Package	Node	Description	Parameters
PID	PID_brushless	**Overview:** The PID controller package is an implementation of a Proportional-Integral-Derivative controller - it is intended for use where you have a straightforward control problem that you just need to throw a PID loop at. It has one purpose and focuses on doing it well. It has numerous features that ease the task of adding a controller and tuning the control loop. Several examples are provided. **Features:** • Easy to interface to: uses std_msgs/Float64 for setpoint, plant state, and control effort. • Dynamic reconfiguration of Kp, Ki and Kd eases on-the-fly tuning. • Low-pass filter in the error derivative with a parameterized cut-off frequency provides smoother derivative term. • ROS node-private parameters configure all controller parameters • Support for multiple controllers • Support for faster-than-wallclock simulation • Auto/Manual modes • Simulations of 1st & 2nd order plants allow evaluation of controller features • A Ziegler-Nichols auto-tuner • Support for discontinuous angle measurement	Kp, Ki, Kd: The values to be used for proportional, integral, and derivative gains. These values are used by the node unless overridden by dynamic reconfiguration. Kp, Ki and Kd should all have the same sign. Defaults are 1.0, 0, and 0 for Kp, Ki and Kd upper_limit, lower_limit: the maximum and minimum limits for control_effort. Defaults are 1000, -1000 windup_limit: The maximum limit for error integral. Default is 1000 cutoff_frequency: The cutoff frequency of the low-pass filter on the derivative term (in Hz). Default is 1/4 of the sampling rate topic_from_controller: The topic name that control_effort will be published to. The plant must subscribe to this topic. Default is "control_effort" topic_from_plant: The topic name that controller subscribes to for updates from the plant. Default is "state" setpoint_topic: The topic name that controller subscribes to for updates to the desired value of plant state. Default is "setpoint" node_name: The name given to the node being launched. Default if not otherwise specified is "pid_node" max_loop_frequency, min_loop_frequency: The maximum and minimum expected frequency at which the plant issues state messages and the control loop runs and generates control_effort. The frequency is controlled by the rate at which the plant publishes state. This can be useful to detect that a node or sensor has failed. Defaults are arbitrary: minimum 1 Hz, maximum 1000 Hz pid_enable_topic: The name of the topic where a Boolean is published to turn on/off the PID controller. This is modifiable in case there are multiple PID controllers. The default is "pid_enable". angle_error: Set this boolean to "true" if the state is a potentially discontinuous angular error measurement. It will maintain the angular error between -pi:pi, or -180:180. The default is "false." angle_wrap: Related to angle_error. Helps to maintain an angular error (in radians) between -pi:pi. Could be set to 2.0*180.0 for degree measurements. The defualt is "2.0*3.14159."