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An Advanced Remote Brained Lego Robot System with Object Identification

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ABSTRACT: Robotics have been better at many things for many decades, and still, robot technology is used on everything from physical therapy to nuclear research modern robots typically run in predictable settings with in-board modules that are preset before being put into use. Traditional and current uses of robotics, on the other hand, call for extremely powerful onboard computation that would not be able to meet the needs of new and future ones. The robot would not have to physically house its own brain in the body. It starts with the whole brains in the mother's womb and converses with them through radio connections. The brain is nurtured by having developed in the maternal system through the years. The central concept of the use of wireless software connected intelligent systems is that it connects intelligent systems with physical robot bodies. In this paper, the robot may provide a strong virtual environment's virtual brain that includes a powerful vision device. As far as the authors are concerned, this method can be applicable to the intelligent design of mobile robots that possess both visual and physical sight to express visual action. A significant amount of effort is placed on exploring new ways to use robotic structures. And in the future, there are still plentiful possibilities for future breed of intelligent, adaptive, autonomous, and scalable robotic systems in the Internet of Things era.

KEYWORDS: Robotics, Virtual Brain, Radio connections, IoT Applications.

I.INTRODUCTION

There are more than five decades of active usage of the places where robotics substitute human in undesirable or risky tasks, but often tiring or boring activities, such as creating conditions hazardous or tetchy to live in, with electronic ones. Many types of desmogleums have been put to use in the industrial sector, in health care, in defense training, in space operations, and in several other locations, as well as in applications. Through the use of robotics, the quality of life was greatly increased, as was the processing speed, as even the chance of failure was decreased. and applying modern production techniques to key processes such as increasing operational efficiency, as well as well as important surgical practices and advanced preparation for surgeries in the military [11,12,13]

Robots are commonly made up of sensors, a control device, and moving parts. Sensors are the vehicles' primary means of sensing systems have a large antenna which serves the dual purpose of detection and communication. In situations, the robot gathers knowledge on what is happening around it and responds by deciding how to behave and what to do by way of a response. There are many kinds of devices, such as a light sensor, a laser sensor, an ultrasound transceiver, a microphone, and a camera. conditions, analyzes and regulates the current operating conditions to assess the actions of the robot There is an endless stream of sensor information being sent to the brain that is analyzed and then is acted upon as well as the actuators, the latter work together to do all that it finds. The actuators are attached to the robot's body which handle and aid in giving physical instructions to the robot in the surrounding world.

Many companies want to monitor the robot's control software on the microcontroller instead of having it on a separate board as well. To carry out these functions, the motherboard of the robot has all the requisite computing and data contained inside it. This machine prevents the robot from doing further work, and its power supply is not able to increase, but allows for further memory and energy to be used.

The research papers of M. Inaba (as outlined in [14–18] by himself) have described the concept "Remote-Minded Robots." Inaba would mean implementing remote controls that are connected to the head only, rather than the entire robot body. In addition to these, there are various configurations of a remote brain, each with their own individual traits. Hence, we may

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hypothesize more efficient robots. Outside of neuroscience, there are several additional topics which might also be interesting in a study lab studies that don't originate in the local brain. There are robots with limited capabilities that are fully dependent on data transmission technology, so wireless connectivity is important for them.

In this article, earlier implementations of remote- controlled robotics are discussed, followed by an explanation of how remote-minded robots are advancing towards networked robot networks, and the emergence of cloud-controlled robots are covered.

II.EXISTING WORKS

Remote-Brained Robots

Many concepts first appeared in registered patents in the field of aviation from 1958 on the much more sophisticated "satellite driven" and "brained" flight control methods. Far sightless compared to today's achievements and efforts in the area, it seems unsophisticated, easy, and utterly outdated.

