

# Omniwheeled Robot Controlled By Zigbee

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**Abstract:** This Paper is designed and implemented for goal of this design is to build an easy to assemble omni-wheeled robot which allows translational movement along any desired path can be combined with a rotation, so that the robot arrives to its destination at the correct angle. The robotics project incorporates the Zigbee communication protocol to control the Robotic module. Zigbee communication provide the another dimension to Robotic control, mainly applied to manure the robot in remote areas, where the security of human is risky. The project has wide application in security area. The higher version of the robot may be used in areas where the direct human approach is impossible.

## I. INTRODUCTION

The invention of the wheel literally revolutionized the history of man. Thanks to it, it was possible to create forms of transportation, invent new industrial and architectural machinery. The wheel is so perfect that no one would think to improve it but recently some special, revolutionary wheels have been invented. These wheels are called "omnidirectional" and essentially consist of a set of normal wheels assembled in such a way as to allow new kind of movements. With omnidirectional wheels is possible to create moving platforms with only three or four wheels, with evident savings respect to the version seen before. However, using wheels of this kind you lose the ability to exploit full motor torque and, in the case of rough surfaces, these are unable to guarantee an exact forward direction. Omnidirectional wheels can be used to create simple four wheels platforms and small robots. A platform employing three omni wheels in a triangular configuration is generally called Kiwi Drive.

They are often used in small autonomous robots in intelligent robots research in the academia. Omni-directional wheels are unique as they are able to roll freely in four directions. It can either roll like a normal wheel or roll laterally using the wheels along its circumference. Omni-direction wheels allow a robot to convert from a non-Holonomic to a Holonomic robot. A non-Holonomic robot that uses normal wheels has only 2 out of 3 controllable degrees-of-freedom which are, moving forward, backwards and rotation. Not being able to move sideways makes a robot slower and less efficient in reaching its given goal. The Holonomic omni-directional wheels are able to overcome this problem, as it is highly maneuverable. Unlike normal non-Holonomic robot, the Holonomic omni-directional robot can move in an arbitrary direction continuously without changing the direction of the wheels. It can move back and forth, sideways and rotates at the same position.

## II. OMNI-WHEELS

Omni wheels or poly wheels, similar to Mecanum wheels, are wheels with small discs around the circumference which are perpendicular to the turning direction. The effect is that the wheel can be driven with full force, but will also slide laterally with great ease. These wheels are often employed in holonomic drive systems. Omniwheels combined with conventional wheels provide interesting performance properties, such as on a six-wheeled vehicle employing two conventional wheels on a center axle and four omniwheels on front and rear axles. Omni-Directional wheels roll forward like normal wheels, but slide sideways with almost no friction no skidding during turns. Use these wheels to make your robot turn smoothly or build a holonomic drivetrain. These Omni-Directional wheels were designed from the ground up to give the smoothest ride possible. Our construction method, using a dual roller design, allows for a constant contact patch with a narrow profile. Each roller is tailored for the individual wheel diameter, and provides the correct, constant radius. We don't share rollers between wheel types -- these wheels aren't "almost round" they're actually round. This smooth-ride provides higher efficiency and reduces wasted power. This allows for easy removal and replacement of sprockets without disassembling the entire wheel. No more worrying about your whole wheel falling apart just because you wanted to remove the sprocket.



Figure1. Basic omniwheel

These robots are for the serious robot enthusiasts. The robots can house a variety of wheels, motors and frames. The motors can be regular size or super-sized for heavy duty applications. We offer many ways to support the axles/wheels with the chassis, refer to the table below. SuperDorid

robots designs and fabricates its robot kits here in We use our CNC Cutting table to cut the aluminum chassis and then hand weld the kits to your specifications.

**III. ZIGBEE**

When we hold the TV remote and wish to use it we have to necessarily point our control at the device. This one-way, line-of-sight, short-range communication uses infrared (IR) sensors to enable communication and control and it is possible to operate the TV remotely only with its control unit.

Add other home theatre modules, an air- conditioner and remotely enabled fans and lights to our room, and we become a juggler who has to handle not only these remotes, but also more numbers that will accompany other home appliances we are likely to use. Some remotes do serve to control more than one device after ‘memorizing’ access codes, but this interoperability is restricted to LOS, that too only for a set of related equipment, like the different units of a home entertainment system

Now picture a home with entertainment units, security systems including fire alarm, smoke detector and burglar alarm, air-conditioners and kitchen appliances all within whispering dis tance from each other and imagine a single unit that talks withall the devices, no longer depending on line-of-sight, and traffic no longer being one-way. ZigBee is an established set of specifications for wireless personal area networking (WPAN), i.e., digital radio connections between computers and related devices. This kind of network eliminates use of physical data buses like USB and Ethernet cables. The devices could include telephones, hand-held digital assistants, sensors and controls located within a few meters of each other.

