RJHS FRC Software Documentation

2011

Generated by Doxygen 1.7.3

Sat Dec 3 2011 14:13:21

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2.1 File List

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Chapter 3

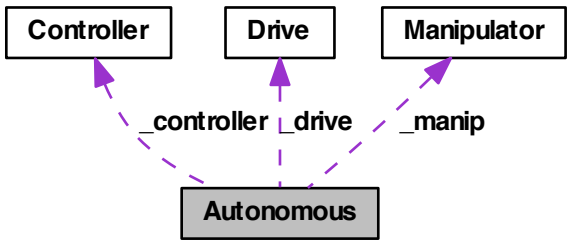
Class Documentation

3.1 Autonomous Class Reference

Class managing the Autonomous period of the competition.

`#include <Autonomous.h>`

Collaboration diagram for Autonomous:



Public Member Functions

- Autonomous (Drive *drive, Manipulator *manip, Controller *controller, DriverStationLCD *screen)

Construct from the addresses of a drive system, a manipulator, a controller, and an LCD screen.

- ~Autonomous ()

  Destructor. Kill stuff.

- void Go ()

  State machine function that decides which state to go into.

- void Init ()

  Convenience method. Same as initialState()

- void printLightSensors ()

  Debug info. Prints the values of lightLeft, lightCenter, and lightRight on the screen.

Private Member Functions

- void initialState ()

  The initial state of the robot.

- void checkForLines ()

  The state in which the robot is looking for tape lines on the floor.

- void move ()

  State in which the robot moves forward.

- void correctRight ()

  State in which the robot moves slightly to the right.

- void correctLeft ()

  State in which the robot moves slightly to the left.

- void placeTube ()

  State in which the robot ejects the tube (ideally onto a peg)

- int flip (int x)

  If x is 0, return 1! If x is 1, return 0!

Private Attributes

- UINT8 lane

  The starting lane of the robot; 1 for center, 0 for left or right.

- char forkDirection

  If we're in the center lane: do we go left or right at the fork?

- Drive * _drive

  Pointer to object abstracting drive mechanism.

- Manipulator * _manip

  Pointer to object abstracting manipulator.

- Controller * _controller

  Pointer to object abstracting controller.

- DriverStationLCD * _screen

  Pointer to object representing LCD screen on the Driver Station. Used toprint feedback to the screen.

- DigitalInput * lightSensorLeft

  Pointer to object interfacing with leftmost light sensor.

- DigitalInput * lightSensorCenter

  Pointer to object interfacing with center light sensor.

- DigitalInput * lightSensorRight

  Pointer to object interfacing with rightmost light sensor.

- DigitalInput * autonomousLaneSwitch

  Physical switch controlling which lane our robot starts out in.

- DigitalInput * autonomousForkSwitch

  Physical switch controlling which direction our robot is to take if it's in the center lane.

3.1.1 Detailed Description

Class managing the Autonomous period of the competition. Manages a "state machine" (essentially a *switch* block) that defines which of a number of "states" to execute based on inputs from three light sensors. These states are: check light sensors, move, correct left, correct right, place tube.

3.1.2 Constructor & Destructor Documentation

3.1.2.1 Autonomous (Drive * *drive*, Manipulator * *manip*, Controller * *controller*, DriverStationLCD * *screen*)

Construct from the addresses of a drive system, a manipulator, a controller, and an LCD screen.

Parameters

drive	Pointer to a *Drive* variable that will be used in both Autonomous and Teleoperated periods.
manip	Pointer to a *Manipulator* variable that will be used in both Autonomous and Teleoperated periods.
controller	Pointer to a *Controller* variable that will be used in both Autonomous and Teleoperated periods.
screen	Pointer to a *DriverStationLCD* variable that will be used in Autonomous, Teleoperated, and Disabled periods to write to the screen.

3.1.3 Member Function Documentation

3.1.3.1 void checkForLines ( ) [private]

The state in which the robot is looking for tape lines on the floor.

Read input from the 3 light sensors and store the results in three variables.

3.1.3.2 void correctLeft ( ) [private]

State in which the robot moves slightly to the left.

Print to the screen that we're in *correctLeft()* and turn left by driving the left wheels at -.15 and the right wheels at *AUTO_TURN_SPEED*.

3.1.3.3 void correctRight ( ) [private]

State in which the robot moves slightly to the right.

Print to the screen that we're in *correctRight()* and turn right by driving the left wheels at *AUTO_TURN_SPEED* and the right wheels at -.15.

3.1.3.4 int flip (int *x*) [private]

If x is 0, return 1! If x is 1, return 0!

Parameters

x	The value to be flipped

Returns

The flipped value

3.1.3.5 void Go ( )

State machine function that decides which state to go into.

Operates on the *lightX* variables to tell where the line is, with 0 indicating that the sensor saw nothing and 1 indicating that the sensor detected something (ideally the tape). We then use a sereis of *if* statements to change to the appropriate state.

3.1.3.6 void initialState ( ) [private]

The initial state of the robot.

Read input from the switches and set variables accordingly. If lane switch is off, we're in a side lane; if it's on, we're in the center one. If we're in the center, read the second fork switch: if it's on, go left; if not, go right.

3.1.3.7 void move ( ) [private]

State in which the robot moves forward.

Print to the screen that we're in *move()* and drive forward at *AUTO_DRIVE_SPEED*

3.1.3.8 void placeTube ( ) [private]

State in which the robot ejects the tube (ideally onto a peg)

Brake the robot to a stop, print that we're in *placeTube()*, and run the ejection wheels for one second.

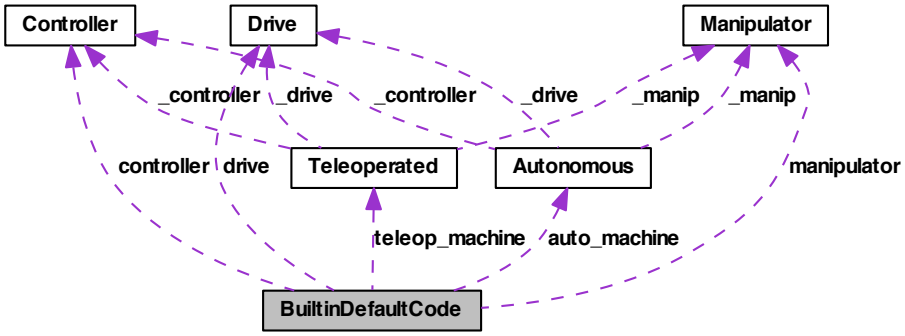
The documentation for this class was generated from the following files:

- Autonomous.h
- Autonomous.cpp

3.2 BuiltinDefaultCode Class Reference

Our big class that does everything. We didn't bother renaming it.

