Multi-Purpose Robot

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Abstract: Today robotics is no longer limited to laboratory experiments; they have found their way into our homes. Being a physical entity itself, several design ideas have been explored and are presented in an attempt to maximize the user awareness of the robot’s interaction with the environment. In this system the advanced monitoring of the home is done. This is handled by the bluetooth controller software Apps and we are using bluetooth module for the purposed of the interfacing of android Mobile and system. In this system uses sensor which is used to detect gas leakage. We can detect thief or unwanted person who is enter in home when owner is not present at home. In the sense it will helps to monitor the home and capture the image of unwanted activities happened in home when owner is not present at home. The advantage of this system is that we can monitor, pick-n-place object and also alert owner when gas leakage detected via sms.

In this system we are using two microcontroller i.e. AVR microcontroller and 8051 microcontroller the main purpose of AVR microcontroller is to interface with the sensor so we can monitor gas leakage, motion and if it is happened the system automatically send massage to owner number with which fault occur in home. The 8051 microcontroller is used for movement of system. This system is basically doing all operations of maid like cleaning or the dust cleaning home as well as pick up the material that present at here and there and put it on the proper place. As well as it keeps eyes on the home as in the security mode, like gas is detected or there is any thief in the home.

This system will operate on the Bluetooth that functions in the android mobile, there is application available in the mobile which will communicate with system and then will operate the function user wants like forward, reverse, left, right, cleaning, grip, leave and stop.

1. Introduction

The word “Robot” is one of those volatile terms that have defied unique definition. One reason for this is that its use changes all the time. Initially, a robot was a humanoid or human-like being. The word “Robot” was derived from the Czech word meaning slave labor and was coined by Kapec in his play, Rossum’s Universal Robots in 1921. These robots were biochemical – what we would now call androids. This was followed soon after by a number of films featuring robots such as Fritz Langes 1922 Metropolis that excited the imagination of both the public and the science and engineering communities. Science fiction books such as Asimov’s I Robot, from where we got the term robotics, were also popular at this time.
Robots brings together several very different engineering areas and skills. You need electronics to power the motors and connect the sensors to the controllers. At last you need the software to understand the sensors and drive the robot around. Throughout history, robotics has been often seen to mimic human behavior, and often manage tasks in a similar fashion.

The practical applications of robots drive development of robotics and drive advancements in other sciences in turn. Crafters and researchers in robotics study more than just robotics. The promise of robotics is easy to describe but hard for the mind to grasp. Robots hold the promise of moving and transforming materials with the same elan and ease as a computer program transforms data.

The robot is a machine, which is controlled by a mobile phone, after receiving a signal from mobile the robot will work. In this project we can control the robot directions like forward, backward, left and right by using bluetooth controller which is in mobile. The components of this Multipurpose robot are the Atmega 328, 8051 microcontroller, GSM module, PIR Sensor, LPG sensor(MQ2), camera, LCD display, motor driver.

Now, the project will also compare and contrast all the systems and look at their various features and disadvantages. A wide range of options are available for the robotics systems. All of these will be examined at length.

2. Literature Review

Robots are physical agents that perform tasks by manipulating the physical world. They are equipped with sensors to perceive their environment and effectors to assert physical forces on it (covered in more detail in next section). As mentioned before Robots can be put into three main categories: manipulators, mobile robots and humanoid robots.

Robotics is diverse area of study with applications in numerous fields and aspects of society. It is the combination of three field i.e. electrical engineering, computer engineering, electronics engineering. Basically robotics and embedded system are similar to each other for example both are modified with small effort and both are used as real time system.

Robotics is basically used in various field i.e. military applications to defusing bombs, mines and exploring shipwrecks.

2.1 History

Literature survey is the most important step in software and hardware development tool. Before developing the tool it is necessary to determine the time factor, economy. Once these things are satisfied, then next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system.

Robotics is based on two enabling technologies: Tele-manipulators and the ability of numerical control of machines. Tele-manipulators are remotely controlled machines which usually consist of an arm and a gripper. The movements of arm and gripper follow the instructions the human gives through his control device. First tele-manipulators have been used to deal with radioactive material. Numeric control allows controlling machines very precisely in relation to a given coordinate system. It was first used in 1952 at the MIT and lead to the first programming language for machines (called APT: Automatic Programmed Tools).The combination of both of these techniques lead to the first programmable tele-manipulator. The first industrial robot using these principles was installed in 1961. These are the robots one knows from industrial facilities like car construction plants.

