

# HEXAPOD

<sup>1</sup>S.Nandhini, <sup>2</sup>Siddharth Singh, <sup>3</sup>Kevin Vaz, <sup>4</sup>Akash, <sup>5</sup>Purushottom Dutta

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, SRM Institute of science and technology, Chennai, India

<sup>2,3,4,5</sup> Student, Department of Computer Science and Engineering, SRM Institute of science and technology, Chennai, India

**Abstract :** *The aim of the paper is to design and construct a hexapod which is a six legged walking robot.*

*The paper consists of the basics about the robot as well as the information about the pros and cons of the device. The output of the project is a well-managed six legged robots which is a multipurpose robot installed with several sensors, resistors etc. The robot is controlled and monitored by a user interface programmed that can be either an application or a simple joystick depending upon the need.*

**Key Words:** Raspberry Pi, Servo motor, Arduino, IR.

## I. INTRODUCTION

Robots are found everywhere the most important part of the bot is its movement, the movement allows the bot accessibility to work in different environment. The legged robots are quite difficult to handle as compared to that of other robots with wheeled chassis but the legged chassis provides an extreme efficiency to the device to work and move in uneven terrain which turns out to be a crucial part. The objective of the project is to create the robot which can be accessed by remote and the data is sent to the connected device. Though there are already hexapods present in the market but they have many disadvantages some of them are like cost, fixed battery set, non-programmable etc. The designed project is extremely cost efficient, programmable

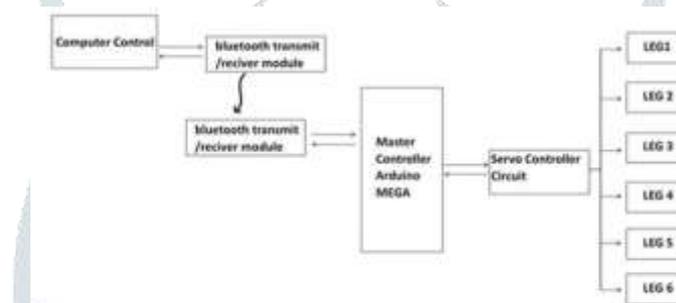


Fig 1: Basic Flow

## II. PROPOSED SYSTEM

The control room of the hexapod is the place where each and every component, including the main processing unit of the hexapod is placed. The hexapod leg control system is also placed in it. The wired connections of all components are passing from this room. A block diagram of the above control room is given below

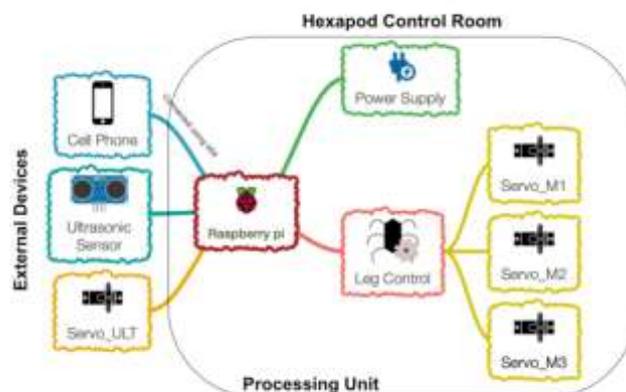


Fig 2: Network Flow

The Power source is kept inside so that both Raspberry Pi as well as Servo motors will get power. The external devices are the ultrasonic sensor and its servo motor which will control its rotation, this servo motor will get power through extended wires from internal power source. The Raspberry pi will be connected to cell phone via Wi-Fi, to control the Hexapod.

**III. BODY CONSTRUCTION**

The constructed project has a six legged body structure with a raspberry pi and Arduino board. The robot uses the Arduino board and raspberry pi to install the os and commands, on top of that the bot is installed with sensors like IR, temperature sensor etc.