Collaboration diagram for BuiltinDefaultCode:



Public Member Functions

- BuiltinDefaultCode (void)

  Constructor.

- ~BuiltinDefaultCode ()

  Destructor. Called when a class object expires. Used so we don't waste memory.

- void RobotInit (void)

  Actions which would be performed once (and only once) upon initialization of the robot.

- void DisabledInit (void)

  Code called at the beginning of Disabled Mode.

- void AutonomousInit (void)

  Code called at the beginning of Autonomous Mode.

- void TeleopInit (void)

  Code called at the beginning of Teleoperated Mode.

- void DisabledPeriodic (void)

  The code called in a loop during Disabled Mode. Left as the default, minus the loop counter.

- void AutonomousPeriodic (void)

  The code called in a loop during Autonomous Mode.

- void TeleopPeriodic (void)

  The code called in a loop during Teleoperated Mode.

Private Attributes

- Drive * drive

  Class abstracting drive system.

- Manipulator * manipulator

  Class abstracting manipulator.

- Controller * controller

  Class abstracting the controller.

- DriverStationLCD * screen

  The screen. Yup.

- DriverStation * ds

  Driver Station object; used so we can send info back to the user (at least, in theory)

- AxisCamera * cam

  Our rear-mounted camera, used to see stuff in style.

- Autonomous * auto_machine

  Class running the Autonomous period.

- Teleoperated * teleop_machine

  Class running the Teleoperated period.

- Timer * timer

  Used to time movements in Autonomous.

3.2.1 Detailed Description

Our big class that does everything. We didn't bother renaming it. BuiltinDefaultCode is technically the name of the example class that we first opened, but once we started coding we realized that we couldn't rename the project and didn't want to reconfigure all the build settings from scratch. So here we are.

3.2.2 Constructor & Destructor Documentation

3.2.2.1 BuiltinDefaultCode (void) [inline]

Constructor.

Set up things before robot does anything; mostly this allocates memory for things.

The documentation for this class was generated from the following file:

- BuiltinDefaultCode.cpp

3.3 Controller Class Reference

Class abstracting the controller(s) used by our driver(s)

`#include <Controller.h>`

Public Member Functions

- Controller ()
  Constructor.
- ~Controller ()
  Destructor. Kill stuff.
- float getManipulatorElevation ()
  Get user-requested manipulator elevation.
- float getDriveSpeed ()
  Get user-requested drive speed.
- float getDriveTurn ()
  Get user-requested drive turn speed.
- int getMinibotSwitches ()

Get user-requested minibot shelf action (in/out).

Static Public Member Functions

- static int getManipulatorAction ()

  Get user-requested manipulator action (input, rotate, or eject).

Private Member Functions

- float abs (float initial)

  Absolute value of a float, since I'm not sure if we can import the <cmath> library onto the cRIO. EDIT: turns out we can, but I'll leave this here to conserve memory.

- float expo (float x, float a)

  An exponential function used to make joysticks less sensitive near the center and more sensitive towards the edges.

- float normalize (float joyVal, float min, float max)

  A function that "normalizes" inputs from the joysticks (because they don't give perfect -1.0 to 1.0 values).

Private Attributes

- Joystick * _controller

  Object abstracting our InterLink Elite controller, which WIPLib seems to think is a joystick.

- Joystick * _joystick

  Object abstracting our legitimate Logitech Attack3 joystick.

3.3.1 Detailed Description

Class abstracting the controller(s) used by our driver(s) Get input from a pair of joysticks (one of which is physically a flight simulator controller) and return those inputs. A class like this is useful because we can modify a few lines of code to change the inputs for functions throughout the entire code.

3.3.2 Constructor & Destructor Documentation

3.3.2.1 Controller ( )

Constructor.

Basically, initialize the controllers to USB ports 1 and 2.

3.3.3 Member Function Documentation

3.3.3.1 float abs (float *initial*) [private]

Absolute value of a float, since I'm not sure if we can import the <cmath> library onto the cRIO. EDIT: turns out we can, but I'll leave this here to conserve memory.

Parameters

initial	the initial value

Returns

the absolute value of the passed value; if it's negative, make it positive

Author

Matthew Haney

3.3.3.2 float expo (float *x*, float *a*) [private]

An exponential function used to make joysticks less sensitive near the center and more sensitive towards the edges.

Basically, plug the value requested by the user and a predefined constant into an exponential equation and return the result.

Parameters

x	the value to be exponentiated
a	a predefined exponential factor

Returns

the "expo-ed" value

Author

Adam Bryant

3.3.3.3 float getDriveSpeed ( )

Get user-requested drive speed.

Reads input from the y-axis on the right stick, normalizes it to a value between -1.0 and 1.0, and then exponentiates it (so the stick's less sensitive in the center and more sensitive at the edges).

Returns

The received, normalized, and expo-ed value (inverted [if the inversion switch {button #2} is thrown]).

3.3.3.4 float getDriveTurn ( )

Get user-requested drive turn speed.

Reads input from the x-axis on the right stick, normalizes it to a value between -1.0 and 1.0, and then exponentiates it (so the stick's less sensitive in the center and more sensitive at the edges).

Returns

The received, normalized, and expo-ed value(inverted [if the inversion switch {button #2} is thrown]).

3.3.3.5 getManipulatorAction ( ) [static]

Get user-requested manipulator action (input, rotate, or eject).

Read input from three buttons on the joystick: the trigger (1) and two thumb buttons (2 and 3). If any one of them is pressed, return that button's ID. If multiple are pressed, or none are pressed, return 0.

Returns

The ID of the received button.

3.3.3.6 float getManipulatorElevation ( )

Get user-requested manipulator elevation.

Reads input from the y-axis on the joystick.

Returns

The received value (inverted).

3.3.3.7 int getMinibotSwitches ( )

Get user-requested minibot shelf action (in/out).

Read input from two thumb buttons on the joystick (buttons 4 and 5) and return ther states in a single variable.

Returns

An integer with the last two bits being the right and left button inputs, respectively.

3.3.3.8 float normalize (float *joyVal,* float *min,* float *max*) [private]

A function that "normalizes" inputs from the joysticks (because they don't give perfect -1.0 to 1.0 values).

