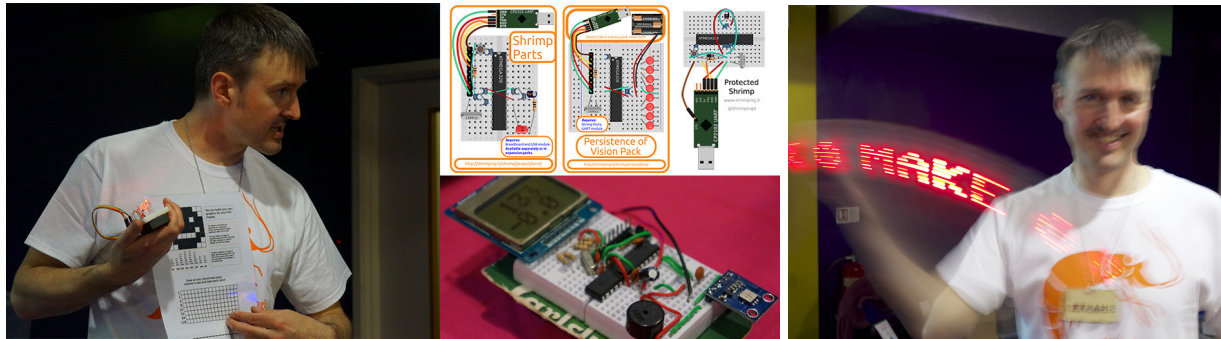


@ShrimpingIt - open programmable electronics for UK educators



@ShrimpingIt project builds and materials snapped at a local maker event, featuring the 'Persistence of Vision' project - painting letters in the air

Business Plan

Introduction

Teachers working in High Schools, Further Education and Higher Education in the UK face a huge challenge. There is a growing demand and, increasingly, government enforcement, for programming and digital creativity to be integrated into teaching practice across a whole range of subjects. These range from Computing through Design and Technology and even other Science Technology Engineering and Math (STEM) subjects. However, many of the teachers expected to deliver this learning have never programmed before, making it still harder to offer engaging, high-impact activities for the classroom.

A huge opportunity arises for UK education to integrate the practices of “Maker culture”, where digital creatives invent and deploy their own software and hardware on small programmable computers in exciting new ways. Makers’ “physical computing” innovations are diverse, inspiring and highly visible online. These inventions integrate their internet lives, gather scientific data, and lead to spinoffs of new products and new experiences. High-profile projects in the Maker community such as the Raspberry Pi, Arduino, LittleBits, MakeyMakey and the BBC’s new Micro Bit are slowly becoming mainstream in the classroom.

These well-supported proprietary offerings help Maker hobbyists invent new digital devices, but their premium pricing makes them prohibitively expensive for teaching budgets, and they are often limited to just a small number of application scenarios. Teachers need not only very low cost offerings, but also materials with the potential for flexibility and repurposing for many different activities across multiple subject areas.

Enter [@ShrimpingIt](#), a new kind of social enterprise. Drawing on many years experience producing bespoke prototype devices in commercial R&D and the arts, we design and document compelling projects for UK educators using the cheapest available commodity electronics components.

Our builds are all based on our core microcontroller layout, [the Shrimp](#), on a flexible commodity material known as solderless breadboard. All builds use the very popular Arduino language and toolchain for programming device behaviours. This enables us and our adopters to remix the many tens of thousands of projects across every imaginable application domain already documented online by the Arduino community, for a fraction of the price.

Our project design materials are specifically designed for education use, and offered for free to educators without limitation, giving them the confidence to construct lesson plans and term projects around the project

builds we provide, and even to source components for themselves. For many teaching budgets the difference in cost of prototyping their own electronics, compared to purchasing pre-built proprietary devices, means that every student can be provided with their own projects kit to take home, experiment, remix and repurpose, completely transforming the experience of learning programming, electronics, product design, scientific data gathering and many other fields.

