Wireless Device Control for Industrial Automation using Arduino and Bluetooth

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Abstract – *Embedded systems have had substantial attention during the last decade as a result of their numerous applications. This system is developed by using Arduino UNO board based on ATmega32P and Bluetooth (HC-05) to communicate (send/receive data) with PC. A software based on visual basic is used to control the different equipment such as DC motors, servo motor and temperature is seen in software. Not only seen but accordingly such motors are also controlled. Data can also be written in 20x4 LCD from software. When motor gets on, the time and date and by whom this operation is performed, is stored in database by using SQL server 2008R2. User of this system needs to have user id and password to access this entire system and each employee of an industry must have their own id and password. This user id and password is there to secure the system. By this way only selected or trusted employees can access this system. By this way different equipment of an industry is controlled with help of a software and we can store that data also.*

***Key Words*:   Embedded   Systems,   Arduino-UNO, ATmega32P, Bluetooth, DC Motor, Servo Motor, LCD, SQL Server 2008R2.**

1.   INTRODUCTION

An **industrial automation** is used to maintain entire plant using a software without going near to the equipment such as motors and employees see the temperature and accordingly motor is controlled. Here in this system, we have used an open source development tool Arduino-UNO based on ATmega32 [1].

1.1 Hardware

In this embedded system, we have used a DC motor as well as a servo motor to understand complete operation that is been done in an industry. Arduino board based on ATmega32P[1] is used to control the motors and to get the data of temperature from LM35 temperature sensor. Employees can write message for workers in the 20x4 LCD by sending message through a software. All this operation is done wirelessly by using Bluetooth technology and here we have used HC-05 Bluetooth to communicate with software. Bluetooth technology is used for short distance and the range of this module is approximately 10 meter (30 feet) [3].

1.2 Software

We have developed this software using Visual Basic and SQL server 2008R2 is used to store the data of employees such as name, password and other details and motor ON/OFF and temperature. In this system, each employee must have their own password to access this system and using that we can fetch that which employee performs an operation and on what time.

2.   SYSTEM DESIGN

The entire system is designed based on open source development tool Arduino-UNO based on ATmega32 [1] to control the hardware and software which is designed using Visual Basic as a front-end design and SQL server 2008R2 as a back-end design.

2.1 Hardware Design

Complete design of hardware control is described by the following flow-chart. Using Bluetooth HC-05, Arduino Receive the data and according to that data motor and other peripherals are controlled. Software sends predefined character to Arduino-UNO and according to that character how peripherals are controlled can be seen in following flowchart.
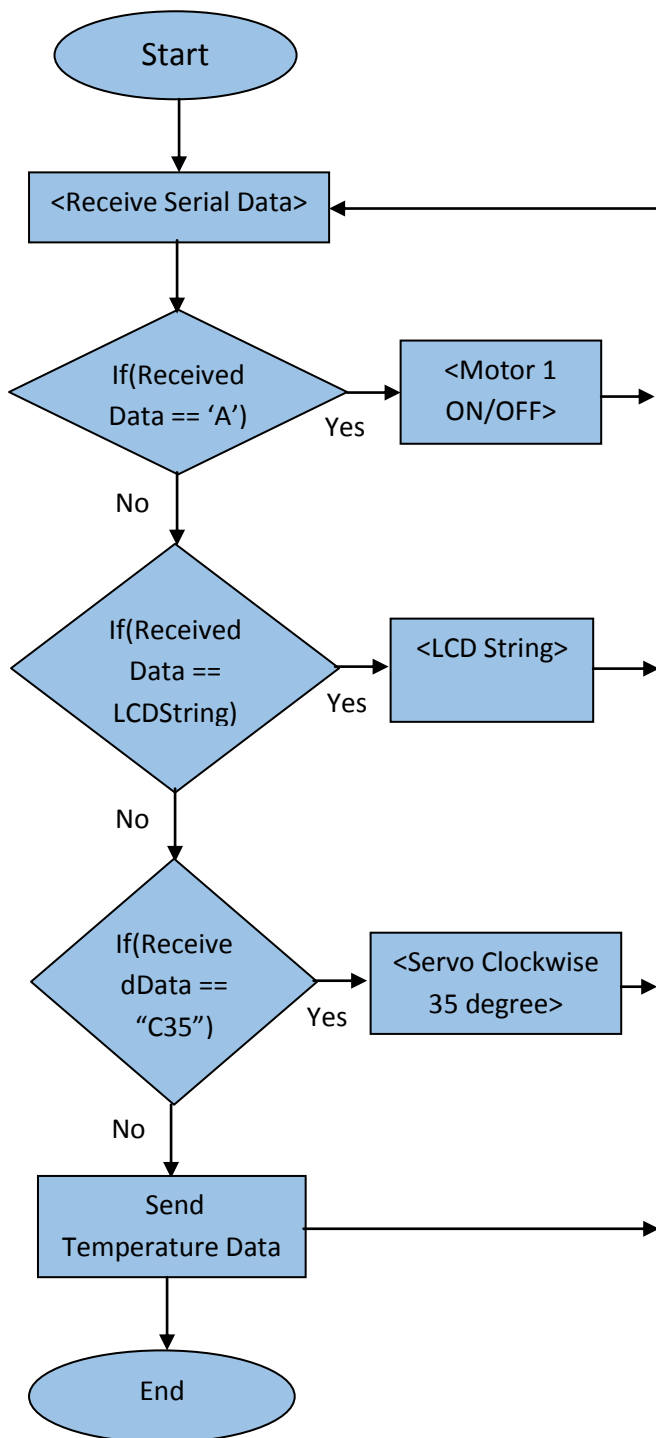
Figure 1: - Flowchart of Arduino-UNO program