If the requested value is negative, return its percentage of the minimum possible value; if it's possible, do the same with the max. If it's zero, of course, return zero.

Parameters

joyVal	the input from the joystick
min	the minimun joystick value
max	the maximum joystick value

Returns

the normalized value

Author

Adam Bryant

The documentation for this class was generated from the following files:

- Controller.h
- Controller.cpp

3.4 Drive Class Reference

Class abstracting the drive system.

`#include <Drive.h>`

Public Member Functions

- Drive ()

Constructor.

- void drive (float speed, float turn)

  Drive the robot, ramping as you go.

- void drive_noramp (float speed, float turn)

  Drive without ramping. Used ONLY in Autonomous, since we don't trust our drivers ;)

- void tank_drive (float left, float right)

  Drive robot from values given for the speed of each wheel; used in autonomous. Regrettably, no ramping here; however, since it won't be sporadic, we don't need it.

- float ramp (float desired_output, float current_output)

  A function that "ramps" input from a joystick to motors so that an overzealous driver doesn't tear up the chassis.

Private Attributes

- RobotDrive * _drive

  WPILib-defined class for abstracting the drive mechanism. Our "Drive" class basically clarifies and ramps the inputs provided by RobotDrive.

- float _speed_prev

  The last sent speed value (used for ramping).

- float _turn_prev

  The last sent turn value (used for ramping).

3.4.1 Detailed Description

Class abstracting the drive system. Basically a wrapper for the WPILib-defined *RobotDrive* class, with our own fancy ramping capabilities put in.

3.4.2 Constructor & Destructor Documentation

3.4.2.1 Drive ( )

Constructor.

Initialize the drive system to work with Jaguars on ports *DRIVE_FRONT_LEFT_-JAGUAR_PORT* , *DRIVE_FRONT_RIGHT_JAGUAR_PORT* , *DRIVE_BACK_LEFT_-JAGUAR_PORT* , and *DRIVE_BACK_RIGHT_JAGUAR_PORT* .

3.4.3 Member Function Documentation

3.4.3.1 void drive (float *speed*, float *turn*)

Drive the robot, ramping as you go.

Parameters

speed	The user-requested speed
turn	The user-requested turn

Drive the robot with the *RobotDrive.Drive(speed, turn)* function UNLESS the user wants to do a dead turn (by pushing a stick directly to the left or right), in which case we use the *RobotDrive.TankDrive(left, right)* function.

3.4.3.2 void drive_noramp (float *speed*, float *turn*)

Drive without ramping. Used ONLY in Autonomous, since we don't trust our drivers ;)

Parameters

speed	The requested speed
turn	The requested turn

Drive the robot with the *RobotDrive.Drive(speed, turn)* function UNLESS we want to do a dead turn, in which case we use the *RobotDrive.TankDrive(left, right)* function.

3.4.3.3 float ramp (float *desired_output*, float *current_output*)

A function that "ramps" input from a joystick to motors so that an overzealous driver doesn't tear up the chassis.

Increase or decrease the sent value gradually based on operator response. With values close to zero, go even more gradually than normal.

Parameters

desired_-output	The output that the operator is trying to send

current_output	The current output
increment	The amount by which to increment ramping. Defaults to .005

Returns

the ramped value

Author

Drew Lazzeri

3.4.3.4 void tank_drive (float *left*, float *right*)

Drive robot from values given for the speed of each wheel; used in autonomous. Regrettably, no ramping here; however, since it won't be sporadic, we don't need it.

Parameters

left	Speed of the left motor
right	Speed of the right motor

The documentation for this class was generated from the following files:

- Drive.h
- Drive.cpp

3.5 Manipulator Class Reference

Abstracts the manipulator.

`#include <Manipulator.h>`

Public Member Functions

- Manipulator ()
  Constructor.
- ~Manipulator ()
  Destructor. Kill stuff.
- void inputTube ()

Suck in the tube.

- void rotateTube ()

  Rotate the tube downward.

- void ejectTube ()

  Spit out the tube.

- void elevate (float val)

  Elevate or lower the manipulator.

- void stopManipulatorAction ()

  Stop all movement of the manipulator.

- void stopManipulatorElevation ()

  Stop all elevation of the manipulator.

- DigitalInput * GetTopLimitSwitchAddress () const

  Safely return address of the top limit switch.

- DigitalInput * GetBottomLimitSwitchAddress () const

  Safely return address of the bottom limit switch.

Private Attributes

- Relay * manipulatorTop

  Forwards/backwards relay controlling motion of the top two wheels of the manipulator.

- Relay * manipulatorBottom

  Forwards/backwards relay controlling motion of the bottom two wheels of the manipulator.

- Relay * manipulatorElevation

  Forwards/backwards relay controlling position of the manipulator.

- DigitalInput * manipulatorElevationBottomLimitSwitch

  Limit switch at the bottom of the manipulator elevator.

- DigitalInput * manipulatorElevationTopLimitSwitch

  Limit switch at the top of the manipulator elevator.

3.5.1 Detailed Description

Abstracts the manipulator. Custom class interfacing with the manipulator on our robot through various relays and digitl inputs. Provides multiple methods for easily manipulating the... err... manipulator.

3.5.2 Constructor & Destructor Documentation

3.5.2.1 Manipulator ( )

Constructor.

Initialize the relays and limit switches to their appropriate ports: see *MANIPULATOR_TOP_RELAY_PORT* , *MANIPULATOR_BOTTOM_RELAY_PORT* , *MANIPULATOR_ELEVATION_RELAY_PORT* , *MANIPULATOR_ELEVATION_BOTTOM_LIMIT_SWITCH_PORT* , and *MANIPULATOR_ELEVATION_TOP_LIMIT_SWITCH_PORT* .

3.5.3 Member Function Documentation

3.5.3.1 void ejectTube ( )

Spit out the tube.

Set both manipulator relays forward to spit out the tube.

3.5.3.2 void elevate (float *val*)

Elevate or lower the manipulator.

If the user is pushing the joystick forward, go down until the lower limit switch is tripped. If they're pulling it backward, go up until the upper limit switch is triggered.

Parameters

val	The user input.

3.5.3.3 DigitalInput* GetBottomLimitSwitchAddress ( ) const [inline]

Safely return address of the bottom limit switch.

Returns

The address, as a pointer-to-DigitalInput

3.5.3.4 DigitalInput* GetTopLimitSwitchAddress ( ) const [inline]

Safely return address of the top limit switch.

Returns

The address, as a pointer-to-DigitalInput

3.5.3.5 void inputTube ( )

Suck in the tube.