@ShrimpingIt Pathways for Educators

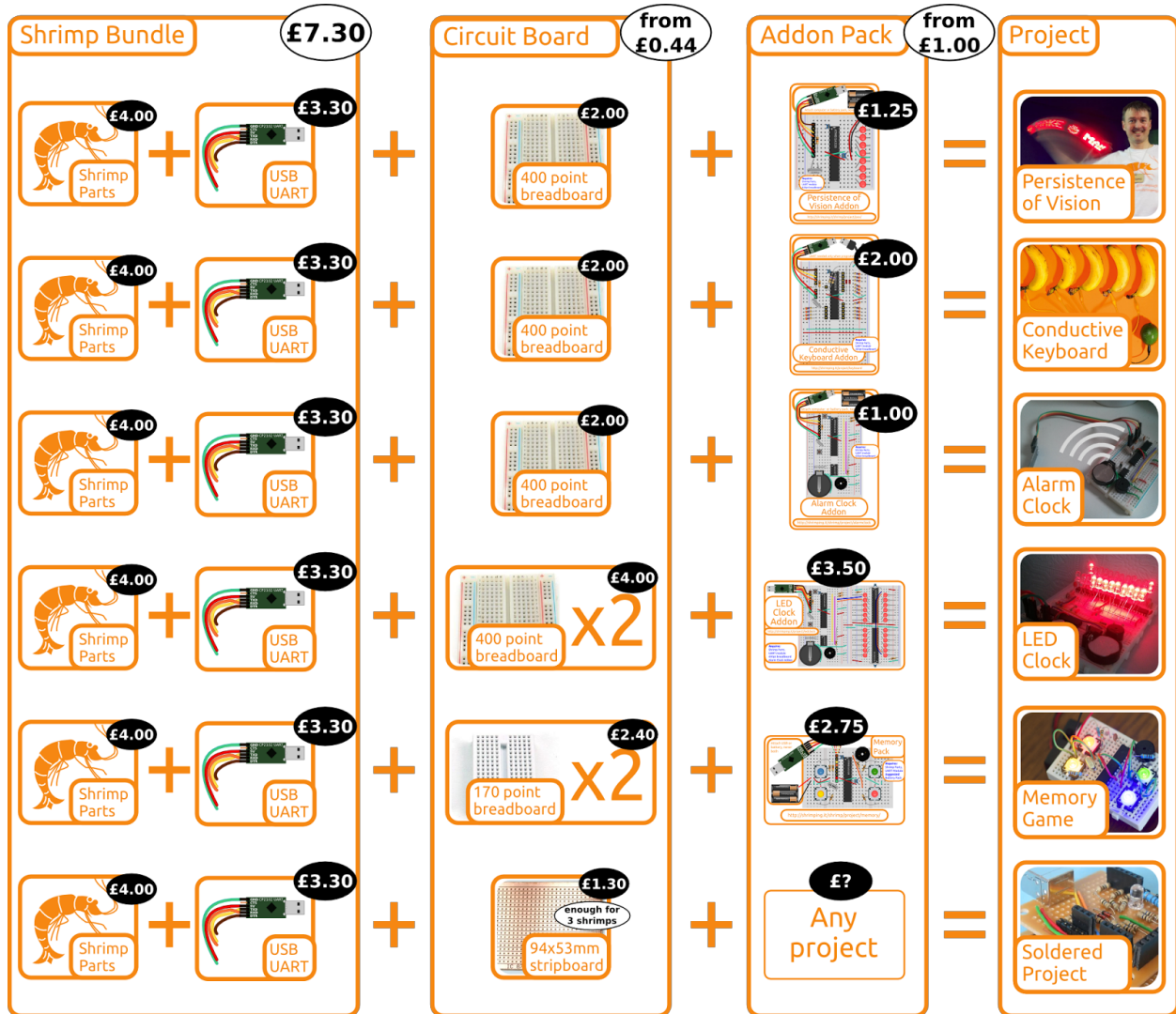


Figure: The kits required for each of our portfolio of projects. Shrimp Bundles and Circuit Boards can be reused with extra 'Addon packs' for your second and third projects, making them pocket money prices.

The @ShrimpingIt business arose from a 'Masters of Research' summer project to connect educators to Maker culture, during which the Shrimp design was developed and shared for free online as a cheap and educational alternative to official Arduino boards. Subsequently a small number of application-oriented project builds using the Shrimp were shared on the same basis.

Since then, the business has been slowly growing as adopters increasingly demand services to support their adoption of the @ShrimpingIt projects, including bulk pre-bagged retail kits purchased by educational institutions, and workshop facilitation including series' for the BBC both internally and externally.

Alongside our commercial activities, our free materials have been slowly transforming the way digital prototyping is taught around the world by volunteers. Workshops based on our materials have been run by Michael Margolis, author of the incredibly popular “[Arduino Cookbook](#)”, Adrian McEwen, author of “[Designing the Internet of Things](#)” and countless others on a global scale. This not only offers a huge latent market for services, but also a substantial word-of-mouth marketing machine for our ongoing developments, through which we have secured significant social capital.

