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Manifold Robotic Lamps With An Automatic Illumination System

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Abstract

The robotic lamp system named as scout robot is designed to serve both as a fully sensitized autonomous miniaturized robot for exploration in unstructured environments and as a module of larger robotic organism. The robotic lamp is designed using light and compact spherical parallel mechanisms. It can rotate at 360 degree angles and provides 3 degree of freedom motion for tracking the human body. This robot tracks the position of one person inside a room with aid of a Passive Infrared sensor (PIR).The sensor can distinguish humans from objects because it gauges the temperature change of the human body. In this paper, when the LCD projector is turned ON at the time robotic lamp is turned OFF and light intensity can be controlled automatically. It analyzes the specific object and cover larger distance.

Index Terms: PIR sensor, projector switch, robotic lamp.

I.INTRODUCTION

This project is designed with light and compact spherical parallel mechanism which has a tilting motion, zoom-in and zoom-out motion. These two motions are improve the robotic lamp performance. The zoom motion is changed continuously according to the distance between robotic lamp and a person .The design of spherical parallel mechanism is prototype of a camera orienting mechanism. It has been developed to pan and tilt a camera with comparable characteristics a human eye because of it is hemisphere. It is note that the hemisphere part and motors are located inside the ceilings and only the lamp module is exposed out of the ceiling. Therefore this 3 DOF robotic lamp is well suited for ceiling installation.

A ubiquitous sensors installed at environment are used to detect the location of the human body. The kinematic model of this device is derived and the proto type has been developed. A test room equipped with PIR sensors, one robotic lamp is developed. The performance of this device is verified through simulation result. By adapting a counterbalancing design, the robotic lamp can control the heavy lamp with less input power. Whenever a person enters the scanning area, we assign a number in order to track the person, and the robotic lamps have different priorities.

A ceiling-mounted 3-DOF robotic lamp to realize an automatic lighting system using multiple robotic lamps and a laser scanner; it is unsuitable for this project. However, even though a PIR sensor has a data accurately and quickly and it has in distinguishing humans from objects. A PIR sensor is used for tracking a human body and a lamp can be illuminated light. It can cover distance up to 6 meters. The robotic lamp is compact and does not require large space for installation. The person tracked specifically at long distance. The light intensity is easily control from robot lamp. It can analyze the specific object and cover the large distance.

In this work will involve using multiple sensors to resolve the blind spot problem and using more sophisticated estimation algorithms to enhance the success rate. The main drawback of the existing system is laser scanner that affected the human. But in this system we totally avoided the laser we replace the laser scanner then fix the PIR(Passive Infrared) sensor to identify the human interfacing. That PIR sensors to identify the human interfacing in his region by using the human body temperature. So the human body affecting elements are to low this system. Then this system can activated and fixed all seminar halls if any projector is switched on then all the lights is to be switched off condition.

II. VERTICAL AND HORIZONTAL MECHANISM

A mechanism is proposed by which net horizontal transport can be induced in an organism which migrates vertically in a purely oscillatory, vertically sheared tidal current. The mechanism contains two elements. First, for all reasonable tidal current profiles, net horizontal transport is induced in any organism which migrates vertically with a period which is an exact multiple of the tidal period. (This is the basis for the widely known process of selective tidal stream transport where the migration period and the tidal period are exactly equal.) The second element in the new mechanism is the observation that dial migration, the most common form of vertical migration, has a period of 24 h and is therefore an exact multiple of the principal solar semi-diurnal tidal constituent (S2) which has a period of 12 h. This relation between the S2 and dial migration periods stems from the fact that both phenomena are independently locked to the solar cycle.

The present invention provides a steerable vertical to horizontal energy transducer for mobile robots that less complex and requires less power than two degree of freedom tilt mechanisms. The present invention comprises an end effectors that, when mounted with a hopping actuator, translates along axis (typically vertical) actuation into combined vertical and horizontal motion. The end effectors, or foot

mounts with an end of the actuator that moves toward the support surface (typically a floor or the earth).

