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AN ANDROID BASED HUMAN COMPUTER INTERACTIVE SYSTEM WITH MOTION RECOGNITION AND VOICE COMMAND ACTIVATION

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Abstract— Human Machine Interface (HMI), Referred to as a Correlated System of Human Activities and Operation of a Specific device, Ratifies Control Mechanism of a Targeted Machine by Execution of citrine physical actions. This PROJECT presents AN effective Design of an Android Based Human Computer Interactive (HCI) System with voice command activation and gesture Recognition to control a computer. With a Continuous Data Acquisition from a 3-D Accelerometer sensor. Embedded into the smart phone. The Proposed System Substantiates Remote Computing Through Prosing of The Orientation Readings Of Physical Movement of The Phone And Compilation Of Imputed Audio Texts. The WI-FI connectivity, The Smart Phone Is Attach to the Wrist of a Human Body.The Motion Parameters Are Utilize to Control the Cursor Movement of Host Computer And the voice commands are used for ultimate executions of instructions Such Wireless System Provides Reliable and Effective Control Operations of The Computing Domains Electronic Devices and Robotic Structures. Physically Challenged People Get Benefitted by Such Systems through Easy And Faster Computing Operations. The Developed Work Has Been Tested Under citrine Conditions and the Performance Analysis Affirms Sustainability.

INTRODUCTION

Electronic gadgets embedded with Accelerometer, Gyroscope, Magnetometer, Wi-Fi and Bluetooth communication technologies have enhanced the dimensionality of innovation. Today the command interface to the computers is being influenced by the advancements of smart phone based communicative preferences. The mouse and keyboard applications are tending to be replaced by voice commands and gesture identification. Such a work has been presented in where a pattern matching based motion recognizable gaming console has been introduced. Another gesture identifying prototype has been proposed in which a wireless Power-point presentation scheme is. Such practices facilitate the physically challenged people to take advantage of remote computing with ease and comfort. In robotics and automation, wireless machine control phenomena are getting modified day by day. In a manned space mission the monitoring process of the expedition can be set up through the wireless circumstantial communication with the controlled machineries.An efficient system based on smart phone imbibed computer control mechanism via voice command execution and motion recorded activity identification with Wi-Fi connectivity has been proposed here. The controller is an Android operated handset and the host is a computer running on either Windows or Linux platform. The cursor movement is interpreted by moving the phone vertically and horizontally along the axial references. The motion parameters are retrieved from a 3-axes Accelerometer which is inclusively mounted into the smart phone fabrication. The developed system consists of two customized server applications and an executable prompt.The installed programs as well as the basic operatives like start or shut down a console of the host computer can be controlled by implementing

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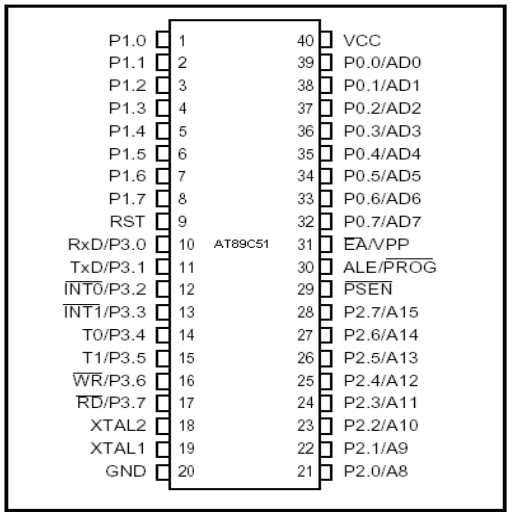
voice commanding process. Such a system has been reported in where a Google voice recognition engine has been fabricated. An Android-based comprehensive Application Programming Interface (API) security system has been reported in. A human-machine interrelated rehabilitation robot control mechanism has been formulated in.

The proposed HMI system in this PROJECT operates upon the executable commands in both forms of vocal texts and gesture recognition. Manually controlled robots and electronic devices can be controlled via transformation of wireless commands by the proposed effective HMI system. The system works on identifying separable commands encoded in voice and simultaneous gesture pattern through processing Accelerometer readings and computation of relevant software programs. A motion recognition based hierarchical classification system has been proposed in which differentiates the motion activities from the non-motion ones. In integrated computing has been proposed where the host monitors is controlled by the phone display and the keyboard is controlled by the touchpad.The work reported in presents a smart wheel chair control system via voice and gesture recognition methodologies. The presented work has introduced an Android-based voice command and gesture identification interface with the movement of wheel chair to facilitate smooth application.



