❖ Lab 06:

Lab due Aug 11, 2023 17:26 PDT Completed

In this section, you will learn to write, compile, and debug programs with PlatformIO.

- Launch Visual Studio Code.
- Choose New Project from the Quick Access menu on the right. Name your project tutorial. Select SparkFun RED-V Thing Plus as the Board and Freedom E SDK as the Framework.
- The first time you create a project for a board, you'll need to wait a little while for the toolchain to install.
- Choose File -> New File, then save your new file as tutorial.c in the src directory.
- Paste in the code below.
- Always include your name, email, and date in your code.
- The code should compute the dot product of [3 4 5] and [1 2 3]. Predict the answer. Remember that a dot product is the sum of the products of corresponding elements of the two vectors: 3*1 + 4*2 + 5*3.
- Choose Terminal → Configure Default Build Task... and choose PlatformIO: Build in Debug Mode to compile for debugging. This turns off certain optimizations that make debugging code difficult.
- Select the PlatformIO alien icon on the left, and then click Build to compile.
- You should see a Success message, and also some warnings about "parentheses around assignment used as truth value", and about "sum may be used uninitialized".
- You can also expect to get two warnings in some library code that you didn't write. Unfortunately there's nothing to do about those.
- Take the warnings in your code seriously. Fix the comparison, which should have been if (i == 0) and recompile. Or better yet, move the initialization out of the loop to "double sum = 0;" Rebuild and check that the warnings are gone.

Dot Product

1/1 point (graded)

What value would you expect the dot product function should return?

26 ✔

26

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```
// tutorial.c
// Your Name, date, email
// Dot product code to learn the PlatformIO tools

#define DIM 3
double dotproduct(int n, double a[], double b[]) {
    volatile int i;
    double sum;
    for (i=0; i<n; i++) {
        if (i=0) sum=0;
        sum += a[i]*a[i];
    }
    return sum;
}

int main(void) {
    double x[DIM] = {3, 4, 5}; // x is an array of size 3(DIM)
    double y[DIM] = {1, 2, 3}; // same as y
    double dot;
    dot = dotproduct(DIM, x, y);
    return dot;
}
```

Variables

1/1 point (graded)

Run the program in the debugger and look at the variables. What value is in dot after the dotproduct function completes?

50 ✔

50

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Debugging

1/1 point (graded)

Find the bug in the program and correct it so you get the proper dot product. What was the bug?

- (●) The wrong variable was used in a math expression
- ( ) i counts over the wrong range
- ( ) sum was incorrectly initialized
- ( ) Only one element of each vector was passed to dot product.

✔

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Now it is your turn to write some code.

Remove the Tutorial project from your workspace by making sure the Explorer is selected on the left (looks like two pieces of paper), right-clicking (Ctrl-clicking on the Mac) on the tutorial project in the workspace, and choosing Remove Folder from Workspace.

Create a new project such as lab6_xx and a new file named lab6_xx.c, with xx being your initials. Paste in the code below. You'll see functions for matrix addition, linear combination, transpose, equality, and multiplication are empty. Write these functions using good coding style. Predict what the results should be, especially for m8. Run the program and debug any discrepancies.

Final Result

4.0/4.0 points (graded)

Run your code and check the values in m8. What is the sum of all six entries in the m8 matrix?

3 ✔

3

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