The foot is shaped so that the first contact with the support surface is off the axis of the actuator. Off-axis contact with the support surface generates an on-axis force (typically resulting in vertical motion) and a moment orthogonal to the axis. The moment initiates a horizontal tumbling motion, and tilts the actuator so that its axis is oriented with a horizontal component and continued actuation generates both vertical and horizontal force.

The spherical parallel mechanism presents the design and prototype of a camera-orienting mechanism. Bio inspired actuators and mechanisms have been developed to pan and tilt a camera with comparable characteristics as a human eye.

III.PIR DETECTION SYSTEM

The operation principle of PIR sensor is to detect the thermal variation in its detection region. The horizontal axis is time stamps and vertical axis is the voltage response from the PIR sensor. Fig.3 demonstrates testing results of human movements under the PIR sensor detection area. The output signal is in disorder for human movement detection. Fig.3(a)-(c) shows different testing speeds of a human passing through the PIR detection region.

That PIR sensors to identify the human interfacing in his region by using the human body temperature. So the human body affecting elements are to low this system. Then this system can activated and fixed all seminar halls if any projector is switched on then all the lights is to be switched off condition. The term *passive* in this instance refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work entirely by detecting the energy given off by other objects.PIR sensors don't detect or measure "heat"; instead they detect the infrared radiation emitted or reflected from an object.

In addition, if three people are in the scanning area and then a new person steps into that area, the multiple robotic lamps do not illuminate the new person. That is, the multiple robotic lamps continuously track and illuminate the first three people in the scanning area. Whenever a person enters the scanning area, we assign a number in order to track the person, and the robotic lamps have different priorities. When more than two people are in the area, a robotic lamp that has the first priority is assigned to the first entered person. The assignment process depends on the priorities of the robotic lamp and the assigned number of the people. If one person leaves the area, the assigned lamp stops tracking and waits or find a person who has the lowest number and does not have an assigned robotic lamp.