PIN DESCRIPTION:

VCC

Supply voltage

GND

Ground

Port 0

Port 0 is an 8-bit open drain bi-directional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high impedance inputs.

Port 0 can also be configured to be the multiplexed low order address/data bus during access to external program and data memory. In this mode, P 0 has internal pull-ups. Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

Port 1

Port 1 is an 8-bit bi-directional I/O port with internal pull-ups. The port 1output buffers can sink/source four TTL inputs. When 1s are written to port 1 pins, they are pulled high by the internal pull-ups can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (1) because of the internal pull-ups.

Port 2

Port 2 is an 8-bit bi-directional I/O port with internal pull-ups. The port 2 output buffers can sink/source four TTL inputs. When 1s are written to port 2 pins, they are pulled high by the internal pull-ups can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current because of the internal pull-ups.

Port 2 emits the high-order address byte during fetches from external program memory and during access to DPTR. In this application Port 2 uses strong internal pull-ups when emitting 1s. During accesses to external data memory that use 8-bit data address (MOVX@R1), Port 2 emits the contents of the P2 Special Function Register. Port 2 also receives the high-order address bits and

some control signals during Flash programming and verification.

Port 3

Port 3 is an 8-bit bi-directional I/O port with internal pull-ups. The port 3 output buffers can sink/source four TTL inputs. When 1s are written to port 3 pins, they are pulled high by the internal pull-ups can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current because of the internal pull-ups.Port 3 also receives some control signals for Flash Programming and verification.

LITERATURE SURVEY

In their PROJECT, QiWangetal propose a novel viewpoint invariant method for sign language recognition. In this the recognition task was converted to a verification task. The Dempster–Shafer theory was applied to improve the robustness of the geometry model.

Shikha Singhaletal extracted the depth data from five different gestures corresponding to alphabets Y, V, L, S, I obtained from online database. Each segmented gesture was represented by its time series curve and feature vector was extracted from it. To recognize the class of input noisy hand shape, distance metric for hand dissimilarity measure, called Finger-Earth Mover's Distance (FEMD) was used. As it matched only fingers and not the complete hand shape, it distinguished hand gestures of slight differences better.

Chang-YiKaoetal developed an efficient mechanism for real-time hand gesture recognition based on the trajectory of hand motion and the hidden Markov models classifier. In this system, they divided gestures into single or both hands; one hand was defined with four basic types of directive gesture such as moving upward, downward, leftward, rightward. Then, two hands had twenty-four kinds of combination gesture. However, they applied the most natural and simple way to define eight kinds of gestures in their developed human-machine interaction control system so that the users can easily operate the robot. Experimental results revealed that the face tracking rate was more than 97% in general situations and over 94% when the face suffered from temporal occlusion.

David Maceetal came up with Accelerometer-Based Hand Gesture Recognition using features of Weighted Naive Bayesian Classifiers and Dynamic Time Warping. They compared two approaches: Naive Bayesian classification with feature separability weighting and dynamic time warping. Algorithms based on these two approaches were introduced and the results were compared. They evaluated both algorithms with four gesture types and five samples from five different people. The gesture identification accuracy for Bayesian classification and dynamic time warping were 97% and 95%, respectively. For all this implementation they used a TI eZ430-Chronos Watch, as the accelerometer data provider. The watch contains a VTI-CMA3000 3-axis accelerometer, with a measurement range of 2g, 8-bit resolution, and 100Hz sampling rate. They used an ASUS TF300T Android tablet to run the algorithms. The tablet received accelerometer data from the watch through an RF receiver with USB interface, which is recognized as a serial port inside of Android.

Much of the work is also done in Arabic Sign Language recognition. In their work Aliaa A. A.Youssifetal designed the Arabic Sign Language (ArSL) recognition using HMM. A large set of samples were used to recognize 20 isolated words from the Standard Arabic sign language. The proposed system was signer-independent. Experiments were conducted using real ArSL videos taken for deaf people in different clothes and with different skin colours. The image features, together with information about their relative orientation, position and scale, were used for defining understated but discriminating view- based object model. For tracking the hand, for each frame extract, the contours of all the detected skin regions in

binary image using connected component analysis were detected. Features considered include the position of the head, coordinates of the centre of the hand region and direction angle of the hand region. Other features that represent the shape of the hand are also considered and are extracted from changes of image intensities called image motion. A total of 8 features per frame were extracted. Further HMM was used as classifier. The system achieved an overall recognition rate reaching up to 82.22%.

