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Feasibility Study

Application of Raspberry Pi as a Sports Tracking Metric Device

Prepared by:
Ankica Basar, 7342324
Daniel Prust, 8335820
Yilin Zhao, 7735230
Yupeng Lang, 837887

Z.Y.A.D. Tech Solutions

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Professor: John Palmer
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Introduction

With such great advancements in technology today, we have seen many innovative solutions to developing technology and designing systems to improve performance, operations, and the way we do business as a whole. These systems are usually associated with a very large price. For the purpose of this feasibility study, our team from Z.Y.A.D. Tech solutions proposes the following solution as a less expensive, wearable sports metric tracking device using a raspberry pi. This device can greatly benefit athletes, and quite frankly the everyday consumer. However, the main reasoning behind this RPI solution was to incorporate elements of sustainability and social responsibility to make a difference to disadvantaged youth aspiring to be athletes. The affordability of this product provides an economically feasible solution to expensive sports wearables while improving performance through data analysis. Although this idea is not relatively new our element of sustainability is and that will provide the base of all our decisions throughout this study. In an article from Biztech Magazines it explains, "Wearable technology has been around for a few decades, but the recent emergence of devices such as Apple Watch and Fitbit have spurred adoption. IDC reports that global sales of wearables grew 10.3 percent in 2017 over the previous year, following a 27.3 percent spike in growth in 2016. Many consumers have begun using these devices to track their steps and measure other fitness factors, but some athletes are using them for much higher-level applications" (Mclaughlin, 2018). Seeing as there is a large consumer market for a device like this, our team aims to cater not only to youth sports programs but to professional athletes and consumers as well. Our wearable sports tracking technology uses the RPI to track metrics of entire teams, as well as individual performance. The technology comes with an additional software and add ons that will collect the athletes distance, speed, number of steps, distance, and heart rate. This technology also opens the door to other health and fitness sectors such as the medical field and gym facilities. Our hope is to

reach youth within programs such as Athletics Canada, KidSport Ottawa, and high schools that offer special sports study programs like Louis Riel. Oftentimes a lot of the high schools and specialty programs exist to keep kids who cannot focus out of trouble while also providing them a healthy lifestyle and a chance to become a professional athlete. A sad truth exists that a lot of youth today are in trouble without proper guidance, poor health and lack of motivation to continue an education. In partnering with these amazing foundations and high schools our team hopes to create the perfect solution to continue to engage and train young athletes. Through much research our team has noted the most important factor of training young athletes is strength training. The peak academy director who specializes in youth sports training , Ken Brunet has said, “Every student participates in strength training, said Brunet, but the program is tailored to their age and individual needs. This is important for developing specific physical abilities before the body is no longer able to develop them. For example, if somebody does not develop their speed between the ages of six and nine, they will never have speed," he said. "They will have passed their window of trainability” (Kveton, 2014). This is where the Sports tracking RPI comes into play. The affordability, social aspect, removable add ons, and element of sustainability altogether provide an easier way to track metrics in one place creating a product that is versatile. Our wearable will aim to prevent injury and help train successful future athletes while providing affordable solution for these foundations and high schools. For further insight on these statistics please refer to Appendix A.

Monetization

Tracking device using a raspberry pi could optimise performance and reduce injury risk for youth athletes. The technology is also used to assess whether players are at risk of exasperating a fitness issue. Running with more weight on one foot than the other, for example, can be a sign that a player is subconsciously compensating for an injury. Sports team benefits from the technology device by reducing the rate of the player injury. Monetizing the action data that people take with wearables is the path to driving recurring revenue from the hardware with highly targeted marketing. By producing the Tracking metric device, our team is able to collect profits from different avenues. Firstly, our Tracking metric device will be sold by various approaches. We are selling the Tracking metric device through the internet. We are going to corporate with Amazon and to set up an account of our brand, we will be establish our official online store easily. After having Amazon officially registered as a sports used product, we are able to do promotions in the sports category of Amazon. We are also using google research engine promotion to boost our popularity. Secondly, this technology allows us to focus on different sports such as soccer, hockey, basketball, baseball and football. We are able to form different partnership with sports foundations and high schools. By cooperating with professional teams in lowers sports league in Canada or USA, and reduce the selling price at the beginning. Organized sport can help children grow, giving them a sense of achievement while building teamwork, leadership, problem-solving, decision-making, and communications skills. Sport also enables children to channel their energy, competitiveness and aggression in socially beneficial ways. Most children are first introduced to sports through the family, which has an important influence on children as they develop their identity and build self-esteem. Many studies have identified the influence that parents have on their children's sports involvement by investing time, emotional support and financial resources.

