance behind a moving object.

Robotic Platform Steering:
The EMAC microcontroller will control the steering of the robotic platform as to navigate behind the moving object.

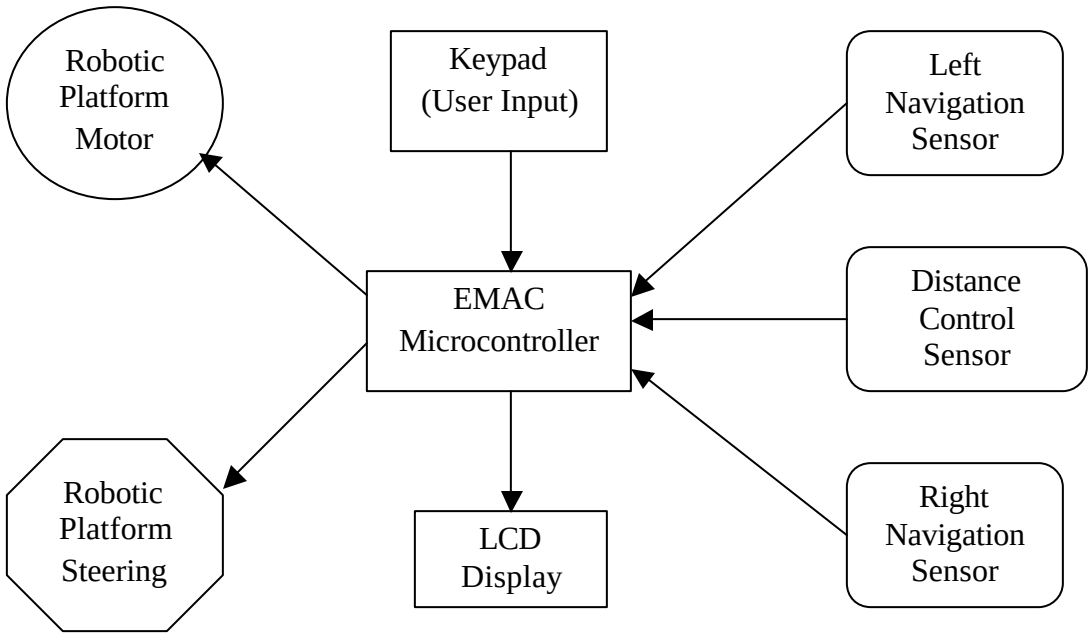

Figure (2.1)
System Block Diagram

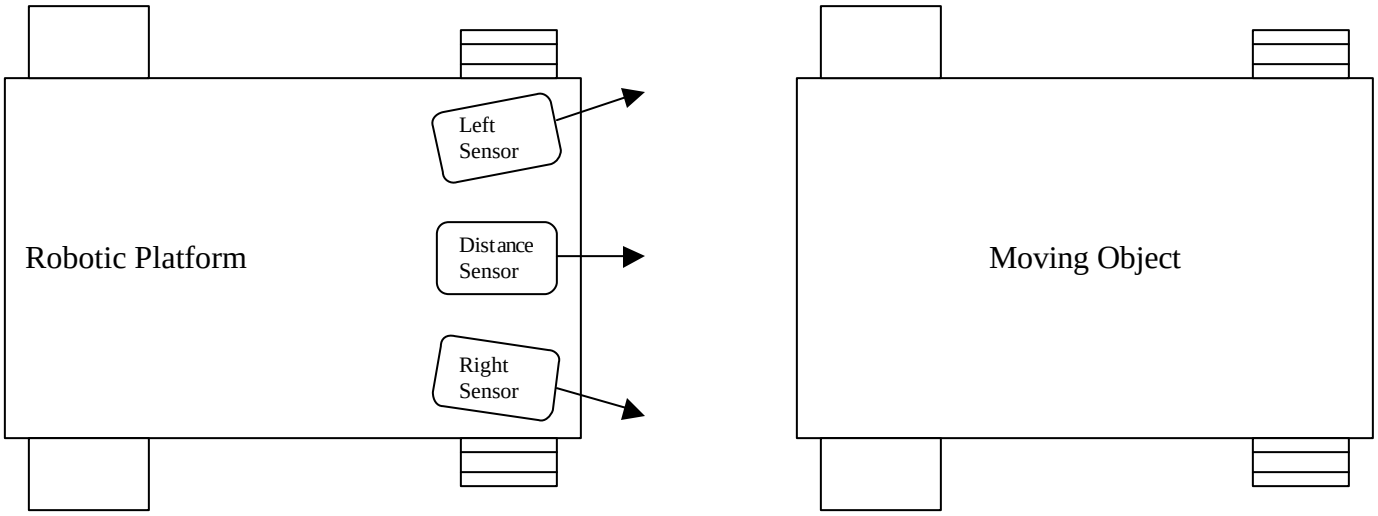

Figure (3.1)
System Sensor Diagram