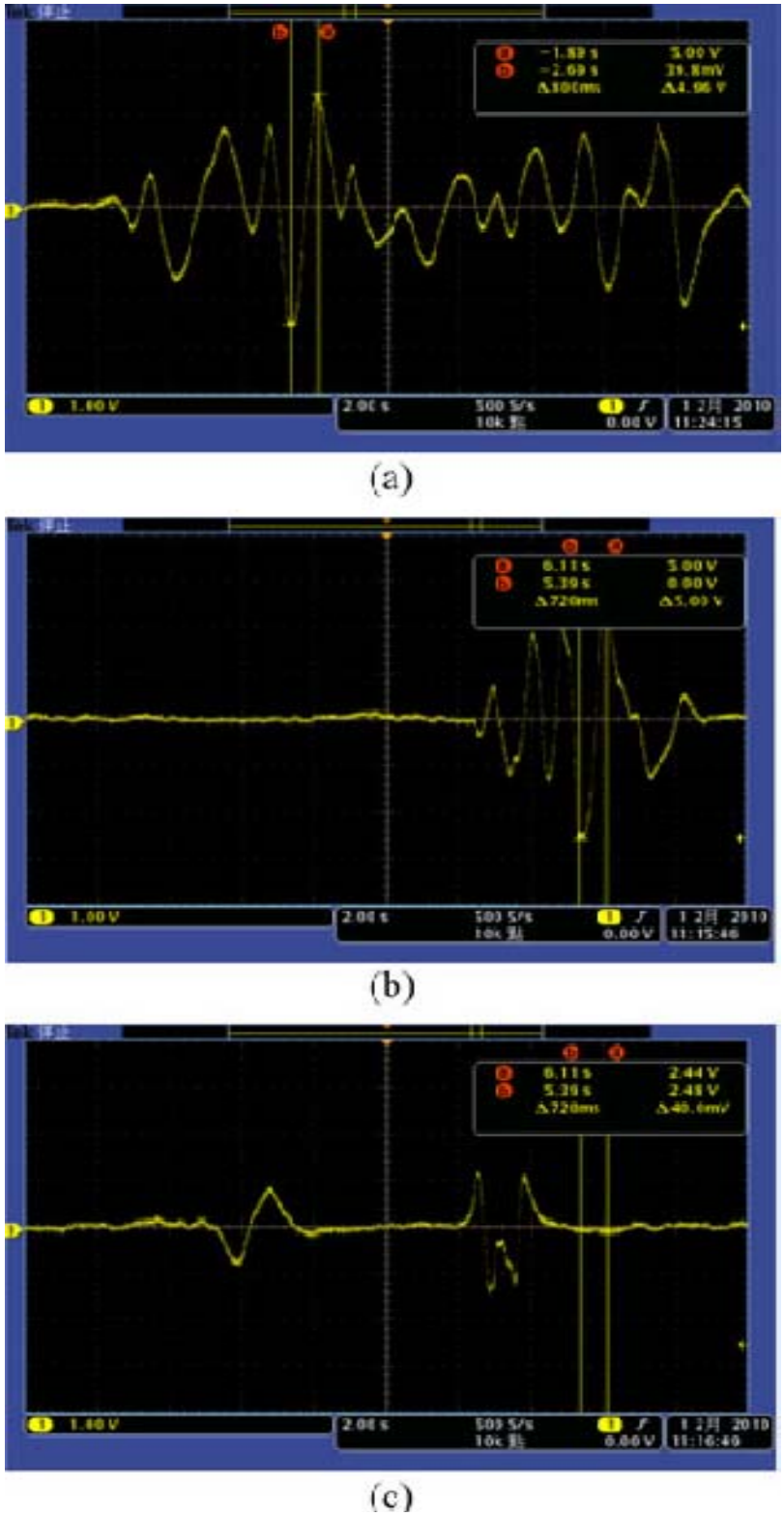

Fig.1 Human movement testing result. (a) Slow walk (b) Faster walk (c) Run.

IV.AUTOMATIC ILLUMINATION SYSTEM

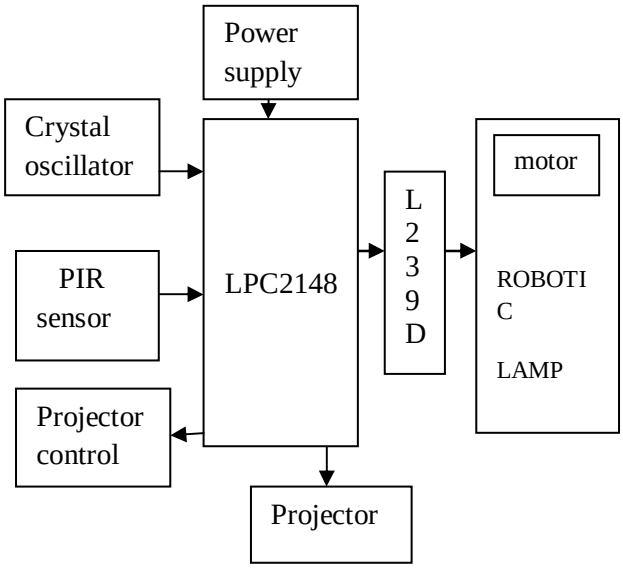

Fig.2 Block Diagram

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is given to the microcontroller for any process. Any digital processor needs a clock. On every clock cycle ARM controller will do something. Faster the clock, the more things processor will do.

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.LPC2148 microprocessor receives the PIR output and projector switch and processes require operation. The projector is directly controlled by projector switch and control. These switch and control are connected to microprocessor because of when projector is turned ON at a time robotic lamp is turned OFF.

DC motors are widely used in robotics because of their small size and high energy output. They are excellent for powering the robot lamp as well as powering other mechanical assemblies. The DC motor is interfaced with processor lpc2148 using IC L293D (quadruple half H-Bridge driver). It is used to avoid the problem of back emf and one L293D can drive two DC motors at a time.