The early work on robotics with a light brain, demonstrates, demonstrated the usage of wireless networks to link the heavy body. They attempted to estimate the various permutations of the count variables in order to implement an effective control system. If interaction, force, and video data can be shown on the sensor are possible, so another concept can be applied to a video camera as well. Instead of creating a parallel computing device that relied on rapid reactions, they believed their solution would create a machine that could churn out an extraordinarily efficient processing power base. When a brain is removed from the rest of the body, a (spare the sight), a computer is (neurobotome, spare the intellect) is put on display. We named the world of the brain “the mother” to refer to the extra body region, and the brain used radio links to access it.

Architectation Researching in (for a new projects) two tasks: first, conceptualizing a robust brained-robots (off-the-the-platform), and then simulating them in the sandbox. Suggested based on their work on classifying the “body” into two compartments, with one part the physical and one part being described as the machine "brain". In simpler and more motivating ways, such division enables better and more effective use of more advanced and efficient techniques. They also ran some trials to see whether all kinds of robots had the same distributed intelligence, doing them using the same framework that uses remote intelligence. Some of the experimental robots were motion-enabled, while others used vision and other techniques to their advantage. They state that the actual environment must go through further investigation and study before a significant real world application can be discovered. There are three principles behind these projects: breadth, depth, and exploration. They have three pillars. These projects have three tenets: applied multiple analysis algorithms and robots to the area, with the aim of enriching the domain by identifying additional workable methods and filling the gaps in existing knowledge.

Previously [as in this case] an entirely [23] this "using a grand, detailed, real-time robot-automated program was devised and [existed "used in place (for)" the authors created a broad automated software platform"] there are three horizontal levels (or layers as a whole) which are the Brain, the infrastructure, and the operational. A new kind of computer was unveiled: it proposed a supervisor of computer program development, the first woman to hold that position in the field of computing. Another aspect of this will be the creation of a diverse array of brain architectures of multi process network.

Due to the increased reliance on and use of robotics in the digital world, the virtual infrastructure industry faces numerous issues. This is a hard problem to deal with in real time because it involves integrating a heavy yet stylized and regular body with a larger-skulled virtual one. It attempted to determine whether key problems with the industry could be solved by autonomous robots, which are non-verbal and which have no internalized sensory abilities.

A real remote-brained robot that has human-machine interaction, vision systems, and manipulator was illustrated in [24]. The brain was separated from the robot’s body. The brain was left on the mother environment, which has the brain’s software. The brain and body are interacting via wireless communication links. Among several examples of remote-brained robots there are “Vision-Equipped Apelike Robot” [16], “Remote-brained LEGO robot” [25].

III.PROPOSED METHODOLOGY

An Advanced Apelike robot that has advanced vision

The Johou Systems Laboratory has been designing and creating a wide variety of robots since the early 1990s [expand into 14 different robots in bold]. Humans and their humanoid cousins use mostly mobile feet, wheeled feet, and quadruped mechanisms. Vesey-expanded from is various “Delaware, Darwin and Cosavoinerbots” [VDC] are their various “vision-

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less 'Delaware, Darwin, and Cosavo' systems. Its Apelike-designed "swagger" Locomotion" has the primary advantage of enabling "how do they get around?" investigation.

It enables remote operation of fitted cameras to gain and the capacity to do the job in almost any context, such capability to manage 3rd person footage as well as well as handheld, handles third person content in an unstructured environments, and weapons robots. It is like a tool, but its robot is similar to one that belongs to an ancestor of Apes in that it is an intelligent and enables it to do complicated visual operations. Whereas the lightness of the robot is because the processing device is not a component of it, is physically conceivable In the picture, Figure 1, the key components of the Apelike robot are seen.

The structure is composed of three important elements: government, business, and civil society.

i. The Eus-powered Remote Brain Designing object-oriented activities using the expandable paradigm is much easier because it allows for the construction of different forms of behaviour and inter-action. In order to achieve further contact with the actual robots, however, we must use the remote brain to direct and monitor both the gesture and motion balance.

ii. Since it has a transputer, it's capable of understanding and communicating, it has an ability to enlarge and localize. When you have finished the interpretation of the information sent, a) the Vision receiver and transmitter are transputers working with the source data to provide new data. For the motion picture acquisition, the interface can only process a small number of images, but for face recognition, it can process a lot.

iii. This robot's weight, plus the amount of electricity that it is connected to, weights around 2.5 kg (i.e. batteries). The body contains two key radio-based communication components; the first, the receiver of motion information, and second, the transmitter of sensor data is kinetic extension of the neural information "the process of info signaling between the robot and the brain gives it the ability to execute dynamic behaviors".