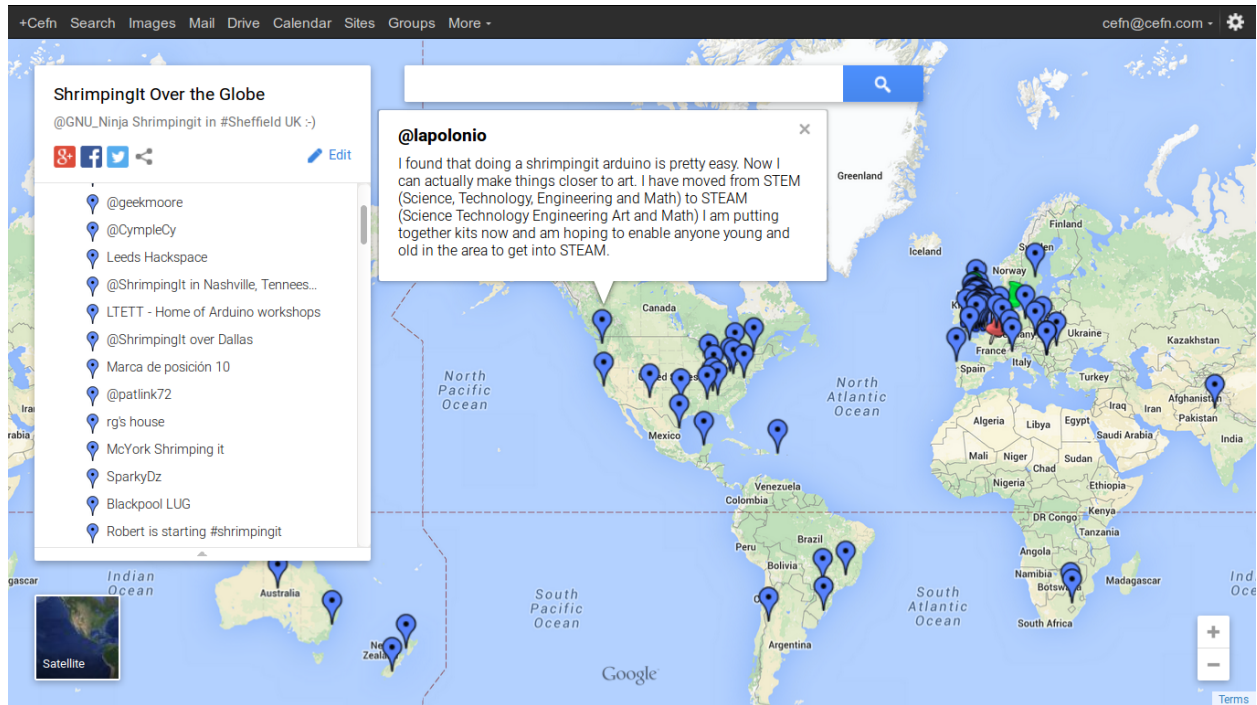


Figure: Recent snapshot of our collaboratively authored map, where experimenters volunteer their location information and Twitter details to meet others who are involved in @ShrimpingIt

So far, this has been a low-key business. No official advertising or promotional campaigns have been run, no ecommerce sites have been established, (people email us to figure out what they want), and the online presence remains organic without even any promotional video or photography showing completed project builds. In spite of this, retail kits have been shipped to more than 1700 learners, and more than 30 days of workshoping have been commissioned at a premium day rate.

Executive Plan

This business plan outlines how @ShrimpingIt can be transformed from a hobby business to a project kit retailer serving the UK education market at scale. It relies on an £8,000 loan, to be paid back in full over 3 years, which will kick-start the business by...

- contracting media professionals to improve the communication of our projects online
- investing in stock of components to service increased demand on 30-day invoicing terms
- securing the full-time availability of the lead designer to produce lesson plan and term project resources, attend promotional events, deliver facilitated workshops and finally develop new project designs to develop more business

Initial focus is on communicating, packaging, promoting and shipping project kits already developed alongside UK educators. To stimulate interest, three brand-new project builds have recently been announced, doubling our portfolio, with each extra project helping to emphasise the flexibility and reuse of the @ShrimpingIt approach.

Supply Chain

Our planning emphasis is on logistics, scaling the retail supply chain and eliminating dependencies on individuals, to serve the explosive demand we expect as the programming element in the Computing national curriculum becomes mandatory from September 2015.