Set both manipulator relays to reverse to suck in the tube.

3.5.3.6 void rotateTube ( )

Rotate the tube downward.

Set the top manipulator relay to reverse and the bottom one forward.

3.5.3.7 void stopManipulatorAction ( )

Stop all movement of the manipulator.

Turn off the manipulator relays.

3.5.3.8 void stopManipulatorElevation ( )

Stop all elevation of the manipulator.

Turn off the manipulator elevation relays.

The documentation for this class was generated from the following files:

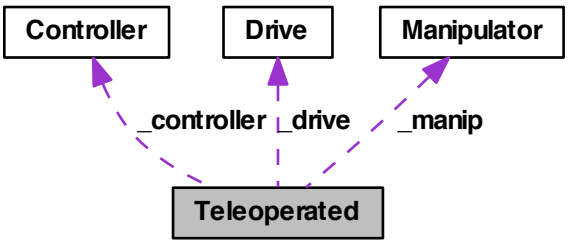
- Manipulator.h
- Manipulator.cpp

3.6 Teleoperated Class Reference

Class managing robot performance in Teleoperated mode.

`#include <Teleoperated.h>`

Collaboration diagram for Teleoperated:



Public Member Functions

- Teleoperated (Drive *drive, Manipulator *manip, Controller *controller, DriverStationLCD *screen)

  Construct from the addresses of a drive system, a manipulator, a controller, and the driver station LCD screen.

- ~Teleoperated ()

  Destructor. Kill stuff.

- void Init ()

  Set up for Teleoperated mode.

- void Go ()

  This is where the magic happens. Get driver input, then figure out what to do with it.

- void testLimitSwitches ()

  Print the values we're getting from the limit switches to the screen.

Private Attributes

- Drive * _drive

  Pointer to object abstracting drive system.

- Manipulator * _manip

  Pointer to object abstracting manipulator.

- Controller * _controller

  Pointer to object abstracting controller.

- DriverStationLCD * _screen

  The screen of the driver station.

- Relay * minibotShelf

  The minibot shelf relay.

- DigitalInput * top

  Top manipulator limit switch.

- DigitalInput * bottom

  Bottom manipulator limit switch.

- float manipulatorElevation

  User input: requested manipulator elevation.

- float driveSpeed

  User input: requested drive speed.

- float driveTurn

  User input: requested drive turn.

- int manipulatorAction

  User input: requested manipulator action.

- int minibotSwitches

  User input: requested minibot switches.

- int _nextState

  Used internally (in genericCondition()) to manage state switching.

- bool rotateTubeDownFlag

  Used to flag that we want to rotate the tube down (after inputting it)

3.6.1 Detailed Description

Class managing robot performance in Teleoperated mode. Gets user input from two controllers (abstracted as instances of class *Joystick*), processes said inputs (normalizing joystick values, dead space, etc.), and feeds them to a series of outputs (mainly the *Drive* class).

3.6.2 Constructor & Destructor Documentation

3.6.2.1 Teleoperated (Drive * *drive*, Manipulator * *manip*, Controller * *controller*, DriverStationLCD * *screen*)

Construct from the addresses of a drive system, a manipulator, a controller, and the driver station LCD screen.

Set up pointers to passed adresses. Initialize state and condition pointers.

3.6.3 Member Function Documentation

3.6.3.1 void Go ( )

This is where the magic happens. Get driver input, then figure out what to do with it.

Get input from the controller (see *Controller* class). Based on this, decide what values to send to the *Drive* class and *Manipulator* class, as well as how to move the relay (*Relay* class) controlling the minibot deployment system.

The documentation for this class was generated from the following files:

- Teleoperated.h
- Teleoperated.cpp

Chapter 4

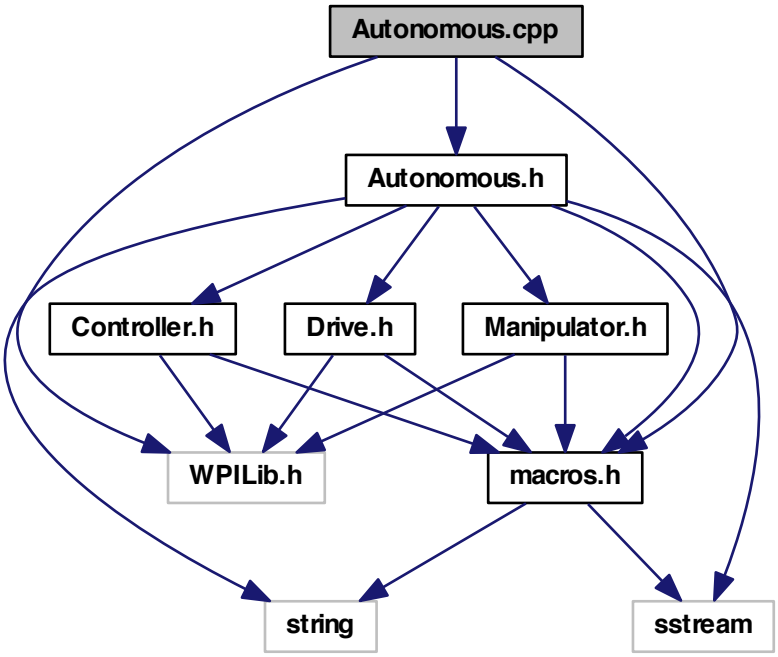
File Documentation

4.1 Autonomous.cpp File Reference

File containing implementations of functions found in the *Autonomous* class (found in Autonomous.h)

```
#include "macros.h"
#include "WPILib.h"
#include "Autonomous.h"
```

Include dependency graph for Autonomous.cpp:



4.1.1 Detailed Description

File containing implementations of functions found in the *Autonomous* class (found in Autonomous.h)

