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Android Mobile Phone Controlled Wi-Fi Robot

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Abstract

This proposed system presents the mechanism of controlling a surveillance robot using android mobile devices through Bluetooth. User gives commands to the robot from his android device. The android mobile communicates with robot via local bluetooth network. Here we can also get the video streaming from the robot through wifi network. the robot is equipped with temperature sensor, light sensor and smoke sensors to measure the abnormal conditions of particular industry. Overall system consists of a local Bluetooth and Wi-Fi network, Raspberry pi android mobile device, sensors and a robot.

I. INTRODUCTION

Robots have been with us for less than 50 years but the idea of inanimate creations represents a sincere bid whose success is much older. But real robots did not come into existence until 1950s and 60s. With the growing invention of transistors and integrated circuits, computer industry added brains to the brawn of already existing machines. In 1959, researchers illustrated the possibility of robotic manufacturing when they unveiled a computer-controlled milling machine. Bluetooth technology was created by telecom vendor Ericsson in 1994.

Android is an operating system made by Google that is open-source. With such feature, Android grows rapidly since people can develop their own applications without the burden of certain regulations. Many application developers have contributed to create applications that run on this operating system. There is one who focuses on creating the application of game, one who focuses on creating the application of social media.Usually a smart-phone is equipped with several sensors, such as accelerometer sensor. The accelerometer sensor is a sensor that can measure the acceleration due to gravity and vibration [1]. In android, this sensor is used to adjust the landscape or vertical position changes on the smartphone screen and set the hand movements as a tool for gaming consoles. On the other hand robot technology is developing rapidly, not only in software but also the hardware. Currently, it has already been developed a robot that can move flexibly, known as Omni-directional robot. The robot can move left and right and can be rotated on the axis point [2]. Based on the exposure and some research which have been done previously, this research developed a system to control robot motion, in accordance with the tilt of accelerometer sensor for android smart-phone. In other words, the smart-phones will be used as a remote control for robot movement.

II. METHOD

The control of robot movement which is developed in this study is the control of motion direction of the robot. They are forward, backward, right and left motion. As in Figure 1, when any change occurs, the axis in the accelerometer will be sent to robot via Wi-

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Fi, then, the robot will move according to the changes of the value, and the axis is accepted.

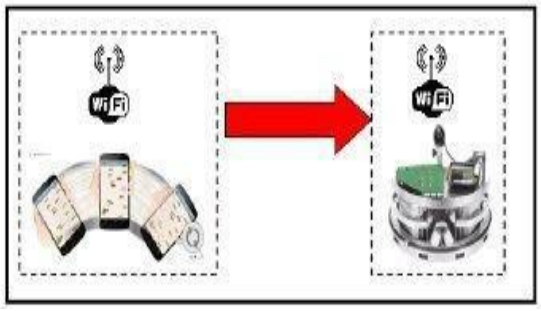

Fig 1.Concept of System

To be able to send information of the axis changes, there must first be established the connection between the smartphones and the robotino via Wi-Fi. As in Figure 2, an application running on a network, when it will send the data to a device or another process using the TCP protocol, must use a socket, so that the transmitted data can be received by the TCP. Then, next is the task of TCP Controlled by the operating system to be able to deliver the data being sent to the TCP on the other device or process. Each process which is associated with TCP will have the IP address and port.

A. Movement Direction Change Control

When the smart-phones and robot have already connected, then, these two devices are able to transmit data. The data sent is the data of the axis changes on the smart-phone which is detected by the accelerometer sensor. As in Figure 2, the x-axis is the horizontal position of the smart-phone, the y-axis is the vertical position of the smartphone, and the z-axis is the axis that leads out of the smartphone screen. In this system, behind the scene ordinate has negative value of z.

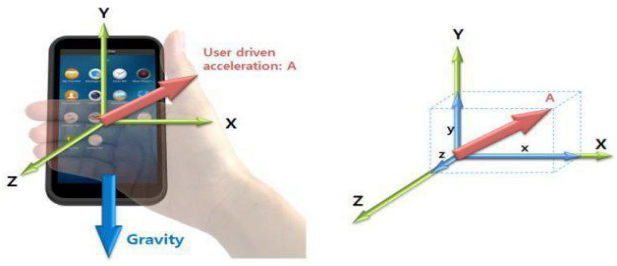

Fig 2. Coordinate System of Smart-phone

Acceleration occurs because of the increased velocity at a certain time. On the other hand, direction or orientation valso affects acceleration, because the changing of motion direction of the an object will also cause acceleration. Therefore, to obtain distance data from the accelerometer sensor, the process of double integral to the sensor output is needed.

II. BLOCK DIAGRAM

Hardware The block diagram of the proposed system consists of Android smart phone,laptop and robot containing various sensors and modules.