To provide both an e-commerce solution and eliminate a significant bottleneck, kits are due to be packaged for warehousing and dispatch through 'fulfilment by Amazon'. Barcodes have already been ordered and allocated to individual kits to make this possible.

Although we are adopting a short-term, opportunistic focus on UK education, we hope to establish an offering which can, in the long term, serve a global population of educators. For example UK success makes it possible to target the USA education system, which we expect to be accessible with minimal changes to teaching resources, and which can take advantage of an identical fulfilled-by-Amazon logistic supply chain. Once growth is ensured in the English-speaking market, we will consider the internationalisation of our materials into Spanish, French and other languages to open retail markets there using the same warehousing and dispatch model.

Once quarterly sales exceed 2000 kits we expect to establish quality-controlled piecework employment in our local area for the preparation of bulk component bags, eliminating a key bottleneck.

Marketing Strategy

With the supply chain in place, the emphasis turns to marketing the projects and their supporting services. Our marketing emphasis is on making the projects digestible for purchasers in education, especially communicating the 'lego' style model which helps to keep their costs low and their projects flexible, as captured by the earlier "@ShrimpingIt pathways" diagram.

So far, the lead designer's work has focused on the choices in software and hardware of the projects themselves, and on the supporting graphical documentation to streamline learners' experiences once they have purchased a kit, such as the [@ShrimpingIt Blink build guide](#). However, the rest of the online presence at <http://shrimping.it> does not reflect this effort and is currently not fit-for-purpose for school and university purchasers. The educational benefits and key outcomes of the projects on offer are not clearly enough communicated by the material presented, and the fundamental resources to support lesson plans and term project are obscurely organised. Visitors frequently report with frustration that they cannot see how to buy our product or how to combine the different elements. This is an artefact of the way in which the business has evolved from a community-oriented blog, out of which an online business has emerged organically.

A root-and-branch redesign will be undertaken to orient every visitor's journey through the website towards understanding the potential classroom costs and benefits for a small number of complete, featured projects. This investment in the website will include graphical and typographical redesign, coupled to a new visual hierarchy in the site structure. Video presentations and high-quality imagery will be professionally prepared for each of the projects on offer. Users should encounter a clear, consistent organisation of supporting educational resources across all the projects listed. We will take this opportunity to migrate to high-capacity hosting to handle the kind of peak traffic which brought down our website after 15000 simultaneous hits when we were featured on the hugely popular www.hackaday.com. The official launch date is slated for September 2015 to synchronize with the seismic changes due to the national curriculum for computing in the UK.

A substantial share of the initial loan is committed to web designers, videographers and photographers to better present our projects, coupled to a promotional budget for online advertising through Google adwords to direct individuals in our target sectors and geographies to the new site. Print materials will be distributed to schools and university departments, and through magazine inserts. A budget is also allocated to expenses for a trestle stall for face-to-face sales allowing us to connect with professional and volunteer educators at calendared events such as Maker Faires, Computing at Schools, Coderdojo and Raspberry Pi events in the North of England. At select events, this could be coupled to a touring demonstration @ShrimpingIt workshop which offers a taste of classroom learning with our kits and supporting materials.

The relaunched website will also feature three more project kits which are already complete in prototype, including build walkthroughs and teaching resources such as lesson plans and term projects to streamline their adoption. Finally, product packaging will be redesigned to include 'bundle' offerings including printed documentation. Bundles are expected to give purchasers confidence that they have all the resources they need for a given project, by contrast with the confusion which reigns in our current website organisation.

Target Audience and Market Research

Exploration of our target user base, competitor assessment, and critical feedback of our initial offerings has been possible through an extensive free "social enterprise consultation" offered by service designers www.amityhcd.co. This has also led to a suite of recommendations for the restructuring of our product range and online resource, underpinning the executive plan outlined in this document.

Based on the numbers of Shrimp bundles already sold, an estimated 1700 learners have already been reached by our retail kits. Our projects have been adopted by a number of communities including hobbyists, home educators, hackspaces, and ad-hoc workshop facilitators, and purchasers have come from the UK and international markets. However, we have chosen to focus on the dominant cluster of purchasers in our order book - professional high-school teachers and university lecturers within the UK education system.