The technology could be separated in two types to sell in the market, sports version and professional version. Sports version involve with low-tech, low produce cost. Focus on the sports teams that have lower budget. Professional version is the product that has high-tech in it, and of very durable make. It cost higher than the sports version. It's going to be easy to order online and have it made in Canada since the tech is mainly focusing on sports teams and homegrown youth programs.

Marketing

Our target market is disadvantaged youth, our team will focusing selling towards youth sports foundations, high schools with specialized sports study programs such as Louis Riel, and government funded sports organizations! The low cost of our product due to the RPI element is perfect for this overlooked segment. Advertise on social media such as Instagram, Facebook, and Twitter. Moreover, the device can be advertised through government foundations we plan to partner with as well as when our team gives seminars to high schools and other foundations in Ottawa. Mainly our focus is in North America area until our product becomes more established in the market. Z.Y.A.D. tech solutions does have a website which our product will be included on as well and will also be sold through Amazon. Our marketing will center around brining the technology to these troubled youth and bring back sports for these young people that do not have the same opportunity as everyone else. Today society is living in the era of social media. Adding social media functionality and encouraging the foundations our team will be partnering with to also add this amazing advancement to their websites and social media. Many of these foundations do not have technology like this so it provides us the perfect

opportunity to not only have a competitive advantage ourselves, but help these organizations amp up their social aspect too! Being and staying accountable is a key goal that is encouraged by the sports metric tracking device. This especially important because many of these young people are enrolled in these programs not only because of dreams of becoming an athlete but to escape troubled or disadvantaged lifestyle. This device will provide our market the virtue of patience, balance and accountability. The Z.Y.A.D. wearable allows the consumer to invite their friends to keep each other accountable or share their goals and progress on social networks as well. Furthermore, our wearable provides a more advanced technology that these foundations and schools do not have access too. The wearable allows coaches and trainers the chance to really improve strength training and really train future athletes. The accuracy of the RPI and collection of data analytics allows these coaches to really fine tune the players skills.

STATSports and CATAPULT are the two major competitors. All Statsports Apex data can be transferred, stored and accessed from our cloud infrastructure. This allows, coaches, and foundations access to the information they need in any place at any time on different device platforms including mobile, tablet and desktop. APIs are provided to give third party applications closer integration with player data. Data security is fundamental to our strategy as elite player performance data is both very valuable and commercially sensitive. With all this being said, these competitors do exist to cater to high level professional athletes so in that sense our wearable loses out if expansion into this type of market was considered by our team. A strong competitor for us is STP2,who we will be buying our software from, as they have a similar device and offer it at cheaper value.

Our product is the perfect product to be bundled with other products such as the software and other sports tracking devices. As we are targeting underprivileged youth who may not be able to afford more advanced and expensive technologies we could bundle our product with all sorts of sports equipment for youth such as hockey helmets, soccer cleats, or football shoulder pads as some examples for a few different sports. We could offer our product at a slight discount in a bundle which would make our profit margin slightly less but would overall lead to an increase in the volume of our sales and lead to a greater overall profit. Z.Y.A.D. solutions will also offer customizations for our product, which could be done bundles with the original item and our other low cost sports gear. As our product is very versatile for different sports this gives us an opportunity to customize it for each different sport and offer a variety of products to maximize profit. For rough sports such as hockey and football we can offer a protective case. For sports that have minimal gear we could offer attachments to wear it on your body, such as belts or our main product the arm strap to wear it for sports like soccer.

Conceivability

As mentioned earlier, he pieces that make up this wearable device are pieces that already exist or can be ordered online by our team for a fairly inexpensive cost. The pieces can all be connected together to create the wearable. Moreover, since our solution caters to consumers that rely on an affordable version, the add ons are easily removable. To further add to the removable element of the device, there is an existing software application called gametraka, that can also be ordered with the pieces needed to make the wearable. After much research our team compared the prices for other existing softwares and it proved to be the cheapest. The consumer will be provided the choice to throw in any of the add ons, which include:

1. The SPT metric tracking and data analytics software to record the metrics.
2. The removable heart pulse sensor for the finger.
3. Optional customization to make the device less bulky.

