

White Box PC-BOTs Brought To Life With Intel

Case Study

Intel® Centrino® 2 processor technology, Intel® Core™2 Duo processor technology

White Box Robotics



Dream in White



Challenge	Create innovative technology solutions by bringing mobile robotics, built to PC standards, into the mainstream.
Solution	Intel® Centrino® 2 processor technology, Intel® Core™2 Duo processor technology

Summary

There are robots among us ... they are doing more than assembling watches or painting cars, they are mobile robots monitoring the environment in office buildings, conducting security patrols, managing inventory in warehouses and even fostering a love of science and technology at a leading Canadian museum. To process the volumes of data needed to multi-task effectively, White Box Robotics' PC-BOT needs Intel at the core.

Challenge

In 2000, Thomas Burick founded White Box Robotics to bring mobile robotics, built to PC standards, into the mainstream. General Manager, Richard Lepack explains that Ottawa-based White Box Robotics is the world's first mobile robot manufacturer that uses off-the-shelf PC parts and standards, which means it can be expanded and upgraded easily, allowing companies to use the PC-BOT machines in a wide range of applications.

With a solution powered by Intel, White Box Robotics now has the computing power needed to enhance their capabilities, meet market demand and grow their business.





"You can only do so much with a PC that sits on a desk," explains Lepack. "What we are doing is making computers independently mobile. Our PC-BOTs can do things for you, like patrol your home, or detect changes in the environment like a leaking pipe, and then alert you with an email, text or instant message. You can also log into the PC-BOT, navigate it to your point of interest and look through its digital camera and see the problem for yourself."

Since the PC-BOT is constructed using off-the-shelf PC parts, owners can customize applications including RFID technology for bar code scanning, facial recognition using biometrics, environmental monitoring and security. And, since a PC-BOT is made from standard computer parts, it can be deployed, maintained and managed by IT departments within a corporation.

"We take all the benefits of a desktop computer and apply it to mobile robotics," he says. "We believe you should be able to build something as robust as a PC, with all the cost savings made possible by advancements in the computer industry. You can literally go to your favourite computer shop and buy the replacement parts you need, or easily add peripherals in the same way you'd add a 5¼" drive bay accessory or a USB adapter to a PC."

With so many potential applications for a PC-BOT, and demands from the marketplace to provide more and more applications that require significant computing power, White Box Robotics needed to increase the power of its PC-BOT to make sure the applications ran efficiently. Running processing-intensive applications such as facial recognition or AI software was taxing the earlier models using slower processors.

Solution

Recognizing that PC-BOTs have a need for speed, White Box Robotics has made the Intel® Core™ processor family the standard for its "Extreme" model. The company moved to using Intel® Core™ 2 Duo processors when earlier PC-BOTs using other processors couldn't handle the multi-tasking requirements of voice recognition, patrolling, detecting motion and using sensors simultaneously. Lepack explains earlier versions were running at 100% utilization when the camera was brought online. The new PC-BOT powered by Intel Core 2 Duo technology can handle the processing power required for processor-intensive applications with ease.

"We're not even at full capacity now," says Lepack, adding they can add more capabilities while improving redundancy within the PC-BOT which makes it more reliable. "We're very happy with the performance. With Intel Core 2 Duo processors, our customers have more power than they need to run applications, which gives us room to grow."

Key Advantages

The upgrade to Intel Core microarchitecture means PC-BOTs can do more while using fewer resources. Intel Core 2 Duo processors are designed to provide powerful energy-efficient performance, allowing PC-BOTs to do more without having to stop for safety reasons, making multi-tasking a breeze. White Box clients can realize their increasing demands to run multiple, software intensive applications concurrently, including video processing, speech recognition and artificial intelligence software.

"With Intel, we know our PC-BOTs can perform all the tasks our clients need, while giving us room to add every new application our clients can dream up," says Lepack, noting that the low power consumption elements of processors like the Intel Core 2 Duo are important since the PC-BOT is mobile, battery operated and not tethered to power outlets.

Pixel Brings Technology To Life

The Canada Science and Technology Museum was founded in 1967 to showcase Canadian innovation and contribution to the advancement of science and technology. With more than 80,000 artifacts in its collection, the museum offers hands on experiences for visitors of all ages, while fostering an appreciation Canada's global contribution to the advancement of science and technology.



Jason Armstrong, an Education and Interpretation Officer at the Canada Science and Technology Museum, helps manage one of the museum's newest additions, honorary staff member Pixel, a PC-BOT hired by the museum in 2007 to help children interact with new technology and foster a love of science.

