US venture capital in robotics
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Abstract
Purpose – This paper seeks to report on the US venture capital (VC) industry's data findings on robotics.
Design/methodology/approach – An analysis of unique reports by the National Venture Capital Association and three interviews with US VC firms are presented.
Findings – Since robotics spreads across many different types of automation and industries, companies looking for venture capitalists may fare better by grouping within the industry category that they serve rather than by classifying themselves under the sole “robotic” industrial product classification.
Originality/value – This paper researches the terminology in-depth and data surrounding US published reports on robotics and VC. A unique report by the National Venture Capital Association was compiled for the purpose of this paper. The original responses of three interviews with representatives from US VC firms are also published here.

Keywords Robotics, Venture capital, United States of America

Paper type Research paper

Background
At most robotic conferences in the USA, no matter how technical the program, the issue of money and investment capital is often the buzz of many discussions. Can the product/application make money? Will venture capital (VC) firms be willing to invest in a particular start-up robot company? These and other related questions are often echoed both in and outside the sessions.

A better understanding of the terminology and statistics provided by the National Venture Capital Association (NVCA), a member-based trade association that represents the US VC industry, may help entrepreneurial robot companies foster their awareness of the US VC industry.

According to the NVCA, VC and private equity firms typically invest in companies that demonstrate the likelihood for a high rate of return within five to seven years, resulting in a small percentage of the total businesses reviewed by these firms. Venture capitalists actively participate with their investee companies by offering their business expertise in management, strategic marketing, and the planning of new products or services. VCs typically look to exit the investment in three to seven years.

Venture capitalists diminish the risk of venture investing by developing a portfolio of young companies in a single venture fund. They often co-invest with other professional VC firms. In addition, many venture partnerships will manage multiple funds simultaneously.

Data regarding US venture investments made in growth-oriented companies (disbursements) are collected and disseminated through a three-way agreement that includes PricewaterhouseCoopers, Venture Economics, and the National Venture Capital Association. Disbursements data are published under the MoneyTree Report by PricewaterhouseCoopers and NVCA on data by Thomson Financial.

NVCA, PricewaterhouseCoopers, and Thomson Financial use their own company classifications called Venture Economics Industry Codes (VEIC). Thomson analysts categorize data into the VEIC provided to them from VC firms, companies’ business descriptions, and companies’ keywords. There is only one primary leading VEIC listing per company, but there may be a secondary listing. There are nine main technology sectors (Group 1), 61 sub sectors (Sub-Group 2), and 519 specific branches (Sub-Group 3). A spreadsheet containing the VEIC codes is available from the author Joanne Pransky (drjoanne@robot.md).

Investment in US “robot” companies
The only VEIC that contains the word “robot” per se is 8,240, “Robotics” a secondary listing under 8,200 industrial automation, which falls under the general category of 8,000 industrial products.

However, an analysis performed by the NVCA, based on a search of the word “robot” in the companies’ keywords, descriptions, or VEIC code (8,240 – robotics), during the two-year period 2005-2006, resulted in a total of 15 “robot” companies.

Table I lists 15 “robot” companies that received reported VC during the years 2005 and 2006 and includes: company name; VEIC company industry description (Group 1); VEIC company industry description (Sub-Group 3); VC firm name; number of deals per robot company; number of VC firm(s) per robot company; average per deal (in US$ millions); average per robot company (in US$ millions); average per VC firm (in US$ millions); sum of the total investment (in US$ millions); and percent of total dollars invested in the 15 total robot companies.
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Table I  PWC/NVCA Moneytree report for 2005-2006 for “robot” investments