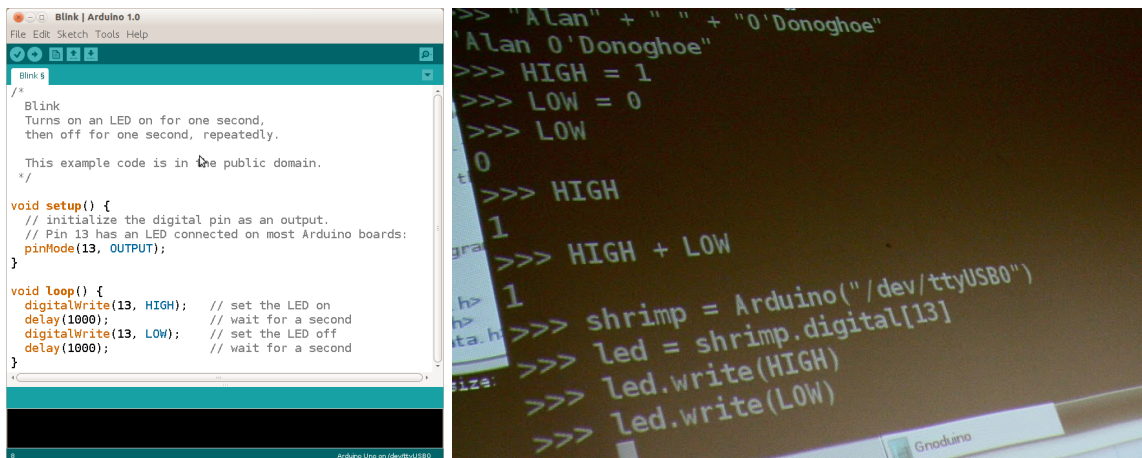


Figure: Hardware projects offer a gateway to software skills, strongly coupled to new developments in government education policy and the national curriculum

There are over 7 million learners in the core 11-20 age group we are targeting. Technology is by no means exclusive to boys, (local repeat-purchasers include Skipton Girls high school). Nevertheless, while we expect our adopters to be more-or-less equal in gender representation in earlier years, this is statistically skewed towards male learners as they progress through A-levels and Higher Education.

It is our good fortune that our company launch will take place at exactly the time teachers are under huge pressure to identify suitable projects and approaches for a completely new way of teaching. In September 2015, a new national curriculum for computing becomes mandatory, requiring high-school teachers across

the UK to incorporate programming tasks into their lessons for the first time. Because 'computing' education in the UK has focused on office products, text, graphics and spreadsheets, many teachers already in-post have no experience in programming, yet will be expected to deliver compelling lesson plans and term projects incorporating it. This date also coincides with the launch of a BBC initiative to provide 1million free programmable Micro Bit devices for year-7 learners to experiment with physical computing. This launch has the potential to create a huge demand for physical computing kits and resources like @ShrimpingIt, especially given the lack of Micro Bit hardware offered to other year groups.

Pricing, Sales and Risk

Bagged Kits

Because of the open nature of the project designs offered by @ShrimpingIt, we have adopted an transparent, cost-plus pricing model for our bagged kits, approximating closely to a bagging service. This contrasts with the value-based pricing model of most proprietary electronics offerings for education.

Pricing is based on wholesale sourcing costs for electronics components including UK or international dispatch plus import taxes (VAT) calculated at 20%. Kit preparation in the UK, such as bagging components, pre-loading software onto microcontrollers and preparing wires is charged at £20 per hour.

Transparent cost-plus pricing has a number of benefits.

1. Our pricing model helps to ensure that our kits are incredibly cheap, suitable for every student in the class to have a kit of their own, maximising social benefit. Also as the proportion of teachers who can afford the kits increases, the chances of wildfire adoption throughout the education community by peer recommendation also increases. In this way, we can hope to establish @ShrimpingIt as a de-facto strategy for all UK educators delivering the new computing curriculum.
2. With our kits composed of freely available commodity electronics parts, and very low margin, we are undercutting our current and future competitors offerings. Other suppliers are unlikely to take an interest as our market grows, compared to higher margin proprietary products.
3. Point 2) includes users who might consider sourcing their own parts and bagging their own kits according to our project designs. Our transparent pricing model makes the savings from sourcing your own parts quite obvious. Educators' experiments have already established that for the volumes they purchase, the cost in uncertainty, delays, incompatibilities and extra effort from the self-sourcing process is much more significant than any financial saving they could make.
4. It clarifies our commercial role in the ecosystem - a service provider connecting educators with a world of prototyping materials and the designs which use them. We don't claim exclusivity over the designs, and you can source your own kits without us. This gives teachers confidence that the work they invest in adopting and developing @ShrimpingIt projects for their classroom will not be dependent on our company or face hidden costs outside of their control now or in the future.

