Aberystwyth Robotics Club University Branch

Project Information

Pioneer

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About the Robot

The Pioneer robot is a commercial research chassis bought by the Computer Science Department 10 years ago. Since then it has been upgraded to higher spec computers and newer electronic components. The Pentium motherboard has been replaced by an Arduino microcontroller to interact with all the hardware and a Raspberry Pi to communicate and run the higher-level control.

Pin Layout

Component	Arduino Pin
Left Motors PWM signal	8
Right Motors PWM signal	9
Right side encoder A	2
Right side encoder B	3
Left side encoder A	18
Left side encoder B	19
Power connection for IR sensors and Ultrasonics	42
Robotic ArmRelay // on/off	43
Power connection for IMU and large LCD screen	44
Power connection for Sabertooth motor controller	45
Bottom IR sensor (line following sensor)	A0
Front IR sensor (distance sensor)	A1
Rear right bumper 2	A6
Rear right bumper1	A7
Rear centre bumper	A8
Rear left bumper 1	A9
Rear left bumper 2	A10
Front left bumper 1	A12
Front centre bumper	A13

Front right bumper 1	A14
Front right bumper 2	A15
I2C control of IMU and large LCD	SDA/SCL
Sonar Trigger	10
Sonar Receive	11
Sonar Cluster 0	5
Sonar Cluster 1	7
Sonar Cluster 2	6

Design Brief

For the next few years, Aberystwyth University will be working towards the ExoMars mission by sending a robotic rover to Mars to take the latest data of the surface of Mars.

Using the Pioneer chassis, I would like you to complete a Mars mission simulation which will include autonomous data analysis, autonomous and semi-autonomous navigation from a remote location.

Tasks

- Create a wireless control system to move the motors on the Pioneer.
- Avoid obstacles using ultrasonic sensors.
- Avoid any falls using the infrared sensor at the base of the Pioneer.
- Create a wireless control system which can operate the robotic grabber.
- Create a User Interface that can control all the hardware onboard the robot and read all the sensors and information.

Document History

Version	Changed	Changed By	Date Changed
V0.1	Initial Creation	Tomos Fearn (tof7@aber.ac.uk)	25th August 2017
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