Authors

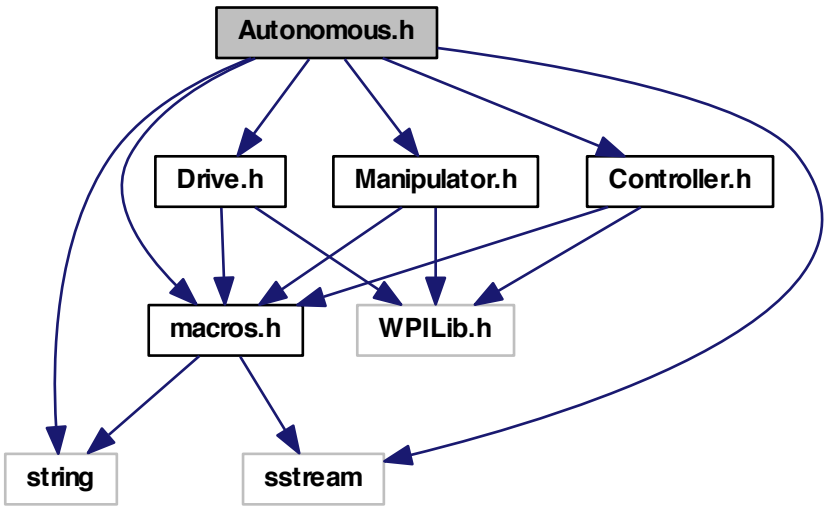
Matthew Haney, Drew Lazzeri

4.2 Autonomous.h File Reference

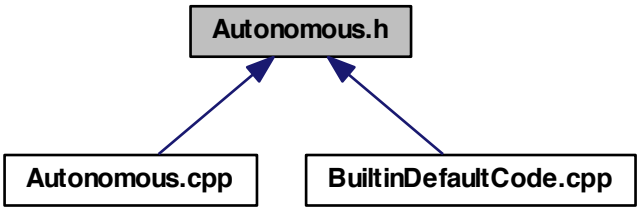
File containing definition of *Autonomous* class, which is used within the *Automonous-Periodic* function in the main program to simplify things.

```
#include "macros.h"
#include "Drive.h"
#include "Manipulator.h"
#include "Controller.h"
#include <string>
#include <sstream>
```

Include dependency graph for Autonomous.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Autonomous

  Class managing the Autonomous period of the competition.

4.2.1 Detailed Description

File containing definition of *Autonomous* class, which is used within the *Automonous-Periodic* function in the main program to simplify things.

Authors

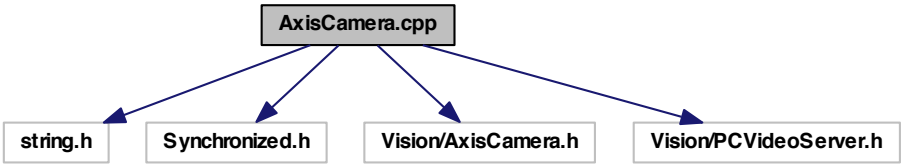
Matthew Haney, Drew Lazzeri

4.3 AxisCamera.cpp File Reference

File patching buggy code for the AxisCamera class that causes the robot to freeze.

```
#include <string.h>
#include "Synchronized.h"
#include "Vision/AxisCamera.h"
#include "Vision/PCVideoServer.h"
```

Include dependency graph for AxisCamera.cpp:



4.3.1 Detailed Description

File patching buggy code for the AxisCamera class that causes the robot to freeze.

Authors

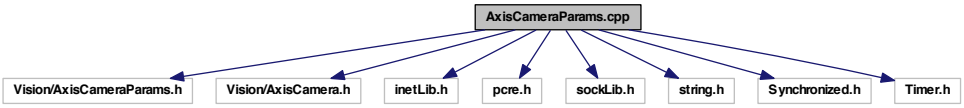
FIRST people, Joe Hurler

4.4 AxisCameraParams.cpp File Reference

File patching buggy code for the AxisCameraParams class that causes the robot to freeze. All documentation included was provided by Hurler and/or FIRST, though it was reformatted to be compatible with Doxygen.

```
#include "Vision/AxisCameraParams.h"
#include "Vision/AxisCamera.h"
#include <inetLib.h>
#include "pcre.h"
#include <sockLib.h>
#include <string.h>
#include "Synchronized.h"
#include "Timer.h"
```

Include dependency graph for AxisCameraParams.cpp:



4.4.1 Detailed Description

File patching buggy code for the AxisCameraParams class that causes the robot to freeze. All documentation included was provided by Hurler and/or FIRST, though it was reformatted to be compatible with Doxygen.

Authors

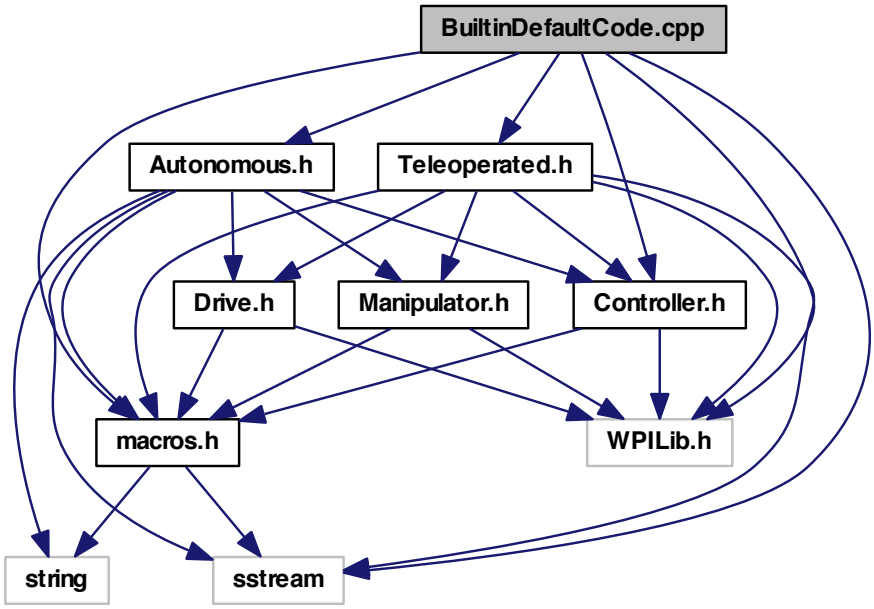
FIRST people, Joe Hurler

4.5 BuiltinDefaultCode.cpp File Reference

The file containing the class BuiltinDefaultCode. We didn't bother changing the name...

```
#include "macros.h"
#include "WPILib.h"
#include "Autonomous.h"
#include "Teleoperated.h"
#include "Controller.h"
#include <sstream>
```

Include dependency graph for BuiltinDefaultCode.cpp:



Classes

- class BuiltinDefaultCode

  Our big class that does everything. We didn't bother renaming it.

4.5.1 Detailed Description

The file containing the class BuiltinDefaultCode. We didn't bother changing the name... The main source code file for Regis Jesuit High School FRC Team #3729.

