

AE483 Lab Manual: Appendix E

How to Add a “Parameter”

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1 The big picture

You have seen that compiling and flashing on-board code to the drone is a slow process. If all you want to change is a parameter—for example, a control gain, or the motor force constant—then it would be nice to make this change without having to recompile. It turns out that this is possible. This appendix shows how to modify the on-board code in order to enable the use of parameters.

2 Change the on-board code

Suppose you want to make the motor force constant k_F something that you can use in your `lab.c` code and that you can dynamically change without having to recompile. Then, you would do the following:

- Define and initialize the variable in `lab.c`:

```
8  #include "lab.h"
9  #include "main.h"
10 #include "sdk.h"
11 #include "math.h"
12
13 /*----- Global Variables -----*/
14 float kF = 0.1; // added this line to define the motor force constant as
15                 // a floating-point number with initial value 0.1
16
17 /*----- Main Control Loop -----*/
18 void lab(void) {
19
20 }
```

- Define the same variable as `extern` in `main.c`:

```
96 // HERE IS WHERE YOU ADD MORE GLOBAL VAIABLES TO WRITE
97 extern float kF;
```

- Add a line to `ACISDK()` in `main.c` to “publish” the variable as a parameter:

```

355 #ifndef MATLAB
356     aciSetStartTxCallback(UARTWriteChar);
357
358     // Variables
359     // ...
360
361     // Commands
362     // ...
363
364     // Parameters
365     aciPublishParameter(&kF, VARTYPE_SINGLE, 0x0600, "motor_constant", "For
tuning the motor constant", "N (s / rad)^2");
366
367 #else

```

Note that this line has exactly the same syntax as a call to `aciPublishVariable` (see Appendix D). We are using `VARTYPE_SINGLE` to indicate a single-precision floating-point variable.

That's it. Don't forget to compile your on-board code (fixing any errors that arise) and to flash your executable to the drone after you are done changing it.

3 Use the ACI Tool

Your TA will show you how to use the ACI Tool to change the value of your parameter(s), once you have defined them.