The Raspberry Pi Wearable

The Raspberry Pi is an open-sourced microcontroller that will allow for a GPS tracking, use a GPS unit that is Pi compatible. The GPS simply plugs into the Pi and will upload any of the recorded distances and metrics to the software application . The GPS can be bought online or ordered specifically for sports racking with software from SPT2. SPT2 is an Australian company that specifically makes affordable sports GPS's to collect analytics"(Sports Performance Tracking Announces: the Smallest and Simplest GPS Device to Analyze Sports Performance for Amateur Athletes, 2018). To measure the Heart Rate of the player, we can use a light-based pulse oximeter which uses light to track the rate, available from sparkfun. This attaches to the user's index finger tip or anywhere else on the body that can capture a pulse. There is also the ability to have the sensor built into the band, preferably as this wearable will wear as an armband. In order for us to measure the distance and speed of the player, a gyroscope with accelerometer sensors can be used. Moreover, a step counter will be included through a gyroscope. In addition to the simple set up of the RPI our team proposes writing simple python code that has easily been found online to program the RPI to function with the GPS, the pulse oximeter, and the code. This online code will coordinate the action of the different sensors and how often they sample. In addition, the gametraka application will be purchased with the wearable to track full teams and individual performance from the GPS. As well to customize the look of the wearable, a custom circuit combining the different sensors can be made to make the

device less bulky. The RPI can also connect to phone via bluetooth component that can be purchased so the measurements can be uploaded to a phone or can display output on the wearable screen. Refer to Appendix B for prices and additional information on parts and where to purchase.

Challenges and Opportunities

Our product is not new on the market, there are other sports and fitness trackers such as fitbits and simple fitness apps. However, our team is striving to provide a certain level of flexibility and affordability to cater to a lower income market and the foundations mentioned earlier. This product offers more than simple fitness apps can as it provides higher quality analytics to track performance . Our product is not changing the way things are currently done by similar devices, however; the use of the RPI and removable add ons allows for a similar product at a much cheaper price. This also makes it more accessible to our target market providing us with a competitive advantage over our competitors. In terms of other companies attempting this, there are the similar products such as fitbits but no one has tried using the RPI or other similarly low powered computing to track sports metrics the way our team proposes to. Solely due to the fact our team is using an RPI we are providing an advanced technology at a very low cost, since it is cheaper for us to make as well. The RPI allows us to embrace change and continue to bring back value based sports for young people.

Crowdsourcing

Our team wanted to make this a team effort and include high school students that love technology and or sports and ask students to send us their ideas after our seminars at their school or sports organization. We encourage consumers of all ages to send us their ideas online through

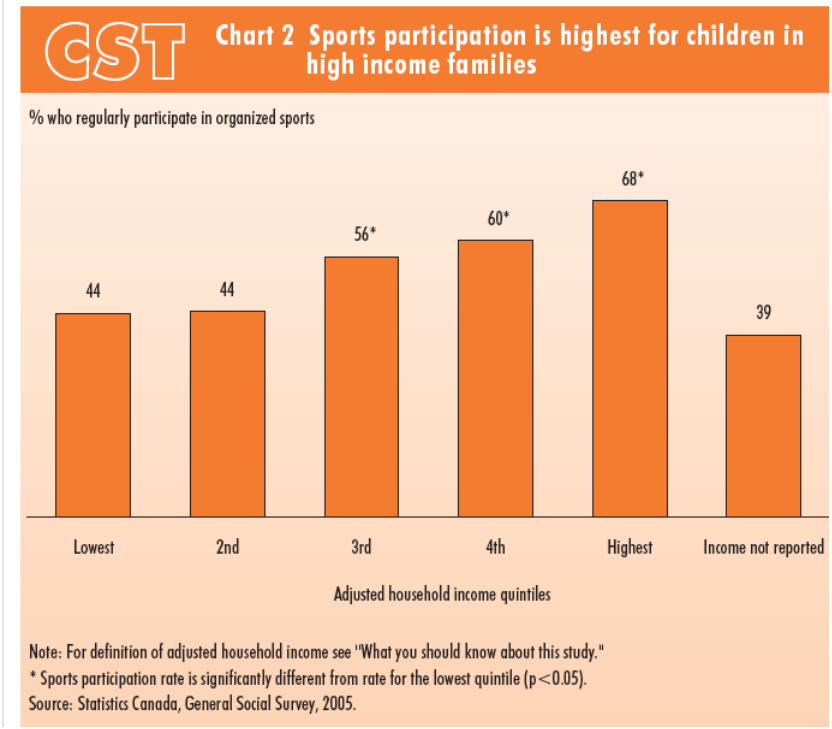
contests and we offer prizes. Moreover our team will also encourage feedback from the consumers that use our product,to give us a better idea of what should be removed or added. As mentioned earlier our funding will come from government funded organizations and fundraisers for youth and sports!

