International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 12 Issue 3, March-2023, Impact Factor: 7.957

Review on Mithra the Humanoid Robot Using Jetson nano

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ABSTRACT

The aim of this paper is to develop a smart social robot showing sufficient intelligence to work as a guide in different environments. In doing so, both a software and a hardware architecture are proposed, the jetson nano processor is used to control different modules, such as microphone, cameras, platform, face, voice, and others. For its navigation, the use of a known visual map can help to obtain an accurate localization, but in the absence of this map, a guided or free exploration pathway must be executed to obtain the image sequence representing the visual map. Our base paper presents an appearance-based localization method based on a visual map and an end-to-end Convolutional Neural Network.

INTRODUCTION

Humanoid Robots are robots which can resemble human behavior and can mimic human expressions and behavior. Through this paper we would like to introduce Mithra-The Humanoid Robot. By this robot which is specially designedfor guiding and greeting the people uniquely designed with Jetson Nano. Humanoid Robots has been setup with a lot of future goals. They are expected to serve as companions and assistants in day to day life of human beings. There will be a considerable progress in the humanoid research which will result in a number of humanoid robots. Many technical innovations and remarkable results by universities, research institutions and companies are visible. There are many futuristic applications in humanoid robot as IRN Architecture or In Robot Architecture. Humanoid robots are outshining in almost every industry, particularly companion robots. While humanoids currently are one of the smallest groups of service robots, they have the potential to become the industrial tool of the future. With the advancements of military weapons, it's now essential to deploy humanoids to cope with the pace and reduce the bloodshed of human soldiers. Some military-grade humanoids can move and gather data, process, and work efficiently, aiding the nation's military system. But there's still a lot of research and development needed to bridge the gap completely. . To achieve equivalent human perception and motor capabilities, large numbers of sensors and actuators need to be implemented ina humanoid robot. To maintain good data transmission conditions between sensors, actuators and processors, a complex and reliable network architecture is essential. Along with that we can also use RPA(Robot Process Automation) for the designing the robot. Robotic process automation (RPA) is a software technology that makes it easy to build, deploy, and manage software robots that emulate humans actions interacting with digital systems and software.

LITERATURE SURVEY

O. Stasse, ``SLAM and vision-based humanoid navigation,'' in Humanoid Robotics: A Reference. Dordrecht, The Netherlands: Springer, 2018, pp. 17391761, doi: 10.1007/978-94007-6046-2_59.Aug 2021**[1],**proposed a positioning is a need for many applications related to mapping and navigation either in civilian or military domains. The significant developments in satellite-based techniques, sensors, telecommunications, computer hardware and software, image processing, etc. positively influenced tosolve the positioning problem efficiently and instantaneously. Accordingly, the mentioned development empowered the applications and advancement of autonomous navigation. One of the most interesting developed positioning techniques is what is called in robotics as the Simultaneous Localization and Mapping SLAM. The SLAM problem solution has witnessed a quick improvement in the last decades either using active sensors like the RAdio Detection And Ranging (Radar) and Light Detection and Ranging (LiDAR) or passive sensors like cameras. , positioning and mapping is one of the main tasks for Geometrics engineers, and therefore it's of high importance for them to understand the SLAM topic

which is not easy because of the huge documentation and algorithms available and the various SLAM solutions in terms of the mathematical models, complexity, the sensors used, and the type of applications. In this paper, a clear and simplified explanation is introduced about SLAM from a Geometrical viewpoint avoiding going into the complicated algorithmic details behind the presented techniues.

Chengyu Cui and Sungkwon Park," In-Robot Network Architectures for Humanoid Robots With Human Sensorand Motor Functions" IEEE Publisher May, 2021**[2],** proposed Humanoid Robots will play an important role in providing physical assistance and even companionship. The potential benefits of artificial intelligence are huge so it is necessary to make a strong network for them. The in- robot network of humanoid robots reveals network requirements for humanoid robots to understand and to sense the abilities that resembles human beings. Humanoid robots require thousands of sensors to imitate human expressions and behavior and its mandatory to coordinate them well. To achieve human equivalent nature complex and reliable network architecture is essential. To reach smooth motion these robots need to strengthen the degree of freedom for that we should be aware about the existing humanoid robots and their limitations. In-robot network include networks of sensors and actuators with different performance parameters such as bandwidth, delay, and transmission speed. IRN(In-Robot Network) is the future network connection for humanoid robot since technology through automation and artificial intelligence is definitely one of the most disruptive sources. Three models of IRN are proposed so far. These IRN surely make a revolution in humanoid robots soon

H. M. Becerra, C. Sagüés, Y. Mezouar, and J.-B. Hayet, ``Visual navigation of wheeled mobile robots using directfeedback of a geometric constraint, „Auto. Robots, vol. 37, no. 2, pp. 137156, Aug. 2014Peng**[3]**, proposed that an image-based control scheme for driving wheeled mobile robots along visual paths. Our approach is based on the feedback of information given by geometric constraints: the epipolar geometry or the trifocal tensor. The proposed control law only requires one measurement easily computed from the image data through the geometric constraint. The proposed approach has two main advantages: explicit pose parameters decomposition is not required and the rotational velocity is smooth or eventually piece-wise constant avoiding discontinuities that generally appear in previous works when the target image changes. The translational velocity is adapted as demanded for the path and the resultant motion is independent of this velocity. Furthermore, our approach is valid for all cameras with approximated central projection, including conventional, cat dioptric and some fisheye

