C++ Porting Guide - 2017-2018

There are several changes coming for C++ for the 2018 FRC season. The goal of this document is capture the most common items that will need to be updated / ported for resuing your 2017 code in the 2018 C++ environment. This document is NOT meant to be a complete porting guide, items will be added at the request of teams though, so if you have a question or issues with your 2017 code in the 2018 environment, please reach out to us using the contact info on the last page of this guide.

Key components that have changed

- RoboRio image – Fill this in with the Changelog once it has been published publicly.

- WPILib – Fill this in with the Changelog once it has been published publicly.

- CTRE – https://github.com/CrossTheRoadElec/Phoenix-frc-lib

- NavX – http://www.kauailabs.com/public_files/navx-mxp/apidocs/c++/

Before we get into some of the changes for 2018, would like to reference our MN CSA google drive and GitHub repo. We track software, library and utility used for FRC control systems and centralize that info in our GitHub and google drive. Further info located on our GitHub page: https://github.com/firstmncsa/csa_resources and code examples are located here: https://github.com/firstmncsa

Porting key items.

- CAN Talon SRX has been removed from WPILib. See this blog for more info and find the CTRE Toolsuite installer here: http://www.ctr-electronics.com/control-system/motor-control.html

- The Eclipse plugins have been tested with Eclipse Luna, Eclipse Mars, Eclipse Neon, and Eclipse Oxygen. Teams with existing installs from 2017 can update their installations to 2018 ensuring you have the current setup in Eclipse.

- The RobotDrive class has been split into separate classes for different drive base platform types. These classes currently include Differential Drive (common 4wd/6wd/8wd/tank/etc. platforms), Killough Drive (3 omni's) and Mecanum.

- Use of SpeedController and SpeedControllerGroup objects for RobotDrive class replacements.

Porting 2017 code to 2018 examples.

- This section will be added to as teams request help with changes and as we port more 2017 code to 2018 codebase.

- Header include changes.

2017 - `#include "CanTalonSRX.h"`

2018 - `#include "ctre/phoenix/MotorControl/CAN/TalonSRX.h"`

Or possibly the include below, which includes all CTRE headers. This is in currently in GitHub and not in the release yet. Use above if you use CTRE release binary install, use below if you use CTRE frc-lib GitHub version.

2018 - `#include "ctre/phoenix.h"`

- Namespace changes.

2017 – `No need to add namespace as CANTalon was still a part of WPILib`

2018 - `using namespace ctre::phoenix::motorcontrol::can;`

- Code changes – Creating base drivetrain related objects.

2017 – RobotMap.h

```cpp
static std::shared_ptr<CANTalon> drivetrainFrontLeft;

static std::shared_ptr<CANTalon> drivetrainRearLeft;

static std::shared_ptr<CANTalon> drivetrainFrontRight;

static std::shared_ptr<CANTalon> drivetrainRearRight;
```

2018 – RobotMap.h

```cpp
static std::shared_ptr<TalonSRX> drivetrainFrontLeft;

static std::shared_ptr<TalonSRX> drivetrainRearLeft;

static std::shared_ptr<TalonSRX> drivetrainFrontRight;

static std::shared_ptr<TalonSRX> drivetrainRearRight;

static std::shared_ptr<frc::DifferentialDrive> drivetrainDifferentialDrive;

static std::shared_ptr<frc::SpeedControllerGroup> drivetrainLeftSCG;

static std::shared_ptr<frc::SpeedControllerGroup> drivetrainRightSCG;
```

2017 – RobotMap.cpp

```cpp
drivetrainFrontLeft.reset(new CANTalon(1));

drivetrainRearLeft.reset(new CANTalon(2));

drivetrainFrontRight.reset(new CANTalon(3));

drivetrainRearRight.reset(new CANTalon(4));
```

2018 – RobotMap.cpp – there are 9 lines below, the lines that start with > are continuations of the line above them.

```cpp
// Create TalonSRX objects for drivetrain motors.

drivetrainFrontLeft.reset(new TalonSRX(1));

drivetrainRearLeft.reset(new TalonSRX(2));

drivetrainFrontRight.reset(new TalonSRX(3));

drivetrainRearRight.reset(new TalonSRX(4));

// Create SpeedControllerGroups for left and right side, use GetWPILib_SpeedController()
function of TalonSRX object to get appropriate SpeedController object to be added to
SpeedControllerGroup.

drivetrainLeftSCG.reset(new frc::SpeedControllerGroup(drivetrainFrontLeft-
>GetWPILIB_SpeedController(),drivetrainRearLeft->GetWPILIB_SpeedController()));

drivetrainRightSCG.reset(new frc::SpeedControllerGroup(drivetrainFrontRight-
>GetWPILIB_SpeedController(),drivetrainRearRight->GetWPILIB_SpeedController()));

drivetrainDifferentialDrive.reset(new
frc::DifferentialDrive(*drivetrainLeft.get(),*drivetrainRight.get()));
```

- Single Motor object with TalonSRX.

2017 – RobotMap.h

```cpp
static std::shared_ptr<CANTalon> fuelShooter;
```

2018 – RobotMap.h

```cpp
static std::shared_ptr<CANTalon> fuelShooter;
```


2017 – RobotMap.cpp

```cpp
fuelShooter.reset(new CANTalon(5));
```

2018 – RobotMap.cpp

```cpp
// Create TalonSRX object and set it's control mode, see this in CTRE headers for more modes:
ctre/phoenix/MotorControl/ControlMode.h

fuelShooter.reset(new TalonSRX(5));

fuelShooter.Set(ControlMode::PercentOutput, 0);
```

Reference links:

What is new for 2018 FRC Control System

https://wpilib.screenstepslive.com/s/currentCS/m/beta/l/801080-new-for-2018

2018 FRC Control System Hardware Overview

https://wpilib.screenstepslive.com/s/currentCS

Driver Station

http://wpilib.screenstepslive.com/s/4485/m/24192/l/144976?data-resolve-url=true&data-manual-id=24192

Electrical components References

http://www.ctr-electronics.com/

Radio and other information

http://www.firstinspires.org/robotics/frc/blog/2017-control-system-update

Main Overview of all the Controls and Software Link

https://wpilib.screenstepslive.com/s/4485

CSA Contact Info:

Email: firstmn.csa@gmail.com
Slack URL: firstmncsa.slack.com For new Slack users: https://goo.gl/3yzrJo – To contact CSA's and other teams in a live session.
Trello Board: https://trello.com/b/rW3CDBfi – To view all support tickets CSA's open.
Twitter: @firstmncsa – To contact CSA's via DM.**CSA Additional Resources:**

First MN Website: http://mnfirst.org/first-community-resources/local-assistance/

First MN CSA Github: https://github.com/firstmncsa

First MN Google Drive: http://goo.gl/STtiAg