2.2 Software Design

Complete GUI of software is shown below and figure 1 shows login form used to login and as can be seen in figure 2 employee name Raj is already registered then Raj directly log in into the system if employee is not registered then using registration form admin register that employee as can be seen in figure 3 and security question is shown in figure 4 and after that employee can log in successfully and if employee forget the password then even using security question and other personal data any employee can retrieve the password and final system is accessed and all the data is stored in database made by SQL server 2008R2.
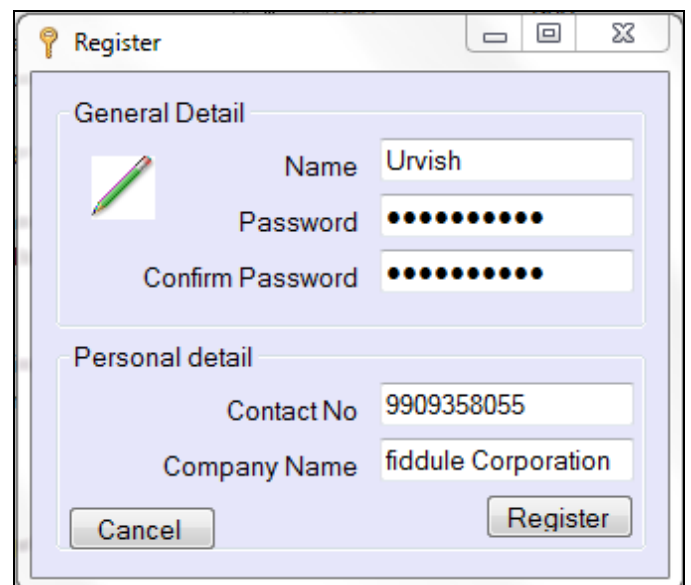

Figure 2: - Log-In Form

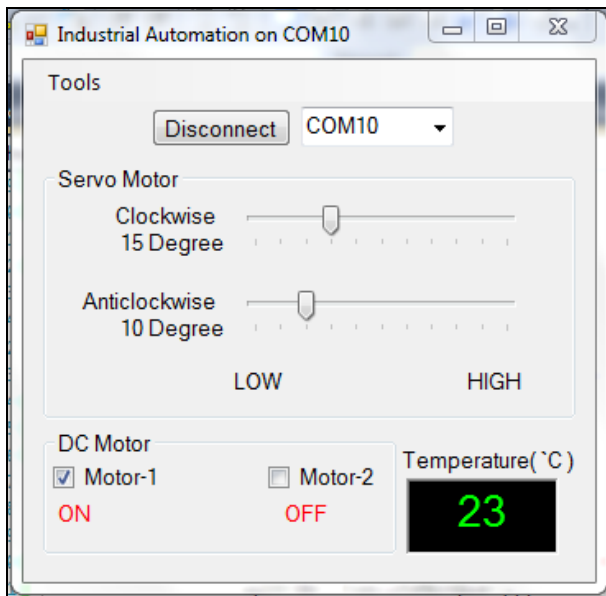**Figure 3: -** Registration Form

Figure 4: - Industrial Automation Software

The main software to control the peripherals is shown in figure 4. HC-05 Bluetooth technology is used for communication but for short distance. The database is shown in below figure 5.
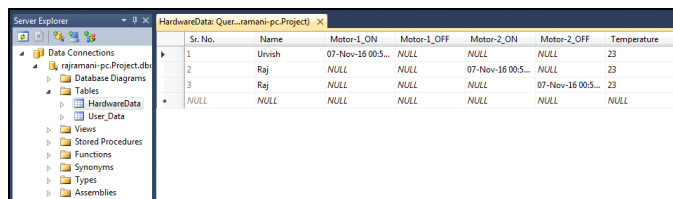

Figure 5: - SQL server Database

CONCLUSION

This project helps us to know more about how to use Bluetooth technology for automation. We got to know about server and related log in system to secure the data as well as the most important thing is we learned how to control different peripherals using a software made by Visual Basic. By doing this work we got fruitful result as well as we enhanced our skills and knowledge in our interested field.

ACKNOWLEDGEMENT

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