Authors

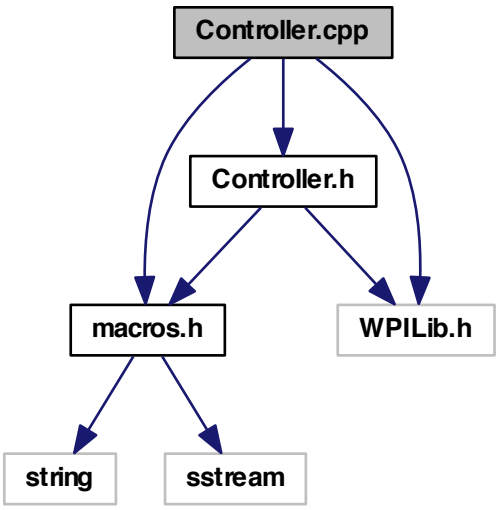
Matthew Haney, Drew Lazzerri

4.6 Controller.cpp File Reference

File containing implementations of functions found in the *Controller* class (found in Controller.h)

```
#include "Controller.h"
#include "WPILib.h"
#include "macros.h"
```

Include dependency graph for Controller.cpp:



4.6.1 Detailed Description

File containing implementations of functions found in the *Controller* class (found in Controller.h)

Authors

Matthew Haney, Drew Lazzeri

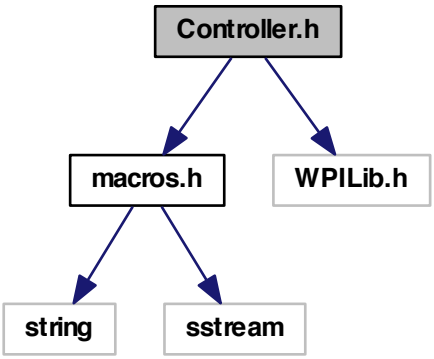
4.7 Controller.h File Reference

File containing definition of *Controller* class, which is used in both Autonomous and Teleoperated modes to get user input.

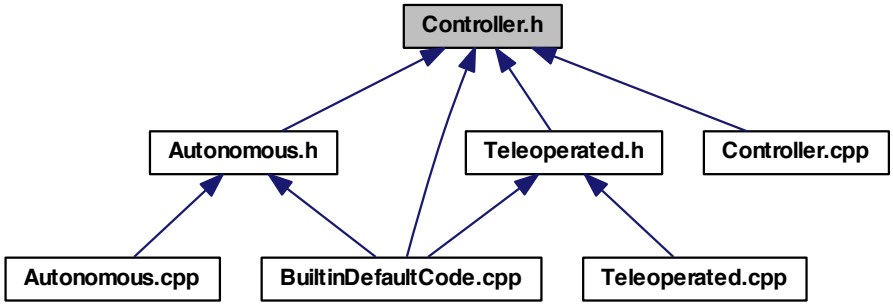
```
#include "macros.h"
```

```
#include "WPILib.h"
```

Include dependency graph for Controller.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Controller

  Class abstracting the controller(s) used by our driver(s)

4.7.1 Detailed Description

File containing definition of *Controller* class, which is used in both Autonomous and Teleoperated modes to get user input.

Authors

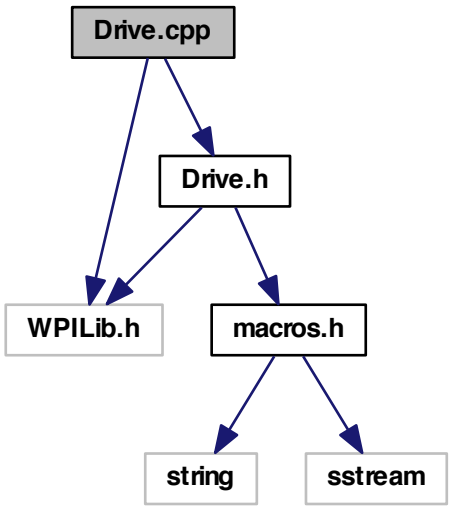
Matthew Haney, Drew Lazzeri

4.8 Drive.cpp File Reference

File containing definitions of functions declared in class *Drive* (declared in Drive.h).

```
#include "Drive.h"
#include "WPILib.h"
```

Include dependency graph for Drive.cpp:



4.8.1 Detailed Description

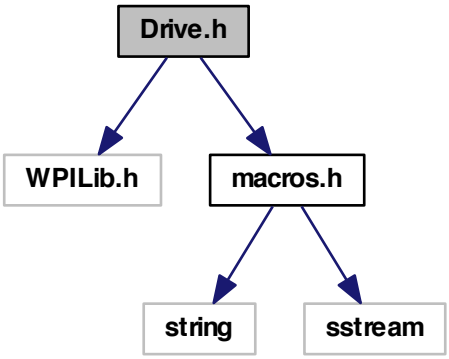
File containing definitions of functions declared in class *Drive* (declared in Drive.h).

4.9 Drive.h File Reference

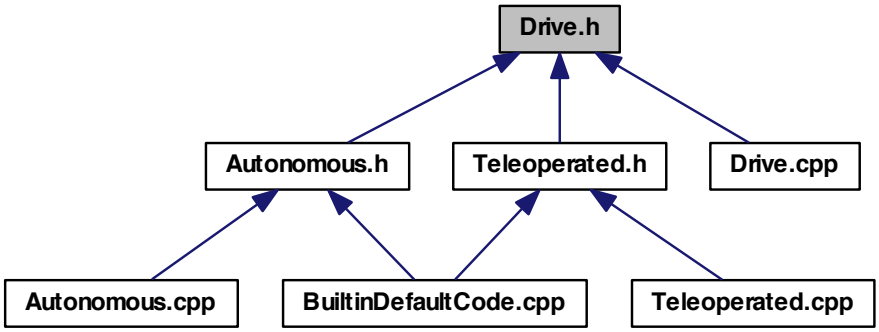
File containing definition of *Drive* class, which is used in the main program to drive the robot in both Autonomous and Teleoperated modes with no waste of memory.

```
#include "WPILib.h"
#include "macros.h"
```

Include dependency graph for Drive.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Drive

Class abstracting the drive system.

4.9.1 Detailed Description

File containing definition of *Drive* class, which is used in the main program to drive the robot in both Autonomous and Teleoperated modes with no waste of memory.