The advanced Apelike robot is capable of three primary functions:

a) model-based motion estimation,

b) vision-based communication, and

c) vision-based stair climbing.

One such multi-limbed robot is capable of responding to complex visual stimuli and performing certain acts akin to those performed by humans. Although the robot was able to imitate human activities, it also requires refinement in order to benefit from executed acts and acquire additional skills.

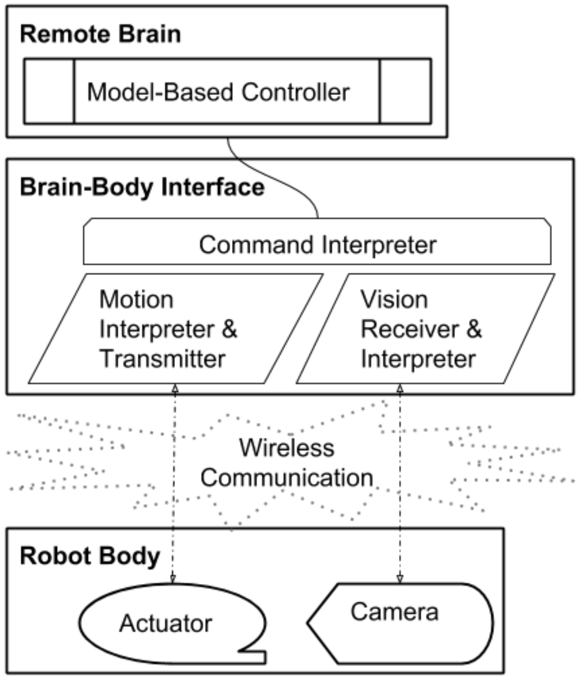

Figure 1. The system architecture of an Advanced Apelike Robot system

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Remote-brained LEGO robot

Authors introduce an inventive, inexpensive, mobile, but original robots that assume the structure of landmine activity in [24] [because of the different assumptions applied] the mapped product description is part of a proposed method depends on moving NXTs to create a map of the environment. There are several robots out there with various sensors, sensors customized to specific environments that work to search for various things depending on the research findings in their database. the mine locations and their internal states so that other modules in the device could ascertain what, if anything, had changed as the environment being studied over time (i.e. objects) of Figure 2 here, which identifies an object on the other side of the room based on visual input, and then searches for it if possible on a global inputs, such as sonar and infrared sensors.

The proposed system consists of three components. They are:

(i) A PC Server is a Pentium 4 computer with a 512 RAM and support Wi-Fi connection. The PC Server works as the robot brain for the whole system since it is responsible of both monitoring and control of the system.

(ii) The LEGO NXT is the mobile robot which is used to execute the mission commands. The NXT robot will hold the N80 mobile phone and navigate in the minefield.

(iii) N80 is a smart mobile phone device. N80 has an ARM-9 processor with clock rate of 220 MHz CPU, 18 MB RAM and Symbian OS v9.11. N80 includes 3.0 Mega pixels camera and support for different types of wireless communication standards. They include (1) 3G network (384 kbps), (2) EDGE (286.8 kbps) (3) Bluetooth 2.0 and 4) WLAN 802.11b/g.