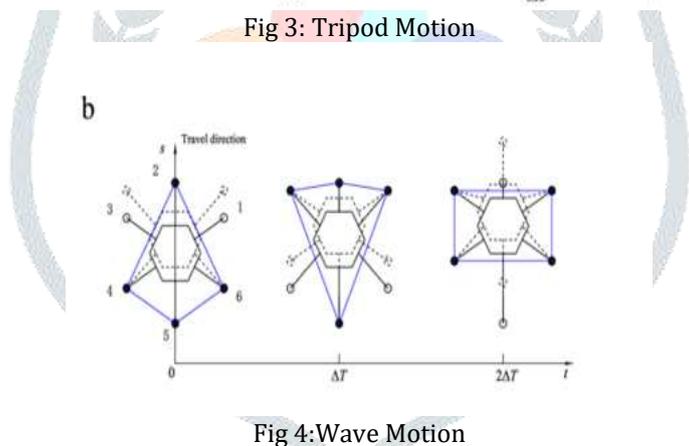
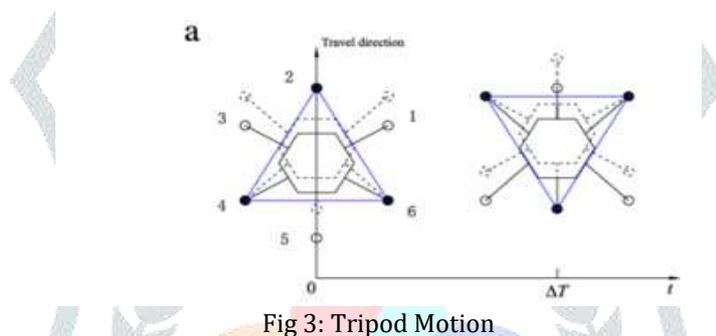
The sensors provided on the robot are controlled and re programmable which gives it an upper hand making the robot reliable. The legs are combined to the main body or joined to the body with the help of hinges that connect the servomotors as well, these motors are used to provide the required torque for the movement of the legs. ach servomotor connected is of similar power as to make the movement synchronised.

**IV. WALKING GAITS**

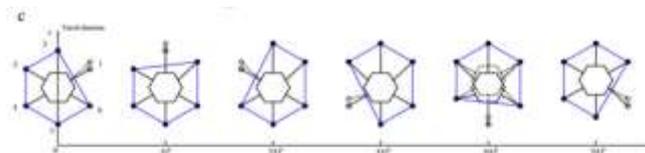
The walking gaits of the bot is achieved by the coordinated movements of the legs with each other. As the robots have more than two legs which makes the movement of the robot much more complicated. There are several gaits for example tripod, ripple, wave.

The first one is tripod it is a simple movement criterion under this one of the legs is lifted and the particular leg moves forward then it halts on ground meanwhile the second pair of leg starts moving, the second pair of leg moves in opposite direction to that of the first one.

The movement provided by the tripod is extremely fast but it has its own flaws, i.e. it's extremely unstable. which makes the device fragile and incompetent in rough environment.



The wave is a method in which only one leg moves at a time and the other legs move only after the first leg has gained its position which is landed on the new position, this makes the device or robot's movement extremely stable but the device becomes very slow.



Ripple movement has got its movement style from insects in this the legs are designed in such a way that each legs perform same operation like forward, backward, upward, downward etc.

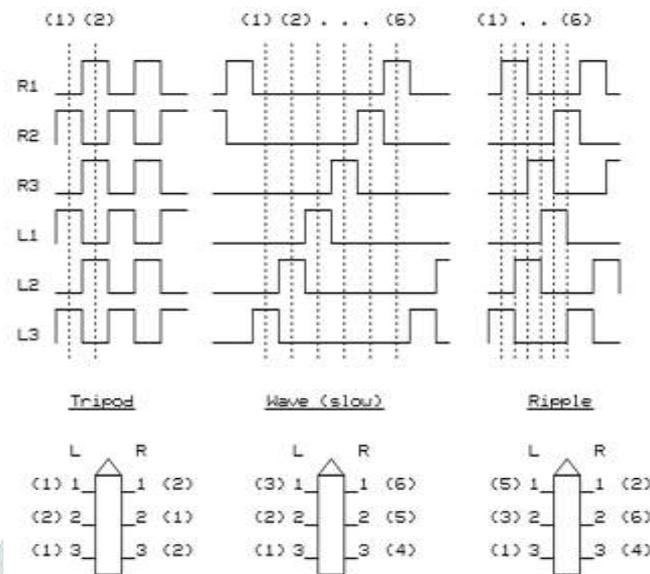


Fig 6: Walking Gaits

#### IV. CONCLUSION

The designed system is an extremely efficient robot provided with efficiency to walk through any sort of surface. As described the system uses Arduino and raspberry pi to work. The model is adjusted in such a way that it can be programmed according to the user's will i.e. the sensors attached to the board can be used as the user need them to be. The robot works with the help of a remote which is extremely useful as it provides with the remote access to the places where humans can't reach. The device is affordable or we can say cost efficient which makes it extremely valuable unlike other available devices which costs hundreds of dollars. The device can also be controlled via mobile phone for example via android device which is another advantage that is added.

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