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Micro-Robot

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Abstract: ***As time goes on, we get new ideas to make a concept as simple as possible. Recent work on development of robotic concepts have been evolved even further, ranging from macro to micro. In today's world Micro robotics are the major trend in most of the fields such as medical, industrial and advancement in scientific research. As smaller the circuits are used, it helps us to create smaller micro robots with high efficiency. The main purpose of this work is to give an overview about the automatic controlling of micro robot and capable of pulling the object more than its own weight, which is inspired by insect behaviour. In order to achieve this, there are many microscale challenges are faced with the fabrication of micro robots such as energy requirements and locomotion method. The improvement in current world of micro robotics is at rapid growth, only a little number of recent ones are chosen to be a neighbourhood of this journal.***
Keywords*: Micro robotics, microscale challenges*

I. INTRODUCTION

The Microscope and the Integrated Circuits are the two major discoveries in 1590 and 1959 which led us the way to world of MICROROBOTICS, one of it gave us the idea about micro scale and the other helped to deal with it. Now a days not only engineers and scientists are working on micro robotics, this also has got the major recognition even by the general public. The robotic concept started its journey from macro, milli and now it is at the stage of micro and Nano scale. By taking power loss into consideration, small things contribute to less power loss which matters for the efficient work, and it has been proved by Miniaturization technology. The micro scale with miniaturization are named as micro robots. Other way of defining micro robot, it exhibits the characteristics of macro scaled robot with the reprogrammable behaviour and is capable of malleability. The micro robots are also the family of robots that handles objects and carry operation within its range as per design. Here falls the restriction on functionality of Micro robots due to their smaller size, in order to withstand this limitation micro robots has to work in large group to affect the environment. The usage of micro and nano technologies in robotics brings down the specified recourses and provides better performance of the robots. The fabrication of micro sensors and micro actuators which gives high efficiency and high stability are the most challenging aspects that are faced during the development of micro robot. Clubbing the technologies like Micro/Nano Electro Mechanical Systems (MEMS, NEMS), nanotechnology and biotechnology by scientists and researchers have made ease at micro robotics, it has been finding its way in more fields of application.

II. BACKGROUND

Grant Wang, Brian Yang, Roberto Calendar, Sergey Levine, Daniel Contreras, and Kristofer Pister —The stride for robotic movement design is a petrifying process which requires high knowledge of engineering. Analytical stride design can be made easy with the data-driven pace development. From this paper, we propose a unique approach to learn about locomotion tasks with saunter robots. Multi-objective locomotion primitives are shown by the data which are collected by the task assigned to the robot. Relaying on concept, performance of the micro robot absolutely evaluated by considering simulated hexapod model. The result substantiate the suggested learning and controller scheme on locomotion chore [1]. Antoni Burguera, Yolanda Gonzalez and Gabriel Oliver- For mobile robot localization sonar sensors have been used in this work. By the utilization of particle filters, this approach is premised. Each particle is tailored with local environment data which is updated during the execution of mission. This work provides an practical characterization of the sonar sensors, which inspired us to use ultrasonic sensor. The sonar uncertainties is defined experimentally consistent by considering the probabilistic measurement model. The quantitative and qualitative experiment provides localization strategies on the sonar with visual inspection [2]. Joseph Azeta1, Christian Bolu1, Daniel Hinvi1 and Abiodun A Abioye1 Department of Mechanical Engineering, Covenant University, Ota, Nigeria- They made a number of successful strives in conspiring robot that avoids obstacle. The divergence in selectivity of sensors, path mapping process leads to the difference in applied algorithms. Here, we take a advantage of cost effective ultrasonic distance sensor for automatic obstacle avoidance. The implementation of the system involves microcontroller Arduino Uno, a Wi-Fi module, an Arduino motor shield driver that have a command over the action of robot via geared dc motors. Under various lighting conditions the system provides better performance.[3].

