Deployment Plan:

To get LaserPi to the market is no simple task, at least not on the surface level. Since this project has a hardware component, software component, and a full web stack there are a lot of bases to cover before our end users would have a complete product. With careful planning and much thought behind the concepts, PySweeper has developed a viable deployment plan that would have LaserPi on shelves and scalable for years to come. I will go over all foreseeable costs needed to put LaserPi to market including all costs, reasons behind the choice of product/service, and options for future scalability if applicable.

The obvious place to start is with the hardware component of LaserPi. While embedded software is necessary to play LaserPi, without hardware there is no LaserPi! The interactive hardware is a defining component that the end user will demand is reliable, ready to use, and fun. A Raspberry Pi Zero W from microcenter currently costs $5 for an individual board, however when purchasing more than 1 the price rises drastically as the Zero model Raspberry Pi’s are intended for individual user applications and not business applications. Assuming Raspberry Pi doesn’t change their Zero model strategy in the future, we would need to change over to the Raspberry Pi Compute Module 3 Lite. These boards are easily available from Newark1 in quantities of over 100 for $23.75 each. This is, of course, assuming we do not convert anything to use cheaper tech. From a business stand point, $23.75 per board for a laser tag application is unreasonable. Thus, if possible from a software standpoint, we would ditch Python in order to go with Lua for use on a much more reasonably priced NodeMCU (Lua board) at $3.55 per board (50 – 199 piece order)2. With the brain of the hardware covered, we move onto the HAT (protoboard), IR sensor (sender and receiver), press buttons, LEDs, capacitors, resistors, and solder. The protoboard will cost $3.50 (over 100) a piece3, the IR sensor and receiver will cost $3.49 for a set of 25 or about $0.14 per set4, for the switch the cost is about $0.23 per piece (over 100)5, LEDs will cost about $0.21 for a red and $0.21 for a green (over 100 each)6,7, capacitors will cost $0.13 per piece (over 100)8, there are 3 different types of resistors needed the 10 kΩ will cost $0.02 per piece (over 100)9 while the 220 Ω will cost $0.04 per piece10 (over 100) and the 330 Ω will cost $0.01 per piece11, and the solder is $30.08 per pound12. Notice that many of these parts are extremely inexpensive and considering how little solder is actually needed for the board, 1 pound may solder well over 1000 boards and thus the price becomes negligible on a per unit basis. The total cost per unit for these components then comes to about $4.49. With the NodeMCU board the total cost then comes to $8.04 per unit to this point. Now the user needs portability, and thus each unit must have a battery pack. To add a battery pack isn’t as simple as going and getting a cheap pack. The battery should be rechargeable, last awhile, and not blow up. Since the hardware is all about user experience as well, we chose to indicate to the user when the battery is running low. Clearly this isn’t cheap but we don’t want a lawsuit and we need reliability, so the battery pack will be a highly rated pack from Miuzei that has a UPS (won’t experience interrupts), an onboard LED battery level indicator, works for 3800mAh (about 9 hours constant use), and is expandable (can add additional battery packs and a fan). The Miuzei Battery Pack expansion board costs $18.99 each13 but with over 100 orders with a deal for future order we would hope to negotiate the price down to below $15.00. The total running cost is now $22.54. Only one more aspect to the hardware must be added, the look and feel. Let’s be honest, everything up until now simply needs to work and the user won’t care otherwise but the outside of the LaserPi gun must be clean and crisp. Which is why we will 3d print guns. The design can be printed for $918.75 for 100 units or about $9.19 per unit14,15. This completes the hardware portion of deploying LaserPi with a total cost of $31.73.

Product Sources:

1. <https://www.newark.com/raspberry-pi/rpi-compute3-lt/raspberry-pi-compute-module-3/dp/02AC9992>
2. <https://www.electrodragon.com/product/nodemcu-lua-amica-r2-esp8266-wifi-board/>
3. <https://www.newark.com/microstack/microstack-protoboard/prototyping-board-raspberry-pi/dp/83X9200?ost=raspberry+pi+protoboard&krypto=E7%2FMWXE%2BRWlcIQz3%2FZCGX15e0HYEM8%2FNydStp3sIOD66EXOFgGfhRt5by94v4zRcZrrWxiduKyGa3boCjN6YFw%3D%3D&ddkey=https%3Aen-US%2FElement14_US%2Fsearch>
4. <https://usa.banggood.com/50pcs-5mm-940nm-IR-Infrared-Diode-Launch-Emitter-Receive-Receiver-LED-p-1205409.html?rmmds=search&cur_warehouse=CN>
5. <https://www.newark.com/omron-electronic-components/b3f-1000/switch-tactile-spst-no-50ma-though/dp/36K7138?st=button>
6. <https://www.newark.com/vcc-visual-communications-company/4304h1/led-red-t-1-3-4-5mm-6-3mcd-650nm/dp/93K6988?st=LEDs>
7. <https://www.newark.com/vcc-visual-communications-company/4304h5/led-green-t-1-3-4-5mm-10mcd-563nm/dp/93K6989?st=LEDs>
8. <https://www.newark.com/avx/sr211c104kaa/cap-mlcc-x7r-0-1uf-100v-radial/dp/95W2705>
9. <https://www.newark.com/multicomp/mccfr0w4j0103a50/carbon-film-resistor-10kohm-250mw/dp/58K5002?MER=bn_browse_1TP_MostPopular_1>
10. <https://www.newark.com/multicomp/mcf-0-5w-220r/carbon-film-resistor-220-ohm-500mw/dp/38K0281>
11. <https://www.newark.com/multicomp/mcmf0w8ff3300a20/metal-film-resistor-330-ohm-125mw/dp/58K3926>
12. <https://www.newark.com/kester-solder/14-5050-0125/solder-wire-50-50-sn-pb-214-c/dp/00Z529?MER=bn_para_1TP_LastViewed_1>
13. <http://www.miuzeipro.com/product/miuzei-for-raspberry-pi-3-3-model-b-battery-pack-expansion-board-power-supply-with-usb-cable-2-layer-acrylic-case-for-raspberry-pi-3-b-2-model-b-mc12-1/>
14. <https://www.thingiverse.com/thing:2908555>
15. 3dPrintPrice.PNG (Documentation folder)