| Company name       | Description | Group 1 | Description | Group 3 | Firm name* | No. of deals | No. of firms | Avg per deal (US$ mil) | Avg Per comp (US$ mil) | Avg per firm (US$ mil) | Sum inv. (US$ mil) | Pct of inv. 
|--------------------|-------------|---------|-------------|---------|------------|--------------|--------------|----------------------|-----------------------|-----------------------|------------------|------------------
| Segway             | Other 9,000 | 9,150   | Motor vehicles, transportation equipment and parts | 9,150   | Credit Suisse; Duff Ackerman & Goodrich; Kleiner Perkins Caufield & Byers; U De Novo Ventures; Kearny Venture; Prospect Venture; Sapien Capital; Skyline Ventures; Vanguard Ventures; U Battery Ventures; Second Avenue Partners; U Brentwood Venture; Rho Ventures; STARTech Early Ventures; Versant Ventures | 2             | 4             | 17.85                | 35.70                | 8.92                | 35.70                | 17.65                |
| Hansen Medical     | Medical health rel. 5,000 | 5,240   | Drug delivery and other equipment | 5,240   | De Novo Ventures; Kearny Venture; Prospect Venture; Sapien Capital | 1             | 7             | 30.00                | 30.00                | 4.29                | 30.00                | 14.83                |
| Insitu Group       | Other 9,000 | 9,110   | Airlines and aviation related | 9,110   | Vantage Ventures; U Battery Ventures; Second Avenue Partners; U Brentwood Venture; Rho Ventures; STARTech Early Ventures; Versant Ventures | 2             | 3             | 11.63                | 23.25                | 7.75                | 23.25                | 11.49                |
| OraMetrix          | Medical health rel. 5,000 | 5,300   | Medical/health products | 5,300   |ivant Ventures; U Battery Ventures; Second Avenue Partners; U Brentwood Venture; Rho Ventures; STARTech Early Ventures; Versant Ventures | 1             | 4             | 18.00                | 18.00                | 4.50                | 18.00                | 8.90                |
| Kiva Systems       | Industrial products 8,000 | 8,240   | Robotics | 8,240   | Bain Capital; Clearwater Capital; U Band of Angels, U | 2             | 3             | 8.25                 | 16.50                | 5.50                | 16.50                | 8.16                |
| InTouch Technologies| Industrial products 8,000 | 8,240   | Robotics | 8,240   | Acacia Venture; Beringea; Galen Associates | 3             | 2             | 4.17                 | 12.50                | 6.25                | 12.50                | 6.18                |
| Blusshift Technologies | Other electronics related 3,000 | 3,119   | Medical equipment and parts | 3,119   | Atlas Venture; Intel Capital; North Bridge Venture; U | 1             | 3             | 12.10                | 12.10                | 4.03                | 12.10                | 5.98                |
| Aethon              | Industrial products 8,000 | 8,240   | Robotics | 8,240   | Ascension Health Ventures; Draper Triangle; Pacific Venture; Salix Ventures; Trident Capital | 2             | 4             | 6.00                 | 12.00                | 3.00                | 12.00                | 5.93                |
| Restoration Robotics | Medical health rel. 5,000 | 5,220   | Surgical instrumentation and equipment | 5,220   | Acme Ventures; Sutter Hill Ventures; U | 1             | 5             | 11.00                | 11.00                | 2.20                | 11.00                | 5.44                |
| HyperActive Technologies | Computer related 2,000 | 2,751   | Expert systems | 2,751   | Spencer Trask Ventures | 2             | 3             | 3.65                 | 7.29                 | 2.43                | 7.29                 | 3.60                |
| M Cubed Technologies | Industrial products 8,000 | 8,141   | Semiconductor materials | 8,141   | Argentum Group; Emigrant Capital; First Analysis In-Q-Tel; U | 1             | 1             | 6.50                 | 6.50                 | 6.50                | 6.50                 | 3.21                |
| Microchip Biotechnologies | Biotechnology and pharmacology 4,000 | 4,113   | DNA/RNA probes | 4,113   | In-Q-Tel; U | 1             | 3             | 5.00                 | 5.00                 | 1.67                | 5.00                 | 2.47                |
| Home Robots        | Consumer related 7,000 | 7,999   | Consumer electronics | 7,999   | Individuals; Noventi Ignition Partners; Second Avenue Partners | 1             | 2             | 3.79                 | 3.79                 | 1.90                | 3.79                 | 1.87                |
| GotVoice           | Communications 1,000 | 1,552   | Internet multimedia services | 1,552   | | 22            | 48            | 9.19                 | 13.49               | 4.21                | 202.28               | 100                |
| Total              |               |             |             |         |             | 52            | 119           | 19.88                | 43.32                | 11.62               | 43.32                | 21.76               |

