*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_|/* ***Command Interfacing***

***All commands have the structure*** *<Command Value>.*

***Valid entries for ‘Command’ and ‘Value’ are outlined below under*** *Command Transmission Structure*.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Gamepad (Supervisor)*** | | ***Command Transmission Structure*** | | ***Robot (Platform Controller)*** | |
| ***Gamepad Event*** | ***Value Range*** | ***‘Command’*** | ***‘Value’ (range)*** | ***Robot Movement*** | ***Motor*** |
| *A Button* | *1 or 0* | *A* | 111 or 000 | Forward | Enables DC Motors |
| *B Button* | *1 or 0* | *B* | 111 or 000 | Reverse | Enables DC Motors (Reverse Direction) |
| *Right Joystick (X)* | *-32768 to -10000*  *10000 to 32767* | *S* | 0 - 200 | Camera Control | Stepper (Pan) |
| *Right Joystick (Y)* | *32767 to 10000*  *-10000 to -32768* | *R* | 0 - 200 | Servo (Tilt) |
| *Left Joystick (X)* | *-32768 to -10000*  *10000 to 32767* | *X* | 0 - 200 | Robot Movement | DC (Varies L/R motor speeds) |
| *Left Joystick (Y)\** | *32767 to 10000*  *-10000 to -32768* | *Y* | 0 - 100 | DC (overall speed) |

**\****Joystick Y-axis event values are opposite what they should be intuitively (i.e., holding joystick down gives a* ***positive*** *event value*

**Notes:**

* *All joystick ranges of 0 to 200 should be thought of as* ***-100 to 100*** *(percent).  The range used avoids sending negative numbers.*
* **All commands must be sent wrapped in < >.**
* *All commands have a string length of 5 (not including command delimiters ‘<’ and ‘>’)*
* *Y-axis of the left joystick controls the overall speed of both motors. Only negative valued events are used while the* ***B Button*** *is engaged (positive values ignored). Only positive valued events are used while the* ***A Button*** *is engaged (negative values ignored*
* *X-axis of the left joystick varies the speed of either the L or R DC motor to turn the robot. The range 0-99 and 1-100 will slow down the L and R motors respectively.*
* *The A Button, while engaged (i.e., a 111 was last sent), will enable DC motor control via the left joystick. While released (i.e., a 000 value was last sent), all DC motor control will be disallowed and motors should be halted.*
* *The B Button acts the exact same as the A button, except that it implies that the DC motor direction should be* ***reversed****.* 
  + ***Note:*** *For improved user experience, the supervisor*

**RIGHT JOYSTICK**

***X-Axis tied to stepper motor***

***Y-Axis tied to servo motor***

***LEFT JOYSTICK***

***Y-Axis tied to overall DC motor speed (for both motors)***

***X-Axis tied to L/R speed variation***

* *No X-axis movement means straight (equal L/R speeds)*
* *Any X-axis movement* ***decreases*** *the speed on that side (negative X-axis values decrease left motor speed OR increase right speed and vice versa for positive X-axis values)*

***B BUTTON***

***When pressed and held, slow, stop, and reverse robot.  When released, resume forward speed unless:***

***(optional) A BUTTON***

***When pressed and held, allow left joystick events to be sent to the robot (aka, cannot move unless A held. But this will make it difficult to control the camera at the same time as moving the robot, which may be desired.***

*Example: to position the RC Servo to 180 degrees,*

* **<R 100>**
* **<S 100>**
* **<X 100>**
* **<Y 100>**
* **<B 111>**
* **<B 000>**
* **<A 111>**
* **<A 000>**