Mohamed S. Abdallaetal projected a Dynamic Hand Gesture Recognition of Arabic Sign Language using Hand Motion Trajectory Features. In their system, they used the dynamic gesture (video stream) as input, extracted hand area and computed hand motion features, then used these features to recognize the gesture. The system identified the hand blob using YCbCr colour space to detect skin colour of hand. The system classified the input pattern based on correlation coefficients matching technique. The significance of the system was its simplicity and ability to recognize the gestures independent of skin colour and physical structure of the performers.

Related work

The Arduino Voice App in android phone is connected through HC-05 connected to the prototype to the inbuilt Bluetooth present in the android. After interfacing is completed L293D IC drives the DC motors connected to it and gives the power to travel in different directions and this power supply is given through the battery connected to it. On/off condition of the is indicated by the LED connected to it. The prototype can respond to the five commands. They are:

- Forward
- Right
- Left
- Back
- Stop

Android controlled robot project make use of an Android mobile phone for robotic control with the help of Bluetooth technology. This is a simple robotics projects using microcontroller. This project is a human interactive based Bluetooth controlled robot. For this the android mobile user has to install an application (RC control pro and AMR Voice) on her/his mobile. Then user needs to turn on the Bluetooth in the mobile. The wireless communication techniques used to control the robot is Bluetooth technology. User can use various commands like move forward, reverse, stop move left, move right through button, accelerations and voice commands robot control according to command given by user. These commands are sent from the Android mobile to the Bluetooth receiver. **Android based robot** has a Bluetooth receiver unit which receives the commands and gives it to the microcontroller circuit to control the motors. The microcontroller then transmits the signal to the motor driver IC's to operate the motors.

ALGORITHM

First make sure your HC-05 Bluetooth is paired with your mobile. The default password is "1234" or "0000". Check the manual of Bluetooth module.

Click on the "SELECT DEVICE" icon to select a paired Bluetooth module.

When we give voice command as "FORWARD", the robot moves in the forward direction.

When we give voice command as "BACKWARD", the robot moves in the reverse direction.

When we give voice command as "LEFT", the robot turns in the left direction.

When we give voice command as "STOP", the robot stops its functioning.

Click on Disconnect icon to disconnect the paired

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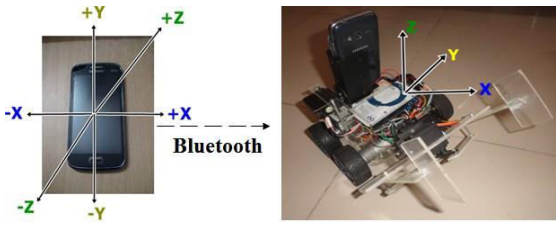
Bluetooth module

Motion and Acceleration Detection using Bluetooth



(a) (b)

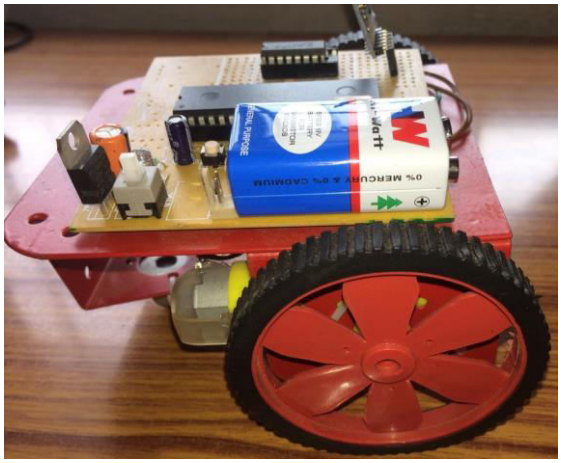
Robot control mechanism of the HMI system;