Source: National Venture Capital Association

Thus, “robot” companies Segway (motor vehicles, transportation equipment & parts) and The Insitu Group (airlines and aviation related), both categorized under the Group 1 VEIC, 9,100 transportation, together accounted for $58.95 million or 29.14 percent of the total dollars invested in the 15 robot companies, compared to the three category 5,000 medical health “robot” companies which represented 27.33 percent of the total dollars. About 20 percent of the 15 “robot” companies were categorized under the 8,240 Robotics in 8,000 Industrial Products, averaging 3.6 US million per firm, for a total of nearly $40 million, or 19.58 percent of the overall investment dollars.

Some of the companies listed in Table I, though having been described in some format with the word “robot” for MoneyTree reporting purposes and may not necessarily be considered “robotic” by those that work in the industry.

For example, “GotVoice, Inc.” a provider of software and services that brings web access and e-mail flexibility to voicemail may be considered a “web robot” in its industry, but not necessarily to the industrial robot community which describes a robot as, “A mechanical device which can be programmed to perform some task of manipulation or locomotion under automatic control.”

Hyperactive Technologies classifies itself as a robot-related company and while the company’s software does utilize a vision system and an “artificially intelligent” program designed for the fast-food industry, this may not meet the criteria above which many roboticists adhere to.

On the contrary, one of the VC firms when asked if they invested in robot companies responded “no” – that they only invested in healthcare companies, when actually one of their investee companies uses customized industrial robots for their medical robotic healthcare product. This again emphasizes that what may be regarded as a robot or robot-related company to one industry might not be regarded as such by the VC world, and vice versa.

Aside from the semantics of robotics and the technological sector or industry a company is grouped in, the core qualities of what VC firms are looking for in a “robot” company are consistent – unique technology, a solid business plan, a strong
management team, and a high rate of return (a minimum of ten times the return on investment (ROI)) over a five-year period.

**Three US VC firms interviewed**

Three US VC firms responded to questions asked specifically about their investments in robot companies (questions asked to the interviewees are indicated in italic):

*Sutter Hill Ventures (SHV) – www.shv.com*

Which robot companies has SHV invested in? Restoration robotics is a current investment that is doing robotic hair transplant (restoration).

Why did SHV invest in the above? Interesting ability to transform a successful but laborious medical procedure and make it more widely available.

Is the robot investment a stand-alone interest or is it linked to investments in associated technologies? Interest is in medical technologies, not robots per se.

What ROI, and over what period of time is SHV expecting? Expected ROI = 10x.

How has the investment(s) been doing? Just beginning first-in-man work.

Would SHV be likely or unlikely to invest in more robot companies? If not, why not, and if so, what, if any criteria, would be changed for the next robot company investment? We are open to other robotic applications.

**Band of Angels – www.bandangels.com**

Has the Band of Angels invested in any robot companies? If so, which one(s)? Yes, Ugobe; maker of Pleo.

Why did the Band invest in the above? Good ROI potential; solid team; solid technology.

Is the robot investment a stand-alone interest or is it linked to investments in associated technologies? The miniaturization of electronics and processing power is making portable electronic devices more and more powerful; so far, this trend has been primarily in communication and data manipulation. A newer trend is disparate, low power, sensor networks – we are investing heavily in this space. Still far out, but closer than before, are useful robots ... still a generation away but we are putting our toe in the water.