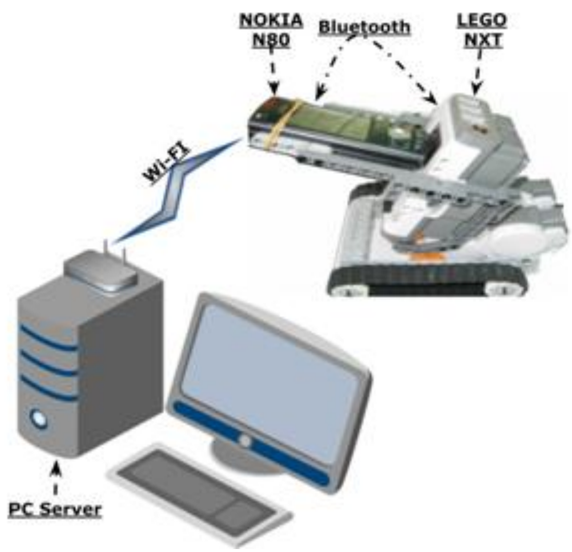

Figure 2 Remote-brained LEGO Robot components

The operation of the proposed system is presented in Figure 3. In this proposed method, the N80 mobile has been worked as a sensor camera that captures images, frequently. Those images will be sent to a PC server (i.e. the robot brain) such that a simple image processing algorithm is executed to detect objects in an image, if any. Then the result of execution is a command that sent back via wireless communication to the robot to navigate in the specified environment.

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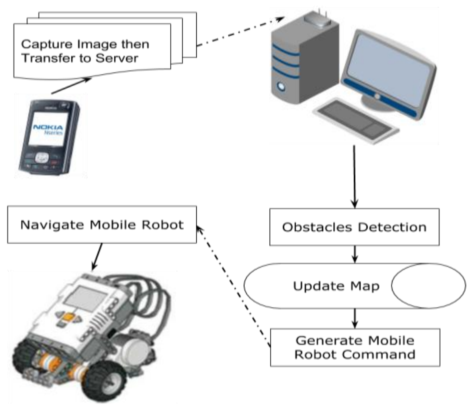

Figure 3: Remote-brained LEGO Robot operations

The general model of the Remote-brained LEGO Robot has shown in Figure 4. It can be seen that the brain is in charge of analyzing the environment based on the collected data, the choice of the optimal decision to be taken based on available information and finally send appropriate command to robot actuators to complete a mission.

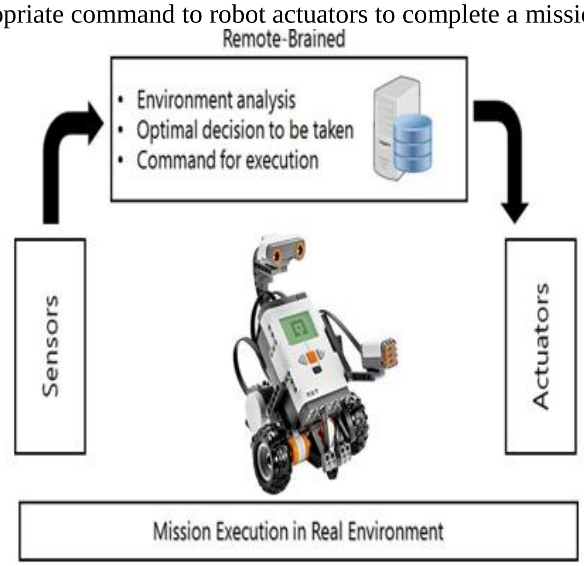

Figure 4 General model of the Remote-brained LEGO Robot

The general model of the Remote-brained LEGO Robot is shown in Figure 4. It can be seen that the brain is in charge of analyzing the environment based on the collected data, the choice of the optimal decision to be taken based on available information and finally send appropriate command to robot actuators to complete a mission.

IV.CONCLUSION

In this paper, the robot may provide a strong virtual environment's virtual brain that includes a powerful vision device. As far as the authors are concerned, this method can be applicable to the intelligent design of mobile robots that possess both visual and physical sight to express visual action. It can be seen that the brain is in charge of analyzing the environment based on the collected data, the choice of the optimal decision to be taken based on available information and finally send appropriate command to robot actuators to complete a mission. A significant amount of effort is placed on exploring new ways to use robotic structures.