The development of mobile robots was driven by the desire to automate transportation in production processes and autonomous transport systems. The former lead to driver-less transport systems used on factory floors to move objects to different points in the production process in the late seventies. New forms of mobile robots have been constructed lately like insect id robots with many legs modelled after examples; nature gave us or autonomous robots for underwater usage. Since a few years wheel-driven robots are commercially marketed and used for services like “Get and Bring” (for example in hospitals). Humanoid robots are being developed since 1975 when Wabot-I was presented in Japan. The current Wabot-III already has some minor cognitive capabilities. Another humanoid robot is “Cog”, developed in the MIT-AI-Lab since 1994. Honda’s humanoid robot became well known in the public when presented 1 Back in 1999. Although it is remote controlled by humans it can walk autonomously (on the floor and stairs).This section will focus on the creation of new devices and their usability.

Other things to keep in mind are where and why a system will be used. Since the systems in this area of robotics are intended to assist human counterparts, high throughput of the robotic system alone may actually be detrimental, as the user’s ability to process input from the system will not be able to keep up. A clear consensus has emerged in this area, that noting the goal of the system before designing and evaluating it is perhaps the most important step in the evaluation process. Interacting with robots as
an assistive tool is only one part of the interaction that takes place between humans and robots. The next section will discuss varying levels of interaction between humans and robotic systems. Wireless controlled robots had been extensively used in a lot of areas like unmanned rescue missions, military usage for unmanned combat and many others. Drawback of such system is as discuss below

- Working range, and limited control.
- The wireless unmanned robots typically make use of RF circuits for maneuver and control.

• Multipurpose Robot for Patients and Military Applications

Multipurpose Robot as the name indicates is a multi-task performing device. With the improvements of new technologies in communication and high performance systems we have implemented faster and smarter robots using new robot control devices, new drivers and advanced control algorithms. The main feature of this project is to control the robot with voice recognition technique. This Robot can perform several operations like picking a remote item, taking photo of remote place, detecting the presence of temperature, humidity, light, gas leakage, fire and sending the observations in form of a message to the controller.

The main principle behind operation of our robot is based on RF transmission and receiving. With the help of voice recognition module in controller section, our instruction signals (Example: Move left, right, forward, backward, pick, place) given by the user is converted to actions performed by robot. The things are run by using Xbee technology. The various sensors in robotic section detects presence of temperature, humidity, light, gas leakage, fire and sends the observations which are displayed in the LCD screen. The values of measured temperature and humidity are displayed on screen. [1]

• Multidimensional Aspects of Human-System Interactions

This paper present the ACCOMPANY project, a pan-European project which focuses on home companion Technologies. The projects aims to progress beyond the state of the art in multiple areas such as empathic and social human robot interaction, robot learning and memory visualization, monitoring persons and chores at home, and technological integration of these multiple approaches on an existing robotic platform and in the context of a smart-home environment utilizing a multitude of sensor arrays. The resulting prototype from integrating these developments undergoes multiple formative cycles and a summative evaluation cycle towards identifying acceptable behaviors and roles for the robot for example role as a butler or a trainer. Furthermore, the evaluation activities will use an evaluation grid in order to assess achievement of the identified user requirements, formulated in form of distinct scenarios.

• Wireless Multi Axis ROBOT for Multi-Purpose Operations

The wireless communication technologies are rapidly spreading too many new areas, including the automation and the importance of the use of wireless technologies in the data acquisition, building control, monitoring systems and automation of manufacturing processes will grow. Intelligent modern robots and cooperative multi-agent robotic systems can be very efficient tools to speed up search and research operations in remote areas. Robots are also useful to do jobs in areas and in situations that are hazardous for human. The main aim is to build a robot communication to detect Live human beings, who need help and the robot can controlled by PC through Zigbee protocol.

The detected information can pass through Zigbee to server point and also give one siren/buzzer. To detect the Live humans, those who are affected by natural disasters like Earth quakes and need help can be identified by using this ‘WIRELESS MULTI AXIS ROBOT’ which can also serves as a Fire Identification robot.

• Assistive technology design and development for acceptable robotics companions for ageing years

Project developments are guided by incorporating user-centred design through formative evaluation to formulate requirements and summative evaluation to assess requirements’ achievements. Furthermore, ethical aspects of utilizing artificial care companions at home are considered during the project. The development of service robotics has so far been mainly driven by technological developments. It has remained close to the mainstream market offering services within the reach of technological developments and within the constraints of safety and affordability. This is understandable from a commercial point of view but it has not been sufficient to generate service robots that can be effective in the domain of elderly care.

3. System development

3.1 Propose System:
3.1.1 Block diagram of purpose system

The main objective of this project is security, monitoring and pick n place. There is a controller used to do the all operations. Bluetooth module is connected over there which done the communication between the mobile to the robot. However the command is passed over the mobile to the robot the controller will decode the commands and related with the code is uploaded in the controller operation will performed. It will gives the data to the display to acknowledge the operation that signal is received by robot is yes or no. as well as the signal is given to the relay’s and the relay driver. It will performs the operation like the robot forward, reverse, left or right, as well as the pick n place operation, dust cleaning etc.

Working of System
- System Flow Chart:

3.1.2 Flow chart of purpose system

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5. References