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III. METHODOLOGY

This is the MICRO-ROBOT based on automatic operation, where the directional-movement of the robot depends on the signals that are received by the ultrasonic sensor, which senses the ultrasonic beams. The Trigger pin of ultrasonic sensor is always made high, and a sonic beam is always transmitted. If any obstacles is found , the signal hits the surface, and return back and captured by the receiver echo pin of ultrasonic sensors .The basic principle of ultrasonic sensor is to make a note of the time taken by sensor to transmit ultrasonic rays and receiving the ultrasonic rays after hitting the surface. The time taken by beam to return back is saved in variable and converted to distance using formula:

Distance = (Time * Speed of Sound in Air (343 m/s))/2.

Here ,we make use of atmega 328 microcontroller SMD version, which triggers with the power supply, the pins of micro controller are initialized with the program .The signals that are received by the Echo pin is read by the microcontroller and this enables input pins of the motor driver to monitor the direction of the microrobotic wheels. Fig 1. Shows the block diagram of the proposed model.

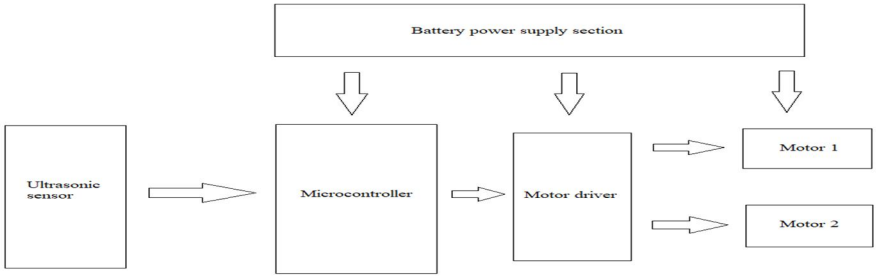


Figure 1: Block diagram of the proposed model.

IV. RESULTS AND DISCUSSION

As a result, Micro robot is designed in a way that they can perform repeat automatic operation and also capable of identifying the obstacles by their own. Ultrasonic sensors made its way in detecting Obstacles. Once the robot senses the obstacles found in front of it, it takes left / right turn automatically according to the program designed. As micro robot characterized by its configured work, this attribute finds wider application in industry such as picking up the loads and places them in desired position.

A single macro robot can be replaced with the group of micro robot which occupies less space but performs same operation as huge robots with same efficiency. “Group work is more effective than single piece work” as inspired by insects (example- Ant). By following this principle the group of micro robot can pull the car. To have a control over the robotic operation we require a behavioural outline of a micro robot. In order to achieve a demand in market, the micro robot become specific to their application hence challenges arrive due to the fabrication of micro scale parameter. To reach the ultimatum, industries are funding their resources in research and development to create fully automated micro robot cell for their high speed and high precision operations. Civilian and military field have their requirements in monitoring application of a micro robots this intern requires a long-lasting power supply which serves us the serious design challenge.

Fig 2. Shows the model of micro robot.

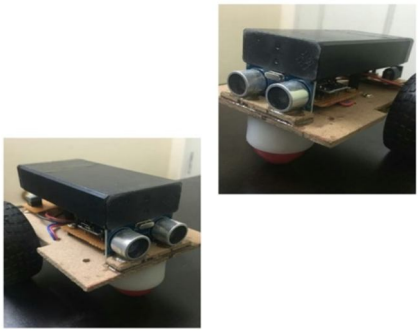


Figure 2: Model of micro robot.

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V. CONCLUSION

Micro robots which have been of great use especially in cases where size is of great matter, as in medical and industrial application. As time passes, the ability to operate with the minimized interference with environment and little size beside other, has provided huge number of advantages to the Micro robot. Micro robots are capable of being applied in a variety of fields because of its mobility on both straight line and turning on smooth surface. The main trump card of our work is that, once the code is loaded there is no need of intervention during operation, hence the robot is self-governed which leads to the establishment of connections between micro robotics and rest of the world.