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V.FUTURE SCOPE

In the future, there are still plentiful possibilities for future breed of intelligent, adaptive, autonomous, and scalable robotic systems in the Internet of Things era.

REFERENCES

[1] K. Khodabandehloo, "Robotics in food manufacturing," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics, p. 10, June 1997.
[2] F. Park, "Robotics and manufacturing," in Proceedings of the 13th International Conference onControl Automation Robotics Vision (ICARCV), p. 1, Dec 2014.
[3] P. Dario, E. Guglielmelli, B. Allotta, and M. C. Carrozza, "Robotics for medical applications," IEEE Robotics Automation Magazine, vol. 3, pp. 44–56, Sep 1996.
[4] S. D. Zagal and B. Tondu, "Control system of artificial chemico-mechanical muscle. medical robotics application," in Proceedings of the 15th International Conference on Computing (CIC'06), pp. 209–214, Nov 2006.
[5] Z. Vamossy and T. Haidegger, "The rise of service robotics: Navigation in medical and mobile applications," in Proceedings of the 2014 IEEE 12th International Sym- posium on Applied Machine Intelligence and Informatics (SAMI), p. 11, Jan 2014.
[6] J. A. Bagnell, D. Bradley, D. Silver, B. Sofman, and A. Stentz, "Learning for au- tonomous navigation," IEEE Robotics Automation Magazine, vol. 17, pp. 74–84, June 2010.
[7] E. C. Ortiz, J. N. Salcedo, S. Lackey, L. Fiorella, and I. L. Hudson, "Soldier vs. non- military novice performance patterns in remote weapon system research," in Pro- ceedings of the 2012 Symposium on Military Modeling and Simulation, MMS '12, (San Diego, CA, USA), pp. 5:1–5:6, Society for Computer Simulation International, 2012.
[8] D. Schreckenghost, T. Fong, H. Utz, and T. Milam, "Measuring robot performance in real-time for NASA robotic reconnaissance operations," in Proceedings of the 9th Workshop on Performance Metrics for Intelligent Systems, PerMIS '09, (New York, NY, USA), pp. 194–202, ACM, 2009.
[9] B. Curto and V. Moreno, "A robot in the classroom," in Proceedings of the First In- ternational Conference on Technological Ecosystem for Enhancing Multiculturality, TEEM '13, (New York, NY, USA), pp. 295–296, ACM, 2013.
[10] F. B. V. Benitti, "Exploring the educational potential of robotics in schools," Comput. Educ., vol. 58, pp. 978–988, Apr. 2012.
[11] R. K. Panda and S. Saxena, "An insight to multi-tasking in cognitive robotics," in 2016 3rd International Conference on Computing for Sustainable Global Develop- ment (INDIACom), pp. 1018– 1023, March 2016.
[12] G. A. Jacoby and D. J. Chang, "Towards command and control networking of co- operative autonomous robotics for military applications (carma)," in Proceedings of the Canadian Conference on Electrical and Computer Engineering (CCECE2008), pp. 815–820, May 2008.
[13] J. Y. Chen and M. J. Barnes, "Robotics operator performance in a military multi- tasking environment," in Proceedings of the 3rd ACM/IEEE International Confer- ence on Human-Robot Interaction (HRI), pp. 279–286, March 2008.
[14] M. Inaba, "Remote-brained robots," in Proceedings of the Fifteenth International Joint Conference on Artifical Intelligence - Volume 2, IJCAI'97, (San Francisco, CA, USA), pp. 1593–1606, Morgan Kaufmann Publishers Inc., 1997.
[15] M. Inaba, S. Kagami, K. Sakaki, F. Kanehiro, and H. Inoue, "Vision-based multisen- sor integration in remote-brained robots," in Proceedings of the IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems, pp. 747– 754, Oct 1994.
[16] M. Inaba, F. Kanehiro, S. Kagami, and H. Inoue, "Vision-equipped apelike robot based on the remote-brained approach," in Proceedings of the 1995 IEEE Interna- tional Conference on Robotics and Automation, vol. 2, pp. 2193–2198, May 1995.
[17] M. Inaba, "Remote-brained humanoid project," Advanced Robotics, vol. 11, no. 6, pp. 605–620, 1996.
[18] M. Inaba, "Developmental processes in remote-brained humanoids," in Robotics Re- search (Y. Shirai and S. Hirose, eds.), pp. 344–355, Springer London, 1998.
[19] S. Kagami, F. Kanehiro, K. Nagasaka, Y. Tamiya, M. Inaba, and H. Inoue, "De- sign and implementation of brain real-time part for remote-brained robot approach," in Proceedings of the IEEE/RSJ International Conference on Intelligent Robot and Systems, Innovative Robotics for Real- World Applications. September 7-11, 1997, Grenoble, France, pp. 828–835, 1997.