Promotional pricing is currently offered for the first of any @ShrimpingIt project design which ordered by any given UK school. Purchasers qualify based on the unique school email domains in their source email address. We expect this offer to continue as it enables educators to prove an initial sample of our kits before purchasing the larger volumes needed to supply their classroom.

Workshops for Learners and CPD for Educators

Our standard rate for commissioned workshops is £350 a day plus travel and subsistence with any kits distributed within the workshop offered at full retail cost. We anticipate up to 20 delegates per session.

Two formats are currently offered, a half-day format which introduces just the Persistence of Vision project, and a full-day format which incorporates also the Conductive keyboard, Alarm clock and other builds. The shorter format serves 40 delegates per day - 20 in the morning, and 20 in the afternoon, with kit costs of £10 each, leading to total revenues of £750 per day, a 73% profit and a cost of £18.75 for each delegate. The

longer format serves just 20 delegates per day, with kit costs of £15 each, leading to total revenues of £650, a 77% profit, and a £32.50 cost for each delegate.

Where our own facilitation team cannot deliver a specific workshop, we have a number of experienced partners who can run workshop sessions on our behalf, and who will receive a payment equivalent to 75% of the day rate, with @ShrimpingIt retaining all retail sales.

Financial Information

The following costs are anticipated within the forecasts summarised at the end of this section.

Online presence and Packaging - £5000 for Root-and-Branch Redesign

Although the existing design of the website and packaging has been enough for a minimal viable product, higher quality design will be required for our official launch to be credible to purchasers.

A budget of £5000 will be invested over the first two quarters after second round funding becomes available, front-loaded to deliver a root-and-branch redesign, and an advertising campaign for the <http://shrimping.it> website and project kits within the first quarter following.

The funding allocated to the redesign will enable us to commission professional web designers, photographers and video production companies to present our work professionally, steering users towards the scalable online ecommerce channels detailed under 'Company Structure and Planned Transitions'. A small amount of cash is allocated to maintain the video and web resources for minor iterations or changes to our product range in each future quarter.

Stock of Electronic Components - £3000 for all kits

Our business model has been conceived from the beginning to be a just-in-time supply with a minimum of upfront investment. We currently maintain a minimum stock of 100 sets of far-east-supply components for each design - enough to complete a single bagging run for that kit, with lead times of around two weeks for international dispatch. The more expensive components - microcontrollers, USB modules and breadboards, are shared between kits minimising our capital exposure from unwanted stock. As volumes increase these stock levels will need to be increased correspondingly. Seasonal peaks are already visible in our order book, synchronised to the school holidays as teachers prepare for the coming term.

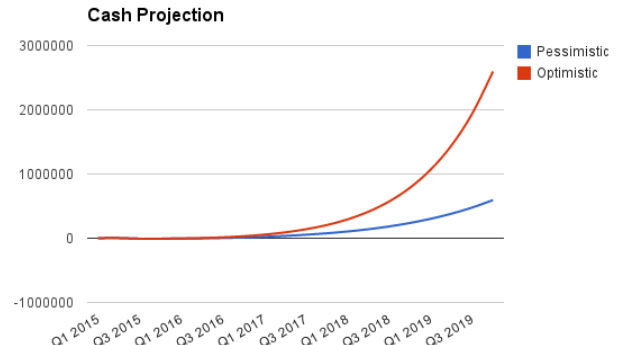
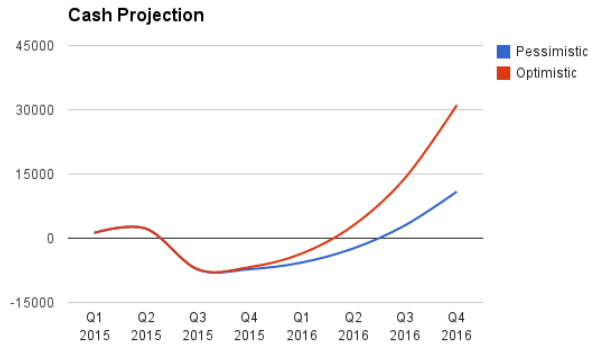
A budget of £3000 has been allocated to component stock to scale the back end of the business and ensure responsiveness to bursting demand as each school term begins. This translates to a stock of approximately 400 USB modules, 400 solderless breadboards and kit components equivalent to 200 of each of our six project kits (including the three newly launched projects). Microcontrollers, packaging and consumables will be sourced within the UK on a just-in-time basis to meet our own dispatch target response times of two working days after order receipt. Since the business has already sold substantially more than this number of kits already in the last 6 months, this investment is not considered to be high-risk even if sales figures do not respond as expected to our relaunch.