Findings

Our solution provides a relatively cheap substitute for more expensive wearables. Moreover, our research has showed that this device provides a feasible solution for this target market. The device also fulfills a need for an overlooked market, disadvantaged youth, that will be long term and lasting.

Appendix

Appendix A - Factors affecting disadvantaged youth and stats



More information found at:https://www150.statcan.gc.ca/n1/pub/11-008-x/2008001/article/10573-eng.htm

Appendix B - Pricing Information and Design

- **Raspberry Pi Pricings: Considering standard $35.00 RPI**

Found at : https://www.amazon.ca/s?k=raspberry+pi&ref=nb_sb_noss_2

- **Arm band with case:**

  Found at: https://www.amazon.ca/Navitech-Sports-Running-Armband-Raspberry/dp/B07C7GYTQS/ref=sr_1_fkmr0_1?keywords=arm+band+for+raspberry+pi+device&qid=1554308315&s=gateway&sr=8-1-fkmr0

- Light based pulse oximeter: Around $22.00
  Found at:

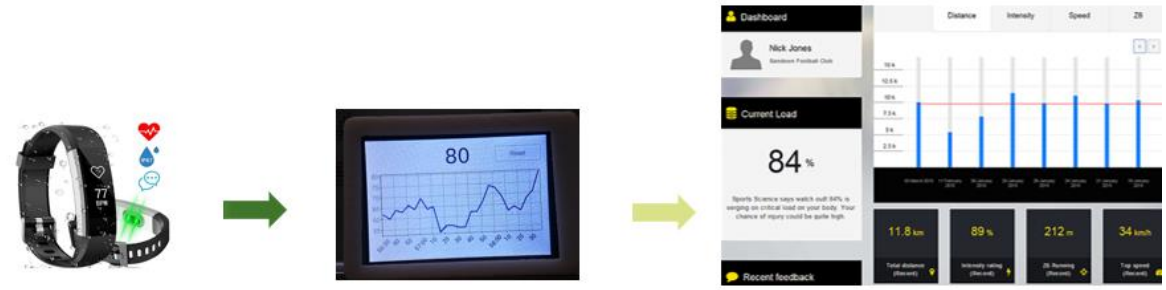
  https://www.google.ca/search?q=cheap+light+based+pulse+oximeter&source=univ&tbm=shop&tbo=u&sa=X&ved=0ahUKEwjytp2qqrThAhUFd98KHfAjB1AQ1TUIyAI&biw=1366&bih=655#spd=744550915331658338

- **Gyroscope for speed and movement: Around $40.00**

Found at: https://www.banggood.com/WIT-MPU6050-3-Axis-Bluetooth-Digital-Accelerometer-6-Axis-Gyro-Gyroscope-AHRS-Transducer-Sensor-p-1387406.html?gmcCountry=CA&currency=CAD&createTmp=1&utm_source=googleshopping&utm_medium=cpc_union&utm_content=2zou&utm_campaign=ssc-ca-all-0302&ad_id=335377878669&gclid=EAIaIQobChMIioD5pKu04QIVhoCfCh1EGwcKEAQYAiABEgJKd_D_BwE&cur_warehouse=CN

- **SPT Software for $249.00 (Our team had a discount since we are partnered with them)**
  Found at: https://www.wareable.com/fitness-trackers/spt2-release-date-price-specs-2194

- **RPI visual design idea:**



The look we are going for | The RPI | The SPT Software

Ethics Statement

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