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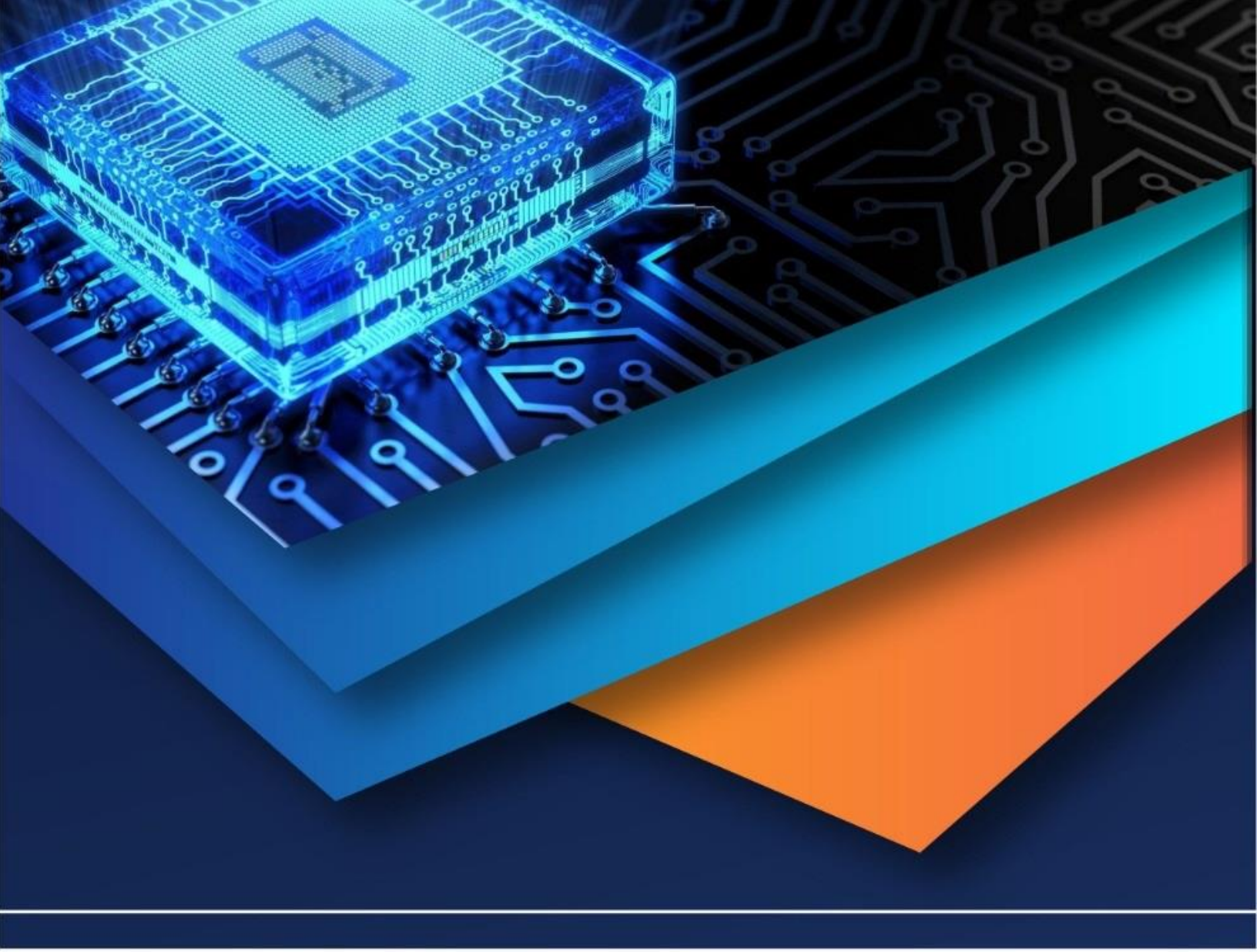
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