Annual Income for Lead Designer - £24000

A first year income of £24,000 a year is budgeted into the business plan based on running costs for the family home including full-time nursery childcare. Operations are currently run from a home workshop and bagging room within the family home so this outlay effectively incorporates the cost of premises until the kit sales exceed the capacity of the home workshop. This is estimated to happen above 3000 kits - due in the third quarter of 2017 on the conservative estimate. Based on the 200% cost-based pricing strategy, this income can be covered by the equivalent of £48000 pro-rata annual sales, equivalent to supplying nearly 5000 learners with the cheapest @ShrimpingIt project bundles per annum. That's just 0.06% of our UK target market.

Forecasts

We have adopted an upper and lower forecast model for the growth of the business to monitor its cash position over the coming 5 years. The generating spreadsheet for the cash projection is hosted on Google spreadsheets, and is available on request, although it requires some guidance to effectively modify the underlying parameters.



Forecast: Year immediately following second round funding Forecast: Five years

Both forecasts are structured around a number of new learners supplied with kits, and assume £10 revenue and £5 cost per learner for a Shrimp bundle and their first project. Both forecasts assume an initial uptick in retail sales from the current 200 kits a quarter to 800 kits in the quarter immediately following the design refresh made possible by our second-round funding. In addition a starting estimate of 6 days a quarter of workshop facilitation is forecast. These outcomes are expected as an immediate consequence of a shift to full-time working, the refreshed design of online resources, the new kits made available, the launch of the ecommerce site, video presentations of the projects, the use of Google adwords and printed material to promote the business. Both forecasts also incorporate the expectation that 25% of any quarterly excess cash position will be taken as income from Q3 of 2016, the first instalments of which are to be used to clear our business loan.

However, they differ in the annualized expected growth rate in learners and workshops. In the pessimistic case, the growth rate is approximately 100% each year, (19% each quarter) meaning that in Q4 of 2019 the business would supply a total of 13000 learners annually, arriving at a nominal cash position of around £600,000. In the optimistic case, the growth rate is assumed to be 200% each year, (32% each quarter) leading to an annual total of 65000 learners reached by Q4 of 2019 and a nominal cash position of around £2,600,000.