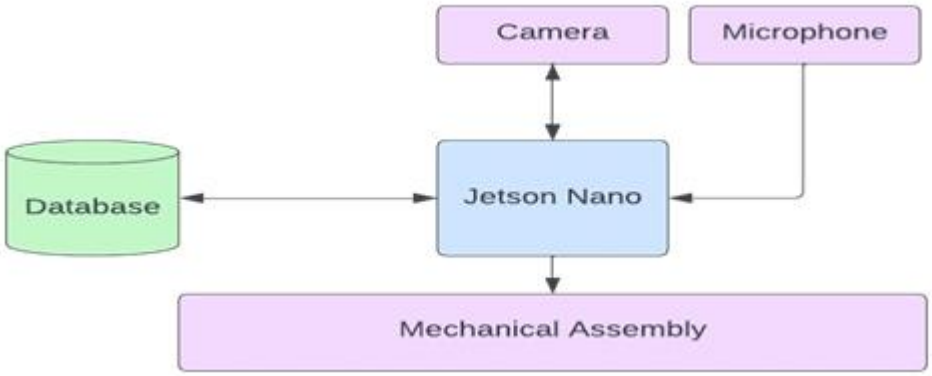
Destephe, T. Maruyama, M. Zecca, K. Hashimoto, and A. Takanishi, „„The influences of emotional intensity for happiness and sadness on walking,"" in Proc. 35th Annu. Int. Conf. IEEE Eng. Med. Biol. Soc. (EMBC), Osaka, Japan, Jul. 2013, pp. 7452–7455, doi:10.1109/embc.2013.6611281. [4], proposed a mobility emotional human-like gait-induced upper body motion in a mobile android ibuki. This paper hypothesize that the gait-induced upper body motion with vertical oscillation enhances the human perception of a mobile robot's emotional expressions.ibuki is a mobile robot, which has a vertical oscillation mechanism, which enables the robot to move its body with a human gait-induced upper body motion. A number of experiments in which participants watched videos of ibuki moving in a room expressing different emotions - anger, happiness, and sadness , before answering how they perceived the emotion and their respective condense level in their answer. The results show that for motions with vertical oscillation, recognition rates were: 56.0 % for anger, 77.7 % for happiness, and 97.0 % for sadness.

L. Chassagne, O. Bruneau, A. Bialek, C. Falguiere, E. Broussard, and O. Barrois„ Ultrasonic sensor triangulation for accurate 3D relative positioning of humanoid robot feet,""IEEE Sensors J., vol. 15, no.5, pp. 2856–2865, May 2015.**[5]**proposed a system simple measurement system with a set of six ultrasonic piezoelectric transducers is presented fordirect 3D positioning of humanoid robot limbs. A configuration with three emitters and three receivers leads to millimetric estimation of the distances. Millimetric resolution achievement over70 cm range is aimed with high angular tolerance in order to mount the sensor on a humanoid robot. Sampling frequency up to 60 Hz is obtained. The sensor is then used to estimate relative positionsandn orientations in the space of each foot of the robot with regard to the pelvis. The principle and experimental performances of the sensor are presented in the first part with uncertainty estimations and discussions. In the second phase, the sensor has been set up on the ROBIAN humanoid robot to illustrate an application case and test the performances.

H.-P. Huang, J.-L. Yan, T.-H. Huang, and M.-B. Huang, „„IoT-based networking for humanoid robots,"" J. Chin. Inst. Engineers, vol. 40, no. 7, pp. 603–613, Oct. 2017 **[6]** proposed a A new network communication approach, named real-time network (RTNET), is designed and implemented for humanoid robots. The proposed five network objects – alarm, condition, message, mail, and file are used to represent the task and priority of the communication data. Compared to the existing protocols, the network scheduling mechanism of RTNET arranges, more efficiently, the priority and flow control of the five network communication objects to meet real-time requirements for the limited bandwidth of the local area network. RTNET can be further integrated with other protocols, such as Ether CAT or controller area networks (CAN Bus) for local control systems, e.g. Robot arms, to improve the communication mechanism. The RTNET can also be used over Ethernet to connect each subsystem and to exchange information among those systems. Also, an Internet of things (IoT) network structure based on RTNET is proposed in this paper. The information of each subsystem is collected through RTNET and users can

access all components in the IoT network. In this paper, the concept of RTNET is presented and RTNET has been implemented on a NationalTaiwan University (NTU) humanoid robot control system with CAN Bus.

PROPOSED METHOD



The humanoid robot Mithra consists of a jetson nano processors which will determine the potential function for all the robotic functions such as face identification, localization, image comparisons ,data base integration ,etc. The pi cameramodule enables Mithra for taking consecutive images and is matched symbolically with the key images .The process isdone through a end to end convolution neural network which act as an intelligence system of Mithra. The microphone and speaker enables Mithra for human robot interaction. The mechanical assembly consists of Metal Gear Servo Motor-Mg995, stepper motors and DC motors These motors are given for head and neck rotation, hip movement, and for the movement of shoulders and elbows. Additionally a localization technique is introduced in Mithra for changing its environment and thereby increasing the human interactions more effectively .the localization technique consists of adc motors and convolution neural networks for image capturing and for prediction of class probabilities.

CONCLUSION

Humanoid robots are always work with many of pros and cons. When we see it in a technical mean, it is a wonderful breakthrough for the entire technology with a lots of future scope, but in case of social mean it give so many new opportunities as well as disappointments. Technically, the most intelligent kingdom is cloned as a robot that give same functionalities that a human can do, which opens a wide opportunities for the developing industries and institutions in the world by increasing the attractiveness of them. 'Mithra' the humanoid robot is a guiding robot with smart and intelligent assisstive system mading by cost effective and efficient manner for the institutional use. Socially it cause unemployment because it can do works as same as a guide and an assistant and it can be used instead of these posts. The developing technology has a vital role for the development of a country. 'Mithra' is not only a guide for the destination we need, she is a guide for the future of technology

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