What ROI and over what period of time is the Band of Angels expecting? About 20 percent internal rate of return.

How has the investment(s) been doing? Confidential.

Would the Band of Angels be likely or unlikely to invest in more robot companies? If not, why not, and if so, what, if any criteria, would be changed for the next robot company investment? Yes, but we need 10x(ROI) over five years; find me a robot company that will really do this and we are interested; most have not a chance, it is still too nascent of an industry with novelty and toy qualities dominating the consumer market.

**Trident capital – www.tridentcap.com**

Which robot companies has Trident invested in?

iRobot Corp

iRobot produces robots that perform dull, dirty or dangerous missions in a better way. iRobot’s consumer-oriented products include the Roomba Vacuuming Robot, the Scooba Floor Washing Robot and the Dirt Dog Workshop Robot. The company’s military products include the Packbot Tactical Mobile Robots that can be transported on the back of a soldier and used for unmanned reconnaissance and bomb disposal missions as well as the R-Gator Autonomous Unmanned Ground Vehicle. The company’s proprietary technology, iRobot AWARE Robot Intelligence Systems, incorporates advanced concepts in navigation, mobility, manipulation and artificial intelligence.

*Aethon Inc*

Based in Pittsburgh, Aethon is a leader in providing practical, dependable and affordable robotics for hospitals. Aethon’s first commercialized product, The TUG, is used to deliver medical supplies, pharmaceuticals, meal service and other supplies. The TUG can navigate autonomously and safely throughout a hospital, delivering and collecting supplies at an unlimited number of selected destinations. Aethon’s solution saves hospitals thousands of dollars, is simple to install and can be applied across a variety of applications.

Why did Trident invest in the above companies? Trident believes that robots are moving into the mainstream of military, consumer and industrial markets, particularly low cost, limited purpose solutions. Both companies above have developed leading edge products with compelling value propositions, with clear ROIs, that solve specific customer problems. Both, Aethon and iRobot have excellent management teams with a blend of strong technical expertise, business acumen, and successful track records.

Is the robot investment a stand-alone interest or is it linked to investments in associated technologies? We have also invested in Vidient, a leading provider of intelligent video security capabilities. This technology was spun out of NEC labs after being initially developed by Carnegie Mellon robotic vision researchers.

What ROI and over what period of time is Trident expecting? We do not release this type of information about any of our investments.

How has the investment(s) been doing? We are very happy with the progress and success of both of our robotic investments. We invested in iRobot in March 2003 and the company went public in November 2005. Aethon is at an earlier stage of growth than iRobot but is making significant customer progress.

Would Trident be likely or unlikely to invest in more robot companies? If not, why not, and if so, what, if any criteria, would be changed for the next robot company investment? We continue to look at additional opportunities in this field. We are seeking robotics companies with a similar profile to our existing investments: innovative technology, a strong management team, a sustainable competitive advantage, and unique products that can solve specific customer problems at a compelling cost level.

**International trends in VC (all industries)**

While statistics on specific “robotics” investments made by the VC world outside the USA are not available, a recent report, sponsored by Deloitte & Touche LLP entitled, The 2006 Global Venture Capital Survey, found that the following non-USA respondents (Europe, Middle East/Africa, Asia Pacific, and The Americas outside the USA), are projecting that the top three industry investments from the years 2007-2011 will be: energy/environment, communications and networking, and software (Figure 1).
**Conclusion**

Since robotics spreads across many different types of automation and industries, companies looking for venture capitalists may fare better to group within the industry category that they serve rather than to classify themselves under the sole “robotic” industrial product classification.

During the last two years, according to reports received by the NVCA, over $200 million have been invested by 22 VC firms in 15 companies that used the word “robot” in their reported keywords, descriptions, or VEIC code. This does not include companies that may use robotics as part of their automation and technology solution, only those that report it as such.

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**Figure 1** Increase (decrease) in industry investment in the next five years (all respondents)

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Source: Deloitte & Touche