Gesture In Air For Security

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ABSTRACT:

This paper is based on developing application and demonstrate the used of gesture in air, we start our project with design of gesture sensor i.e. hand motion sensor using 3 axis accelerometers and I2C protocol based ADC, we will also make this a wireless sensor so we are free to make gesture in air. To demonstrate the application of the sensor we will design a security system, patterns will be made in 3D air space instead of touch screen, hence in our system one has to enter password not with keypad but by his hand gesture/motion in air. This requires special algorithm which converts raw accelerations measured by accelerometers in to the hand motions.

and secured. We have decided to make a novel security system in which keypads are not used to get entry to house/office or to open a locker, one can get access or authenticate himself just by making some unique gesture using his/her hand motions in air. Once technology is mature one can make his signature in air to get access.

The aim in this paper is not only to design a security application of gesture in air but to learn various uses of accelerometer, new technologies, new protocols and different new algorithm approaches and all to be implements in low cost microcontroller with limited code memory and RAM.

I. INTRODUCTION

With the advancements in technology various new sensor are introduced, one such sensor is accelerometers, these sensors have tremendous application in various aspects of life and engineering, we are also using same for designing a wireless hand motion/gesture sensor. With this sensor we are going to develop pattern unlock security application as we have seen in android phone. The important and crucial difference is the pattern will be drawn in air.

Security being an important issue now a days and everybody want to be stay safe

II. BLOCK DIAGRAM
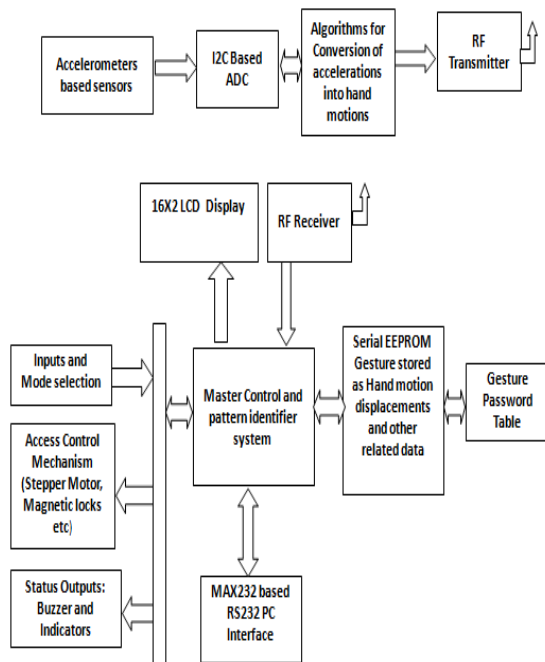
III. BLOCK DIAGRAM DESCRIPTION

1. Accelerometers Sensor

Accelerometer sensors convert either linear or angular acceleration to an output signal. Accelerometer sensors use Newton's second law of motion, F = ma, by measuring the force from acceleration on an object whose mass is known. There are many ways to measure the force exerted on the mass, called a proof mass, but the most common method used in accelerometer sensors is measuring the displacement of the mass when it is suspended by springs. Acceleration is a measure of how quickly speed changes. Just as a speedometer is a meter that measures speed, an accelerometer is a meter that measures acceleration. Using Accelerometers we can measure acceleration, Tilt and tilt angle, Incline, Rotation Vibration, Collision, Gravity etc.

2. Microcontroller (MCU)

For Hand motion we want to use low cost and small in size MCU for making device portable our first choice is 89C2051 or MSP430 equivalent but if code or data size exceeds we will some higher version with more ram like P89V51RD2.

For Main Gesture system we will use P89V51RD2 advance version of 8051 with boot loader feature which help us in fast and hassle free prototyping and code development. We need more I/O lines in this part of project so P89V51RD2 will be best to use as it has 32 I/O lines.

3. I2C Based ADC:

I2C is special communication protocol and using protocol we will interface to I2C based ADC PCF8591 which used only two wires for control and data acquisition compared to 14 line interfaces to ADC0808 hence it will save space, cost and weight.

4. Main System:

This system integrates all the systems, when gesture is made using hand motions, it converts gesture movements in the small strokes and it compares theses strokes to strokes stored in EEPROM memory using specially pattern matching algorithms. And at the end it concludes whether the gesture made is same as stored in EEPROM, then only access is granted and required action of unlocking the access mechanism is initiated and after some time interval locking mechanism is activated. There is provision to update the password for that main system is to be configured in password update mode and the new

password can be updated in the system serially or wirelessly.

5. Serial EEPROM

It is I2C based Serial EEPROM which is used to store password gestures and utility gestures in form or strokes and time stamps, which are used by main system to compare with gestures made using hand movements or motions in air.

6. Access control, input and status output

Few switches are provided for user interface and for selecting different modes of operations, status output is used for audio visual indications of gesture registration, identification or rejection. Finally for access control Stepper motors, magnetic locks, solenoids, relays can be used. We can use ULN2003 high current drivers to operate above locking mechanisms.

7. PC Interface

Finally a PC interface is provided to update configurations, monitoring, debugging and to view statistic of entered gestures.

IV. ADVANTAGES AND DISADVANTAGES

Keypad based access or security systems are prone to password leaks in various ways and this is improved to great extent in our security system.Being compact it can be used in small places like electronic safe, bank lockers, cars etc.
Unique gesture motions are having more combinations and it has more randomness which makes it more reliable.

This system is not suitable who are having shaky hands or who cannot make gestures like elderly people or children's. Complex processing algorithms are require for pattern matching to verify a gesture while in keypad based system it is very simple to verify the password.

V. EXPECTED RESULT & CONCLUSION

In this paper we will design our own Accelerometer based gesture controller and interface it with gesture engine via wireless connections, multi-microcontroller communication is implemented using wireless devices; we implement a pattern recognition algorithm for gesture matching and mechanism control for access same will be used to demonstrate use of gestures in security.

VI. FUTURE SCOPE

Security being an important issue now a days and everybody want to be stay safe and secured. In the proposed system one can get access or authenticate himself just by making some unique gesture using his/her hand motions in air. And once this technology is mature one can make his signature in air to get access in near future.

VII. REFERENCES

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