Authors

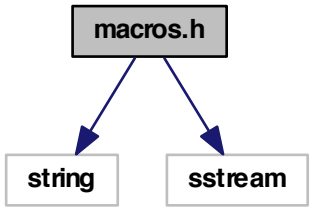
Matthew Haney, Drew Lazzeri

4.10 macros.h File Reference

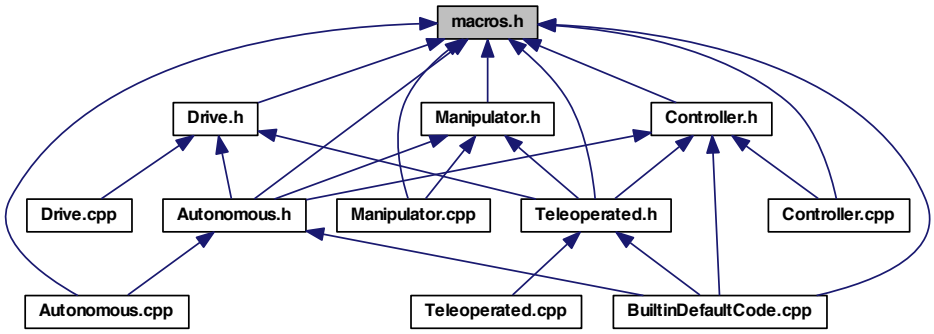
File containing a bunch of macros to de-clutter our other files.

```
#include <string>
#include <sstream>
```

Include dependency graph for macros.h:



This graph shows which files directly or indirectly include this file:



Defines

- #define YCENTER (0.03125)

  Adjustment for the fact that the joystick is slightly off-center.

- #define ROTCENTER (0.0156)

  Adjustment for the fact that the joystick is slightly off-center.

- #define XMIN -0.641

  Minimum possible X value.

- #define XMAX 0.648

  Maximum possible X value.

- #define YMIN (-0.57-YCENTER)

  Minimum possible Y value.

- #define YMAX (0.641-YCENTER)

  Maximum possilble Y value.

- #define ZMIN (-0.54)

  Minimum possible Z value.

- #define ZMAX (0.63)

  Maximum possible Z value.

- #define ROTMIN (-0.64-ROTCENTER)

  Minimum possible rotation value.

- #define ROTMAX (0.68-ROTCENTER)

  Maximum possible rotation value.

- #define XEXPO 0.4

  Exponential constant for modifying input from the x-axis.

- #define YEXPO 0.4

  Exponential constant for modfying input from the y-axis.

- #define ROTEXPO 0.6

  Exponential constant for modifying input form the rotational axis.

- #define AUTONOMOUS_LANE_SWITCH_PORT 6

  Port # for the physical lane choosing switch in Autonomous.

- #define AUTONOMOUS_FORK_SWITCH_PORT 7

  Port # for the physical fork choosing switch in Autonomous.

- #define MANIPULATOR_ELEVATION_TOP_LIMIT_SWITCH_PORT 4

  Port # for the limit switch at the top of the manipulator elevator's reach.

- #define MANIPULATOR_ELEVATION_BOTTOM_LIMIT_SWITCH_PORT 5

  Port # for the limit switch at the bottom of the manipulator elevator's reach.

- #define LIGHT_SENSOR_LEFT_PORT 1

  Port # of the leftmost line-following light sensor.

- #define LIGHT_SENSOR_CENTER_PORT 2

  Port # of the center line-following light sensor.

- #define LIGHT_SENSOR_RIGHT_PORT 3

  Port # of the rightmost line-following light sensor.

- #define MINIBOT_SHELF_RELAY_PORT 1

  Port # for the relay controlling the minbot shelf.

- #define MANIPULATOR_TOP_RELAY_PORT 2

Port # for the relay controlling the top wheels of the manipulator.

- #define MANIPULATOR_BOTTOM_RELAY_PORT 3

  Port # for the relay controlling the bottom wheels of the manipulator.

- #define MANIPULATOR_ELEVATION_RELAY_PORT 4

  Port # for the relay controlling elevation of the manipulator.

- #define DRIVE_FRONT_LEFT_JAGUAR_PORT 5

  Port # of the front left Jaguar on the drive train.

- #define DRIVE_FRONT_RIGHT_JAGUAR_PORT 7

  Port # of the front right Jaguar on the drive train.

- #define DRIVE_BACK_LEFT_JAGUAR_PORT 6

  Port # of the back left Jaguar on the drive train.

- #define DRIVE_BACK_RIGHT_JAGUAR_PORT 8

  Port # of the back right Jaguar on the drive train.

- #define DEFAULT_WATCHDOG_TIME 3.0

  The default expiration time of the Watchdog timer, in seconds.

- #define AUTO_DRIVE_SPEED 0.35

  Speed at which we drive in Autonomous.

- #define AUTO_TURN_SPEED 0.65

  Speed at which we turn in Autonomous.

- #define AUTO_BRAKE_SPEED -0.6

  Speed at which we brake in Autonomous.

Functions

- template<typename T >
  const char * topchar (T val)

  Convert an arbitrary type to a printable string, since this isn't Python.

4.10.1 Detailed Description

File containing a bunch of macros to de-clutter our other files. NOTE: All adjustment macros experimentally made by Adam Bryant.

4.10.2 Function Documentation

4.10.2.1 const char* topchar (T *val*)

Convert an arbitrary type to a printable string, since this isn't Python.

Parameters

val	The number to be converted

Returns

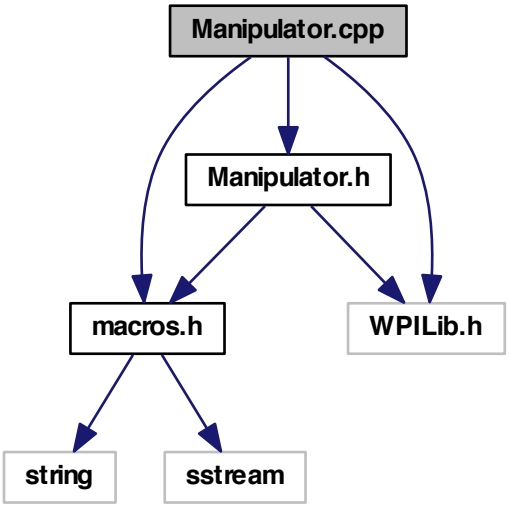
The string representation of the passed number

4.11 Manipulator.cpp File Reference

File containing implementations of functions found in the *Manipulator* class (found in Manipulator.h).

```
#include "Manipulator.h"
#include "WPILib.h"
#include "macros.h"
```

Include dependency graph for Manipulator.cpp:



4.11.1 Detailed Description

File containing implementations of functions found in the *Manipulator* class (found in Manipulator.h).