"We were looking for a higher functioning robot that could execute more sophisticated applications," recalls Armstrong. "And with almost 1,100 kids enrolled each year in summer programs, we needed something that would excite the children, but that could handle the wear and tear that many kids wanting to interact with it. The Museum needed something larger than a toy that could also move autonomously."

"The kids love Pixel," says Armstrong. "They learn more when they can interact with something, and with Pixel, they are more engaged and remember their experience."

Since Pixel has been in use, the museum has been programming new applications for the robot and adding more information to its database in both of Canada's official languages. At camp last summer, kids could bring in their own music to upload onto Pixel. He would play their music while autonomously patrolling the room and projecting images of the kids dancing as Pixel "sees" them onto a large screen.

To simultaneously run all of these applications, Pixels needs the ability to multi-task, which is made seamless by Intel's Core processor technology.

Armed with new software, Armstrong says the development environment has become easier so they can see the potential for adding more applications for Pixel in the future. While the museum has used the Artificial Intelligence for some Q&A sessions with the children, the software is still in its early development stages.

"The kids love asking Pixel personal questions like 'what is your favourite snack?'. To which he would answer, 'computer chips,'" says Armstrong. The Museum staff programmed the responses rather than relying on AI technology.

New software has also allowed Pixel to move around more freely, respond to voice commands in both English and French, and interact more with the kids. "We are getting more clever about how we are using Pixel, and he now interacts more with the kids. It has become a very rich experience for Museum visitors. Pixel is a highlight at summer camp, and the kids get excited whenever we bring him into the room," says Armstrong.

Intel-Based Notebook Supervises Pixel

To initiate new programs and control Pixel remotely, the museum uses a Fujitsu* Lifebook* powered by Intel® Centrino® 2 processor technology. With wireless connectivity to Pixel, Armstrong can start projecting Pixel's vision on a large screen to show the kids dancing to a favourite CD or start a question and answer session with the kids participating in the museum programs.

The museum chose the Lifebook because it had enough power to run the graphic-intense applications needed to control or program Pixel. And, with Intel Centrino 2 processor technology inside, Armstrong says they have the ease of use they wanted for speakers who might need a notebook to run their presentations, and the processing speed needed to seamlessly interface with Pixel.

"This notebook gives us the power we need to easily run graphically intense programming for video or presentations, at a reasonable price. As a public institution, we are always conscious of cost-benefit ratios," explains Armstrong.

Patrolling With Ease

Beyond the interactive learning at the museum, White Box is leveraging the patrol and monitoring expertise of its sister company, Frontline Robotics, to deliver commercial applications for PC-BOTs.

"Our PC-BOT could drive within a building and scan everyone using biometrics to authenticate them," explains Lepack. "We could also tie it into applications like HVAC to monitor temperature controls or monitor for any gasses or hazardous materials. The same PC-BOT could also be patrolling warehouse aisles to scan inventory."

While these commercial applications are in the early stages, development work to enable teams of robots working in one environment is underway. Lepack, who is the founder of Frontline Robotics, explains that any work with AI software is

processor-intensive so PC-BOTs will rely on the processing capability of Intel Core technology to effectively manage the volume of data required for robots to be autonomous.

White Box Robotics has incorporated image recognition technology which could be used for security applications, while software programming to identify suspicious packages can be used in a wide range of commercial venues.

“The sky is the limit,” says Lepack. “If you have the time, you can build a program to do just about anything you dream about, and with Intel at the core, you have more than enough power to run all the applications you want.”

Future Uses

For White Box Robotics, Lepack sees opportunities in a range of industry sectors including health care where a PC-BOT could provide assistance for the elderly wanting to remain safely in their homes longer. It could also be used in assisted living facilities or nursing homes.

The company is furthering its work for PC-BOTs in monitoring and security and is working with a company in Ottawa to add a deterrent spray application which is remotely controlled by a notebook or PDA so PC-BOTS could disable an intruder while awaiting the police.

At the museum, Pixel’s role is secure but he might be getting more responsibilities in the future. Armstrong would like to hook Pixel up to the Internet to search for answers to children’s questions using online search engines. He also sees the opportunity, if someone has programming time, to leverage Pixel as a curator for some of the warehouse artifacts. With a handler and scanning technology, Pixel could describe items in their collection for visitors based on a programmed script.

“This might take time to program but it is something that will truly enrich the visitors’ experience,” says Armstrong. “Pixel is so popular with Museum visitors. We will continue to put him to action, and can’t wait to see Pixel reach his full potential!”

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Intel® Core™2 Duo processor technology, visit www.intel.com/products/processor/core2duo

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