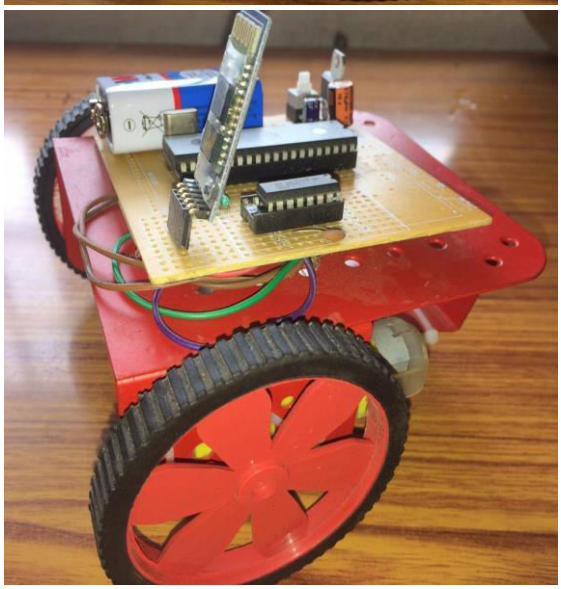
(A) Shows the orientation of the Accelerometer,

(B) Shows the tested robotic structure.

Above Fig presents the robot control scheme via wireless connectivity by dint of motion recognition methodology developed in the proposed HCI system.

According to the Accelerometer readings, which represent the physical motion values of the phone, the robot has been made to navigate along an arena. This practice compliments the cursor movement and the robotic activity can be interpreted as the positioning of the mouse cursor along the host computer. The voice command execution has been experimented with the robotic framework where some sample vocal sounds have been processed by a code snippet and transferred to the Arduino firmware of the robot. The XY alignment, robotic arm movement and mounted camera rotation are some of the modes of actions tested in this casework. The accelerated data transmission from the smart phone to the micro-controller board of the robot has been established via Bluetooth protocol. The works reported have not provided any practical accuracy evaluation with respect to different voice and gesture inputs; whereas this PROJECT presents real-time performance parameters for different vocal and gesture inputs. The PROJECTs articulated in and have not presented any demonstration of the proposed methods; whereas this proposed work consists of hardware implementation and relevant performance analysis. The evaluated performance analysis ascertains the effectiveness of the proposed work. The discussed caseworks imply that the demonstrated frame- work is quite efficient and reliable in case of practical applications. Several prospects have been investigated while testing the system, like motion sensitivity of the sensor and corresponding response of the developed software, elementary deflection of cursor position irrespective of the phone movement, misidentification of different vocal sounds and converted texts by the host software and little delays in execution of a specific command. Such aspects are meant to be resolved with the further improvement of the work.





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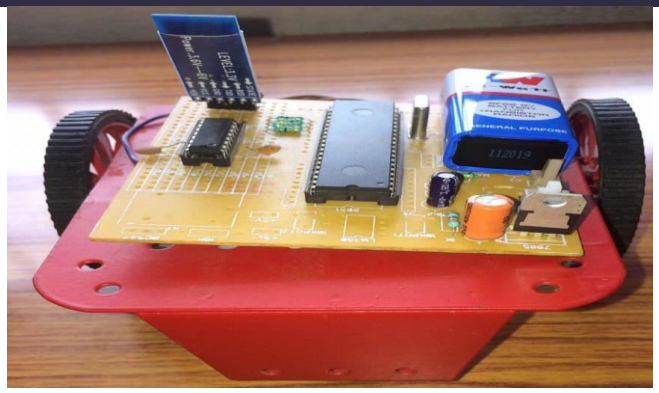

Voice Controlled and motion and acceleration recognition robot using Android prototype

CONCLUSION

The operating system of smart phone is android which can develop effective remote control program. At the same time , this program uses blue-tooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot which would allow a non-expert to interact with and adjust the functionality of a system which uses 8051 controller, a single board micro-controller intended to make the application of interactive objects or environments more accessible. 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 then you can guarantee yourself with good results and success. This system is a good step for secure surveillance using robots. Wireless control is one of the most important basic needs for all the people all over the world. But unfortunately the technology is not fully utilized due to a huge amount of data and communication overheads. Generally many of the wireless-controlled robots use RF modules. But our project for robotic control make use of Android mobile phone which is very cheap and easily available. The available control commands are more than RF modules. For this purpose the android mobile user has to install a designed application on her/his mobile.

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