Authors

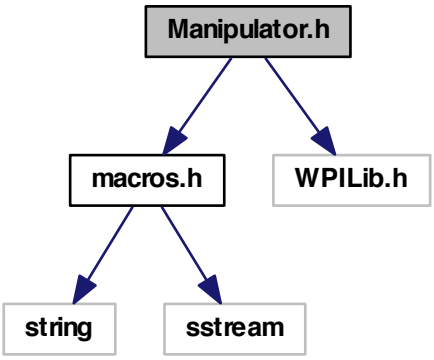
Matthew Haney, Drew Lazzeri

4.12 Manipulator.h File Reference

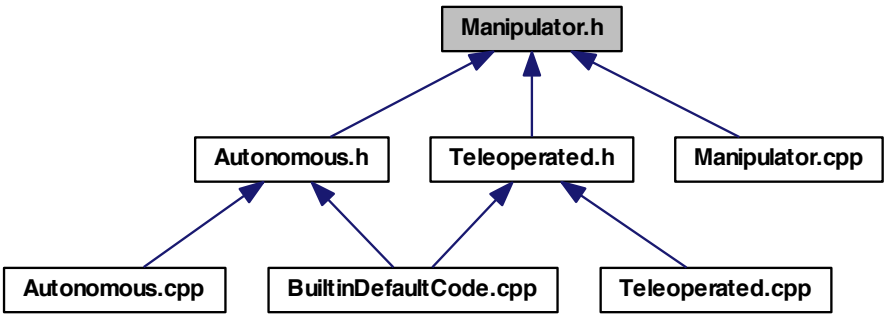
File containing definition of *Manipulator* class, which is used to simulate the manipulator in both Autonomous and Periodic modes.

```
#include "macros.h"
#include "WPILib.h"
```

Include dependency graph for Manipulator.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Manipulator

Abstracts the manipulator.

4.12.1 Detailed Description

File containing definition of *Manipulator* class, which is used to simulate the manipulator in both Autonomous and Periodic modes.

Authors

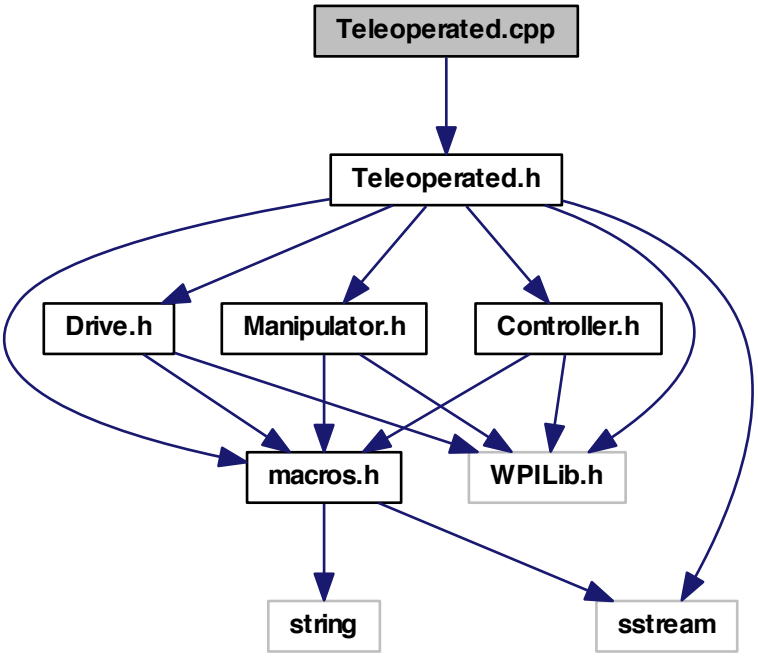
Matthew Haney, Drew Lazzeri

4.13 Teleoperated.cpp File Reference

File containing definitions of functions declared in class *Teleoperated* (declared in Teleoperated.h).

```
#include "Teleoperated.h"
```

Include dependency graph for Teleoperated.cpp:



4.13.1 Detailed Description

File containing definitions of functions declared in class *Teleoperated* (declared in Teleoperated.h).

Authors

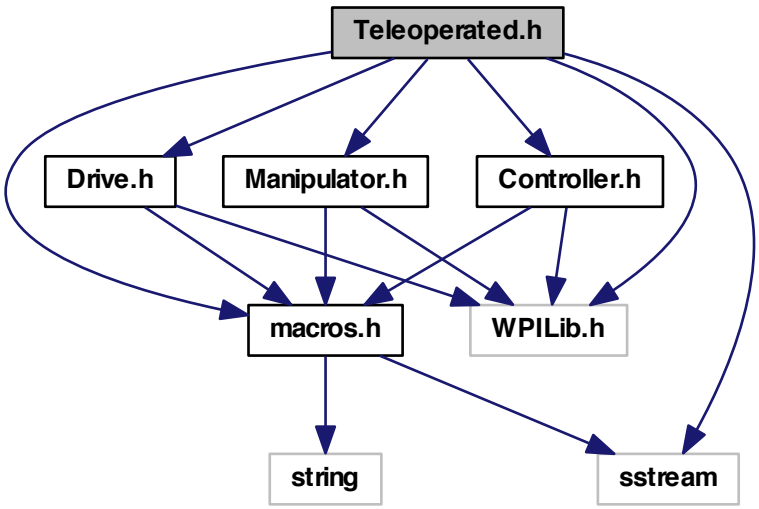
Matthew Haney, Drew Lazzeri

4.14 Teleoperated.h File Reference

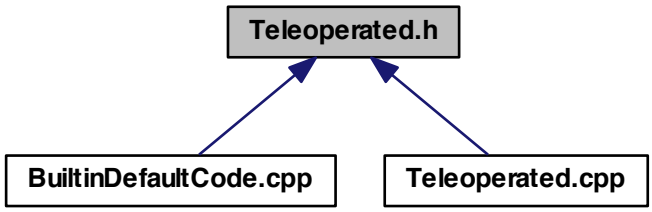
File containing definition of *Teleoperated* class, which is used in the main program during Teleoperated mode to simplify things.

```
#include "macros.h"
#include "WPILib.h"
#include "Drive.h"
#include "Manipulator.h"
#include "Controller.h"
#include <sstream>
```

Include dependency graph for Teleoperated.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Teleoperated

  Class managing robot performance in Teleoperated mode.

4.14.1 Detailed Description

File containing definition of *Teleoperated* class, which is used in the main program during Teleoperated mode to simplify things.

Authors

Matthew Haney, Drew Lazzeri

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