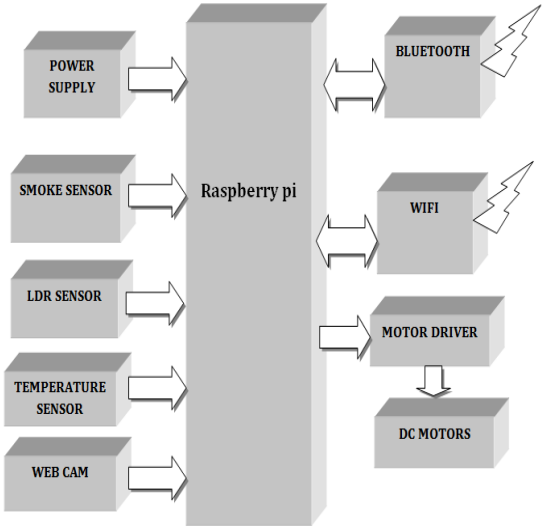

Fig 3 Block Diagram

The proposed system consists of two sections

1. Robot section
2. Monitoring or controlling section

Here the robot section consists of different sensors (smoke, light sensor and temperature sensor), wifi, Bluetooth and dc motors. Here the sensor will sense the corresponding parameter s and fed to the raspberry pi , then the controller process the data and send it to the monitoring node through bluetooth module. The raspberry pi also reads the commands from android through bluetooth and control the dc motors accordingly. In the proposed system we are using a android mobile with installed App as a monitoring /controlling node. It also get the video from webcam and send it through wifi to the android.

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1. LM 35 Sensor

- It is Calibrated directly in Celsius (Centigrade)
- LM 35 has scale factor linear a 10.0 mV/ C
- Its accuracy 0.5 C guaranteeable (at +25 C)
- Its rating full -55 to +150 C range
- Suitable for remote applications

2. Gas sensor(Mq6)

- They are used in gas leakage detecting equipments in family and industry.
- They are suitable for detecting of LPG, iso-butane, propane cooking fumes and cigarette smoke.
- It gives fast response and have a stable and long life.
- Its Heating consumption less than 750mw.
- Simple drive circuit

3. Wi-fi module

- 2.4 GHz 802.11 b/g/n compatible
- Support IEEE 802.3, IEEE 802.3 u
- Low cost UART-ETH-WIFI module
- Range of Baud rate -1200-500000bps
- Wi-fi client/AP/Router mode
- Support transparant transmission mode
- Benefits in Home and commercial building automation
- Use in telemetry,industrialsystem,toys and gaming peripherals

B. Algorithm for Android Code

- START
- Pair with Wi-fi module of robot
- Send ASCII code over Wi-fi Mobile Tilt Forward:Forward movement Mobile Tilt Backward:Backward movement Mobile Tilt Right :Right movement Mobile Tilt Left :Left movement Mobile stable:robot stop
- Receive temperature and gas update from module
- Display temperature and gas update on mobile screen
- End

C. Flowchart for microcontroller

In the Figure3.1 and Figure3.2 shows the typical sequence of events when a user runs the application. This sequence diagram assumes the user already has the software on his phone and the robot and it represents an abstract level of the interaction between the system components (mobile application and the robot).

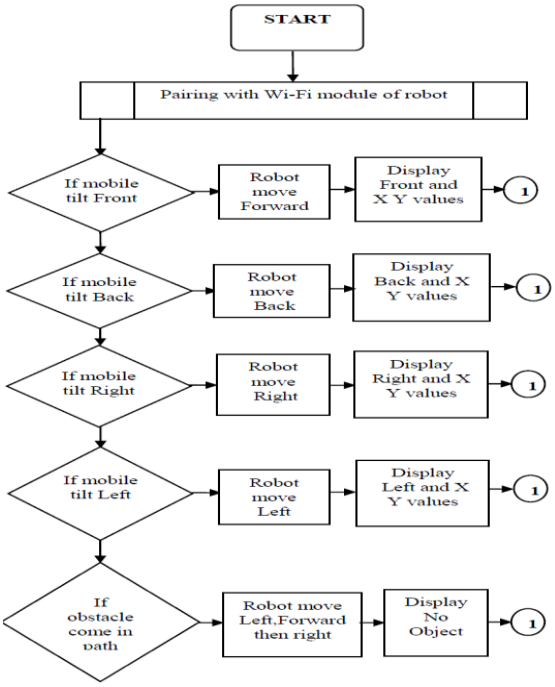

Fig 4 Flowchart 1A

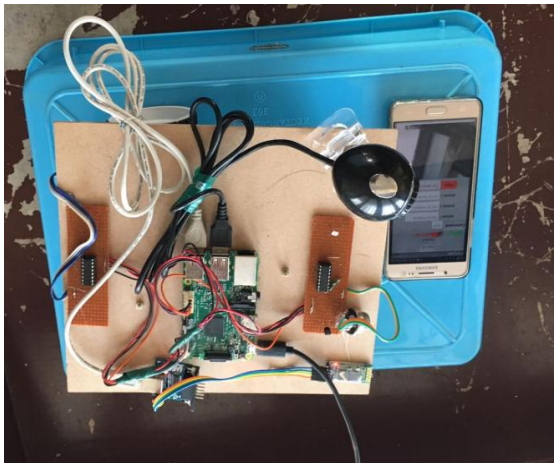

Fig 5 Implemented circuit

IV. CONCLUSION

The surveillance is always has been a quite sensitive task. And it includes so many risks. So it's better to use robot for this job instead of people. And if you are able to control the robots with efficiency and accuracy

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then you can guarantee yourself with good results and success. This system is a good step for secure surveillance using robots.

Right now we have implemented the idea for local network that is established using a single Wi-Fi router. Therefor the access is limited to the area that is in range of that local network. So right now we are bound to the limited use of this system. But in future we intend to replace the local network by internet. In that case we will not be limited for the use of the system. We will be able to control the robot from anywhere in the world.

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