**Spherical Robot using Pendulum Mechanism**

**PROJECT REPORT**

**Submitted by**

**R. VAISHANTH (16MTR110)**

**V. SANDEEP (16MTR085)**

**V. PRAMOTH VIJAY (16MTR068)**

***In partial fulfilment of the requirements for the award of the degree***

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**DEPARTMENT OF MECHATRONICS ENGINEERING**

**KONGU ENGINEERING COLLEGE**

**PERUNDURAI ERODE-638052**

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**BONAFIDE CERTIFICATE**

This is to certify that the project report entitled **SPHERICAL ROBOT USING PENDULUM MECHANISM** is the bonafide record of project work done by **R.VAISHANTH (16MTR110), V.SANDEEP (16MTR085) AND V.PRAMOTH VIJAY (16MT068)** in partial fulfillment of requirements for the award of the Degree of Bachelo ofEngineering in **KONGU ENGINEERING COLLEGE** of Anna university Chennai during the year 2013-2014.

SUPERVISOR HEAD OF THE DEPARTMENT

**Dr. K. Krishnamurthy Ph.D.,** **Dr.R.Parameshwaran M.E., Ph.D.,**

Professor Professor and Head,

Mechatronics Engineering, Mechatronics Engineering,

Kongu Engineering College, Kongu Engineering College,

Perundurai - 638060. Perundurai – 638060.

Submitted for the end semester viva voce examination held on**\_\_\_\_\_\_\_\_\_\_\_\_**

**INTERNAL EXAMINER** **EXTERNAL EXAMINER**

**DECLARATION**

We affirm that the project report titled spherical robot using pendulum being submitted in partial fulfillment of the requirement for the award of bachelor of engineering is the original work carried out by us. It has not formed part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

**Date:**

**R.VAISHANTH (16MTR110)**

**V. SANDEEP (16MTR085)**

**V.PRAMOTH VIJAY (16MTR068)**

I certify that the declaration made by the above candidates is true to the best of my knowledge.

**Date:** Name and signature of the supervisor with seal

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**ABSTRACT**

Spherical robots have a unique approach to achieve locomotion. It sets a different design paradigm compared to conventional or track wheeled robots. Unlike other conventional robots it does not rely on wheels for its motion. Thus, eliminating all the major constraints that the wheels pose to robot motion. There has been increasing demand for mobile robots for varied application ranging from surveillance to security measures. But a factor limiting its capabilities is the use of wheels. It might not be a hindrance in normal environment conditions but a typical usage scenario is in rough terrain where human accessibility is impossible. This is where convention robots start struggling to maneuver through the environment.

The main objective of this project to design a robot to traverse through rough and undulating terrain which is rather difficult to achieve using wheels. The spherical robot typically has an external spherical shell that acts as an enclosure to the inner drive mechanism, for active steering and motion control. Locomotion is achieved by rolling of the spherical shell. The purpose of the Inner Drive Unit (IDU) is to shift the Center Of Mass (COM) of the robot in the desired direction in which motion is required. Thus, creating the rolling motion of the shell in the specified direction. A 3D model was designed using SOLIDWORKS software, bearing all the dimensional constraints according to the available facilities. The robots’ parts where modeled according to the dimensions of the mechanical and electrical components used. All the inner robot parts are symmetrically distributed inside the shell, thus eliminating unbalanced oscillation. Finally, the parts where 3D printed using ABS (Acrylonitrile butadiene styrene) material.

This robot finds its applications in wide range of fields. Its versatile capability of traversing through rough terrain allows it to have an upper hand over conventional robots. Its immense use is in the field of surveillance and planetary exploration mission. The same concept can be implemented for varied sized robots according to the application specificity.

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**LIST OF ABBREVIATIONS**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **ABBREVATION** | **SYMBOL** |
| 1 | Inside Driver Unit | IDU |
| 2 | In-pipe Inspection Robots | IPIR |
| 3 | Non-destructive Testing | NDT |
| 4 | Inertial Measurement Unit  Sensor | IMU sensor |
| 5 | General Purpose  Input/Output | GPIO |
| 6 | Universal Serial Bus | USB |
| 7 | Secure Digital Card | SD card |
| 8 | Digital Motion Processor | DMP |
| 9 | Pulse With Modulation | PWM |
| 10 | Centre Of Mass | COM |
|  |  |  |

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