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[20] F. Kanehiro, I. Mizuuchi, K. Koyasako, Y. Kakiuchi, M. Inaba, and H. Inoue, "De- velopment of a remote-brained humanoid for research on whole body action," in Pro- ceedings. 1998 IEEE International Conference on Robotics and Automation, vol. 2, pp. 1302–1307, May 1998.
[21] J. D. E. endall, R. C. Mack, and R. R. Wellock, "Remote control of robot aircraft," July 2 1963. US Patent 3,096,046.
[22] M. Inaba, S. Kagami, F. Kanehiro, Y. Hoshino, and H. Inoue, "A platform for robotics research based on the remote-brained robot approach," The International Journal of Robotics Research, vol. 19, no. 10, pp. 933–954, 2000.
[23] S. Kagami, Y. Tamiya, M. Inaba, and H. Inoue, "Design of real-time large scale robot software platform and its implementation in the remote-brained robot project," in Proceedings of the 1996 IEEE/RSJ International Conference on Intelligent Robots and Systems, vol. 3, pp. 1394–1399, Nov 1996.
[24] S. Cui, X. Xu, Z. Lian, L. Zhao, and Z. Bing, "Design and path planning for a remote-brained service robot," in Life System Modeling and Simulation (K. Li, X. Li, G. Irwin, and G. He, eds.), vol. 4689 of Lecture Notes in Computer Science, pp. 492– 500, Springer Berlin Heidelberg, 2007.
[25] A. Sheta and M. Salamah, "A multistage image processing methodology for land- mine detection using an innovative NXT mobile robot system," in Proceedings of the 2009 International Conference on Image Processing, Computer Vision, and Pat- tern Recognition (H. R. Arabnia and G. Schaefer, eds.), pp. 202–208, CSREA Press, 2009.
[26] K. Kawasaki, Y. Motegi, M. Zhao, K. Okada, and M. Inaba, "Dual connected bi- copter with new wall trace locomotion feasibility that can fly at arbitrary tilt an- gle," in 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 524–531, Sept 2015.
[27] M. Mitsuishi, Y. Hatamura, T. Nagao, and H. Inoue, "Development of a user friendly manufacturing system," in The International Conference on Manufacturing Systems and Environment, pp. 167–172, 1990.
[28] S. Alian, N. Ghatasheh, and M. Abu-Faraj, "Multi-agent swarm spreading ap- proach in unknown environments," International Journal of Computer Science Is- sues (IJCSI), vol. 11, no. 2, pp. 160–168, 2014.
[29]G. Hu, W. P. Tay, and Y. Wen, "Cloud robotics: architecture, challenges and applica- tions," vol. 26, no. 3, pp. 21–28, 2012.
[30] G. T. McKee and P. S. Schenker, "Networked robotics," in Sensor Fusion and Decen- tralized Control in Robotic Systems III, vol. 4196, pp. 197–210, International Society for Optics and Photonics, 2000.
[31] G. McKee, What is Networked Robotics?, pp. 35–45. Berlin, Heidelberg: Springer Berlin Heidelberg, 2008.