**IV. Sharp GP2 Sensor**

Designed to use in variety of Applications areas Computer, OA 4equipment, Telecommunication Equipment Terminal, Measuring equipment, Measuring distance range Min 4 to Max 30 cm

Tooling machines, Home appliance etc.

Operating supply voltage 4.5 to 5.5 V

Operating temperature -10 to +60 C

**Hardware Implementation**

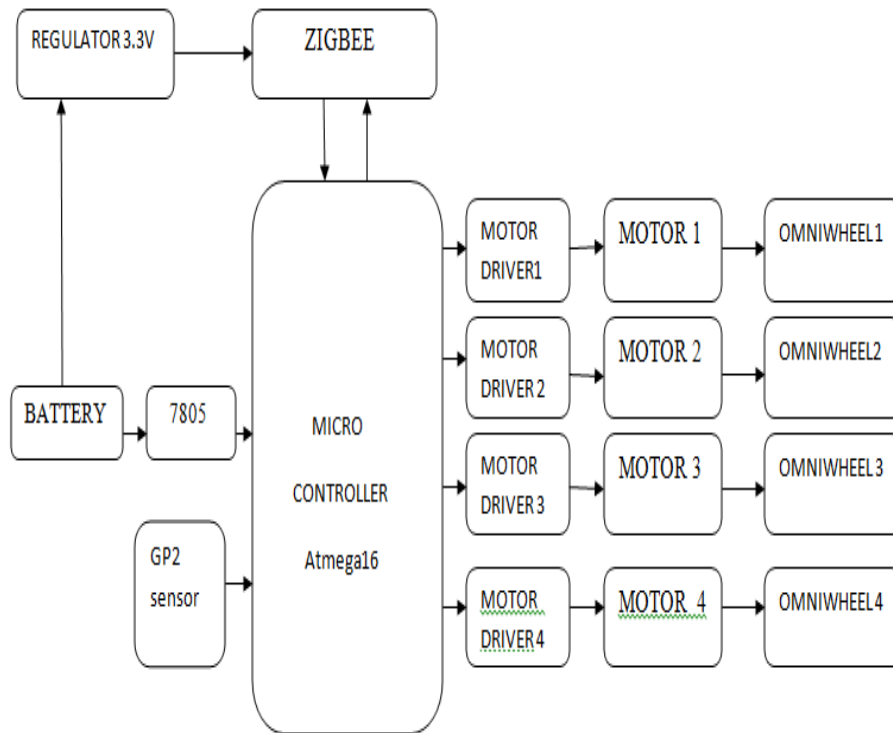


Fig.Block Diagram

## V. Battery

A lithium polymer battery, or more correctly lithium-ion polymer battery (abbreviated variously as LiPo, LIP, Li-poly and others), is a rechargeable battery of lithium-ion technology in a pouch format. Unlike cylindrical and prismatic cells, LiPos come in a soft package or pouch, which makes them lighter but also lack rigidity.

To prevent the electrodes from touching each other directly, a microporous separator is in between which allows only the ions and not the electrode particles to migrate from one side to the other. the voltage of a LiPo cell depends on its chemistry and varies from about 2.7-3.0 V (discharged) to about 4.20-4.35 V (fully charged), for cells based on lithium-metal-oxides (such as  $\text{LiCoO}_2$ ), and around 1.8-2.0 V discharged to 3.6-3.8 V charged for those based on lithium-iron-phosphate ( $\text{LiFePO}_4$ ). The exact voltage ratings should be specified in product data sheets, with the understanding that the cells should be protected by an electronic circuit that won't allow them to overcharge nor over-discharge under use.

## VI. Microcontroller(Atmega16)

High-performance, Low-power AVR® 8-bit Microcontroller . Advanced RISC Architecture – 131 Powerful Instructions 131 Powerful Instructions – Most Single Most Single-clock Cycle Execution clock Cycle Execution – 32 x 8 General Purpose Working Registers – Fully Static Operation – Up to 16 MIPS Throughput at 16 MHz – On-chip 2-cycle Multiplier . High Endurance Non-volatile Memory segments – 16K Bytes of In-System Self-programmable Flash program memory – 512 Bytes EEPROM – 1K Byte Internal SRAM – Write/Erase Cycles: 10,000 Flash/100,000 EEPROM – Data retention: 20 years at 85°C/100 years at 25°C(1) – Optional Boot Code Section with Independent Lock Bits In-System Programming by On-chip Boot Program True Read-While-Write Operation – Programming Lock for Software Security.

## VII. DC Motors

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

### Result



**Conclusion:**

- This paper presents the real time control of a four-wheel omni directional mobile robot using zigbee.
- This paper is successfully completed by Omni-wheeled robot controlled by zigbee.

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