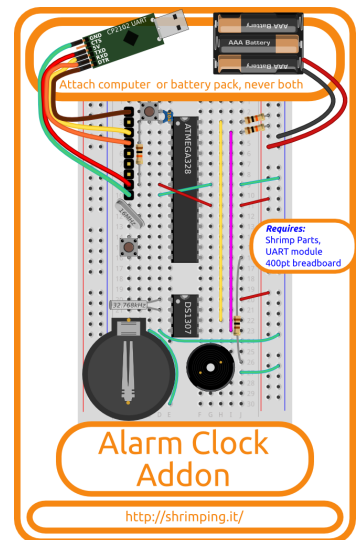
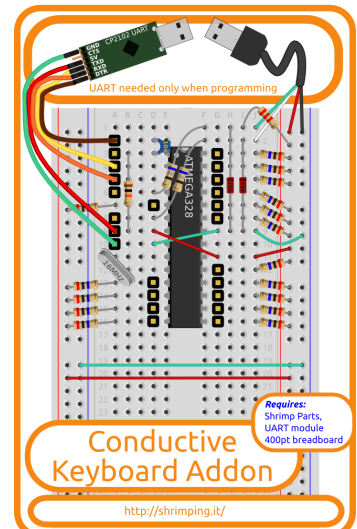
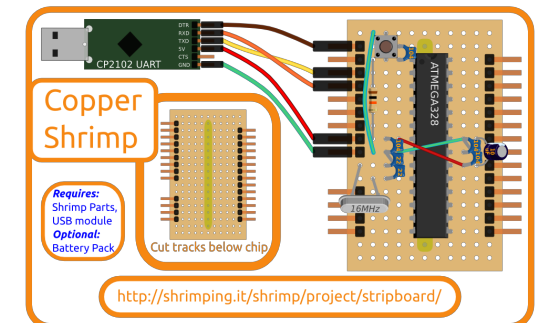
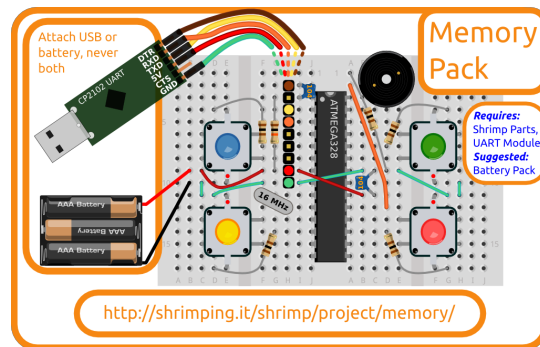
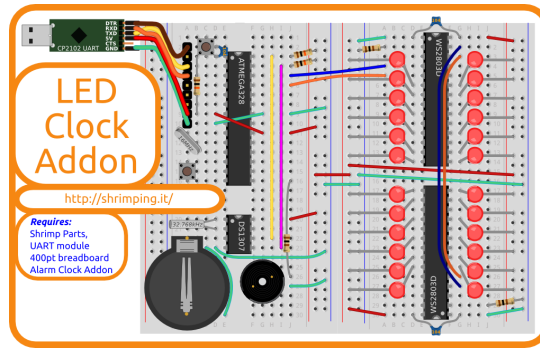
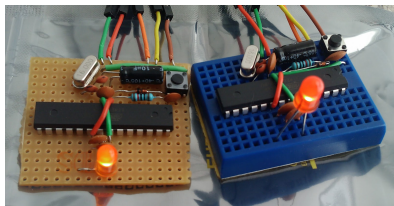
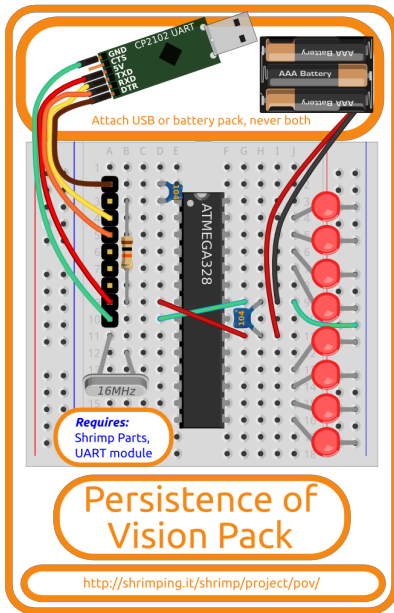


Figure: Kit covers for both established and newly-launched kits, lower left; hobbyists at a public @ShrimpingIt workshop.

Company Structure and Team

At present @ShrimpingIt's founder designs, packs and dispatches the kits, facilitates face-to-face workshops and maintains the web and Twitter presence. Currently all project design, kit packing and dispatch takes place at our Morecambe workshop HQ under direct supervision for quality control.

The supply chain for kits depends on bulk international imports of commodity electronics components such as solderless breadboards and compatible electronics components from Shenzen, China and Bangkok, Thailand. Stock maintained from international parcel post and courier deliveries from Far East suppliers is combined with overnight just-in-time deliveries from UK suppliers for microcontrollers, anti-static electronics bags, printed covers and flat-pack cardboard product boxes to satisfy orders negotiated by email. Payments

are cleared and verified either by cheque, bank transfer or Paypal invoice. Default terms require orders to be paid for in advance, although 30 days credit has been extended to some buyers by negotiation.

At this stage the business is incredibly dependent on the lead designer to deliver many parts of the business. Kit-bagging and dispatch is currently completed by hand at home, and facilitation is also delivered at customer sites by the same person.

Our £20 per hour costings for the bagging of components deliberately anticipates outsourcing piecework for a “living wage” rate per hour within the local community here in Morecambe, UK as demand for the kits scales. For dispatch, we will be moving to the “fulfilment by Amazon” service for warehousing and end-to-end e-commerce. This means pre-bagged kits can be shipped without any direct engagement with the Morecambe team. Finally, given the network of facilitators already using our free material throughout the UK, we are well-placed to outsource facilitation to trusted others on a day rate, whilst still absorbing retail profits from any kits used in the workshop.

As sales grow, all business functions except for project design will therefore be increasingly performed by others. The role of designing and maintaining @ShrimpingIt project resources will also become less and less critical to day-to-day business function as our existing portfolio of designs and supporting resources become finalised in response to customer feedback. Once the success of our initial marketing strategy is established, it is hoped the lead designer can return to a focus on the invention and sharing of new project designs, broadening our portfolio and guaranteeing our relevance to changing needs in the classroom.