V.SIMULATIONRESULT

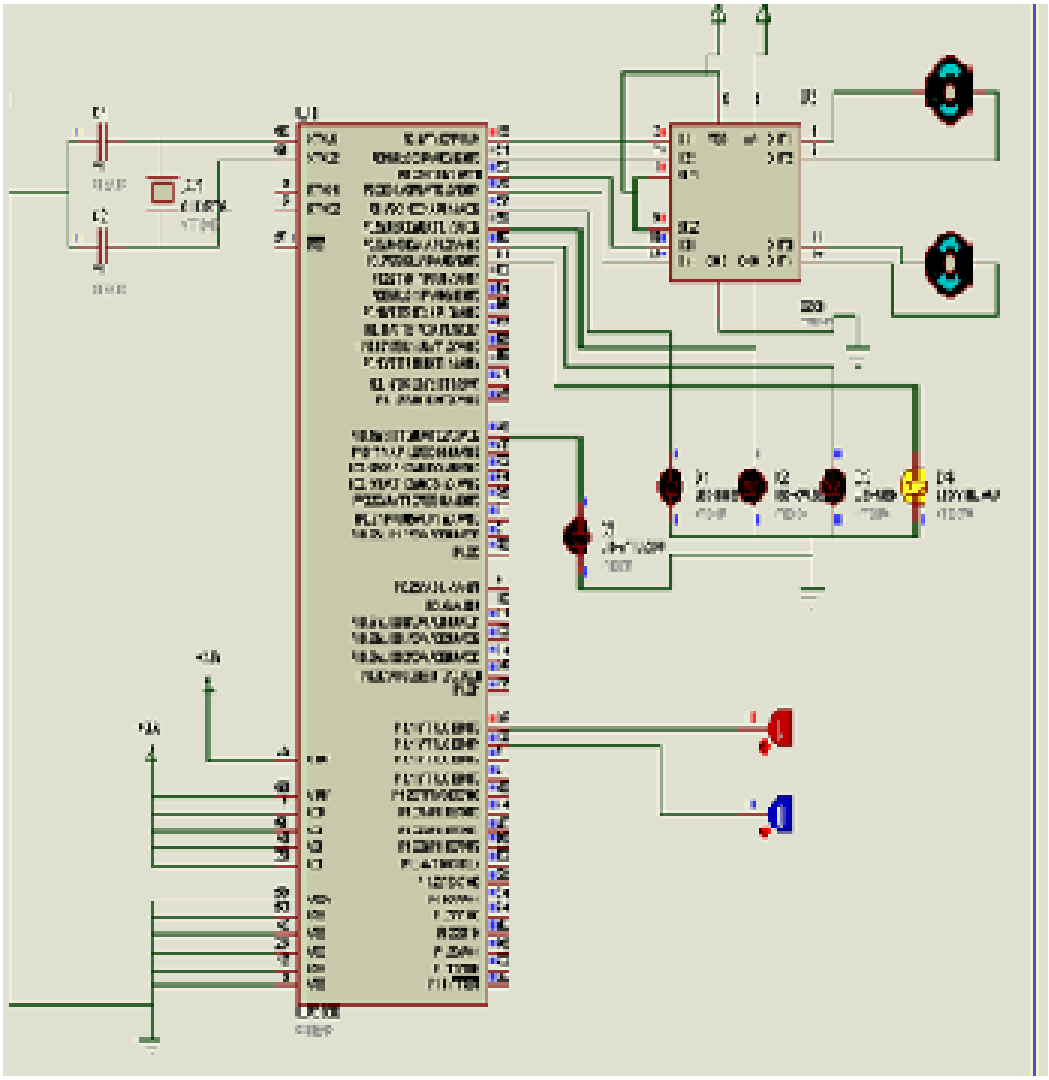

Fig.3 Simulation result

VI.CONCLUSION AND FUTURE WORK

An autonomous lighting system using multiple robotic lamps was designed to track and illuminate people independently in software. A robotic lamp with three DOFs creates the tilting motion for tracking and lighting people and the zoom-in and zoom-out motions control the intensity of the light. Indoor human and robot monitoring are important for providing services to people. The PIR monitoring system used in this project has shortcomings, where multiple targets identification is required and the RF localization system is notorious for its imprecision. Future work will involve using multiple sensors to resolve the blind spot problem and using more sophisticated estimation algorithms to enhance the success rate.

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