External Mathematical Keyboard

Mariam Sarfraz, Koral Hassan

***Abstract*— Specialists working in diverse fields all have trouble digitizing their notes, due to the weaknesses of traditional keyboards, which have barely evolved as technology advanced. They are designed for the use of the general public, and it is very tedious to write documents using symbols that are only needed in certain professions. We will be building a keyboard to help mathematicians. Using this keyboard, symbols that they use frequently will be much more easily accessible. This way, they can focus on the work they are doing instead of struggling with entering symbols like π repeatedly.**

I. PROPOSAL

A. *What is the problem to be solved?*

Typing mathematical equations is a very slow process compared to typing words or writing the equations down with a pen. All mathematicians have a pen, paper and calculator along with their laptops/ monitors as they are frequently required to do calculations. Applying to graduate jobs or internships, you need to solve several online numerical tests, which you cannot do by solely using our laptops.
To build the keyboard, we have to research the suitable keycaps, switches, PCB and controllers needed. Programming of the controller will be the main, technical aspect that we will need to address. We will also need to look into how operating systems handle USB input signals from keyboards.

B. *Business case*

Our dependency on papers, pens and calculators is a problem we will eliminate using these mathematical keyboards.
The project is aimed at anyone who needs to perform mathematical calculations in their daily routine.
Employees with analytical or mathematical work, postgraduate and undergraduate technology students and majority of the students up to and including A level can benefit from our project. It is especially attractive to students since the it is going to be much cheaper than its competition.

C. *Competitor analysis*

There are programmable keyboards in the market but a specified mathematical keyboard has not yet been introduced. The products out on the market are mainly targeting gamers. Therefore, they have a much bigger focus on mechanical performance than affordability. They are very high end products, and most of the time you must buy whole keyboards just to gain access to around 10 macro keys.

Company	Prices	Functionality
Cherry Keypads	£30 - £90	Used as external number pads
X Keys Keypads	£100 - £500	Dedicated keys
Razer Keyboards	£70 - £300	Used for gaming
Logitech Gameboard	£60	Used for gaming

Figure 1. Competing brands currently in the market

II. PROJECT DEVELOPMENT

A. *What expertise is needed?*

The project relies heavily on software engineering, computer architecture, and digital electronics. A passion for information technology and programming amongst group members is highly sought after.

B. *Project Planning*

The different aspects that need to be studied are:

1. Hardware; Production and functionality of keyboards
2. Software; interfacing the USB input to character outputs

As a demo, we will have a working prototype of the keyboard.

Phase	Time required
In depth technical research, distribution of work, setting milestones	Week 9 (Autumn)
Building the keyboard	Week 10 and 11 (Autumn)
Testing the keyboard	Week 1 (Spring)
Programming the keyboard	Week 2 and 3 (Spring)
Testing interface	Week 4 (Spring)
Checking compatibility with different Windows versions	Week 5 and 6 (Spring)
Desktop app development for Windows 7 and onwards	Week 7 and 8 (Spring)
Making the report and building the website	Week 9 and 10 (Spring)

Figure 2. Project Milestones

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