Smart Automatic Fire Guard

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Abstract:- **In this project we are going to detect the fire and stop the accident. At first when the fire occurs the alarm should to alert the passengers. In the second step the information should be given to the guard and nearby the station using walkie-talkie along with the train number in the third step power supply should get off. In the indication that power supply get off take place than water should be sprinkled. In the second step if the train number should be changed and we changed the train number then it should be automatically converted into the audio signal. The number is entered using keypad. For suppose, if the module get damaged then it should be replaced by another it should be capable to give the required audio output that is train number.**

Key Words— Fire sprinkler, active fire protection

1. INTRODUCTION

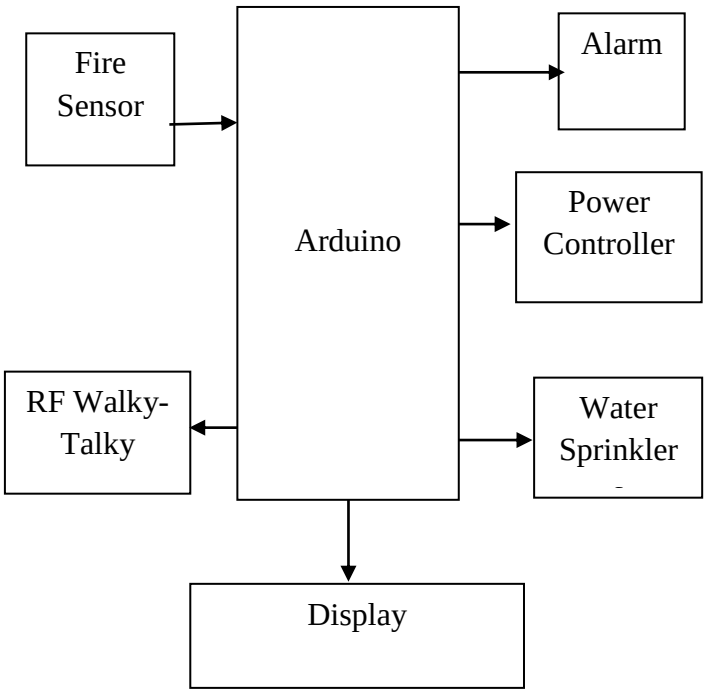
An embedded system is a special purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Since the system is dedicated to specific type task, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economics of scale.

Personal Digital Assistants (PDAS) or handheld computers are generally considered embedded devices because of the nature of the hardware design, even though they are more expandable in software terms. This line of definition continues to blur as devices expand. With the introduction of the OQO Model2 with the windows XP operating system and ports such as a USB port both features usually belong to" general purpose computers", - the line of nomenclature blurs even more.

Physically, embedded system ranges from portable devices such as digital watches and mp3 players, to large stationary installations lights, factory controllers, or the systems controlling nuclear power plants

In terms of complexity embedded systems can range from very simple with a single microcontroller ic, to very complex with multiple units peripherals and networks mounted inside a large chassis or enclosure.

2. BLOCK DIAGRAM



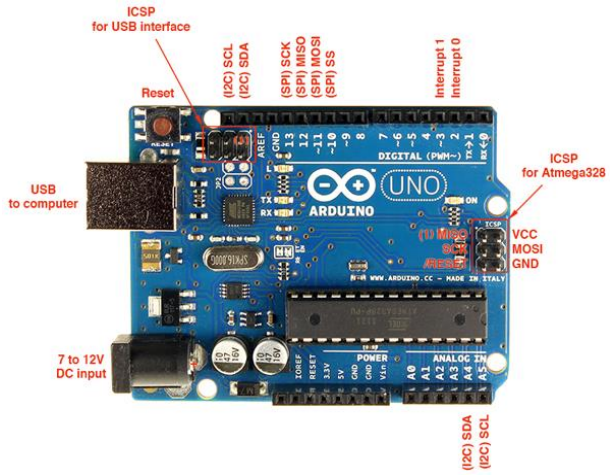
2.1 ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board

has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.



Description

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

POWER

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

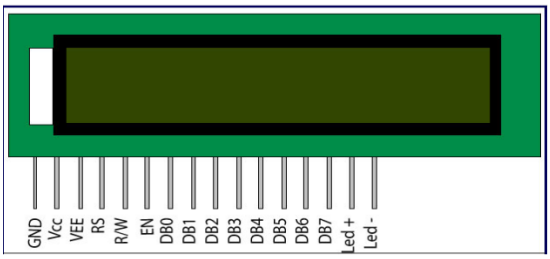
Input and Output

Each of the 14 digital pins on the Uno can be used as an input or output, using pin mode, digital write, and digital read functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms.

2.2 LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.



Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

3. COMERCIAL VIABILITY

Although its technology is more than a 100 years old, fire sprinkler system is the single most employed active fire suppression system in use today. The main reason for its traditional, persistent popularity can be attributed to its constantly diminishing costs and wide availability of manufacturers, products and services worldwide. Another good reason may be due to lack of suitable alternatives.
Perhaps the lack of alternative products is what lead many to adopt systems with regular sprinklers even for environments containing sensitive equipment (industrial machinery, electronic appliances, computers), furniture (wooden, leather, textile), documents, books (libraries) or high-voltage (transformers, distribution boards, power stations), where the results of activating such measures could be as devastating as the fire itself. For such scenarios, a product based on the described prototype or presenting similar characteristics could have a significant market potential, as water hazard is minimized by just replacing some key sprinklers in the system with smart sprinklers. However, the inclusion of smart protection would add considerably to the cost of the installation, a known issue concerning choices made by consumers when purchasing appliance upgrades. To have a better idea of the relation between cost and protection, we need to compare each of the options from an economic perspective. According to Stacy et. al. [6], the current cost of Sprinkler Systems usually range from 8 to 22 €/m2, what answers for around 1% of the total construction cost. In locations where the installation of sprinkler systems became mandatory for new buildings (including residential), prices dropped abruptly, reaching close to 5 €/m2, as the related costs were incorporated into the cost of construction. This shows a close relation between popularity and low prices, in accordance to free market rules. It is safe to assume that the same would apply to smart devices, is natural to expect a reduction to competitive prices as the technology grows in popularity. But at first we must consider current costs. For the proposed device, starting with the cost of the implemented prototype, we estimate around €300 in total: €250 the price of the Lego kit alone, a €35 WiiMote and another €15 in parts, including the solenoid valve, hoses, wires and support. The prototype had its working range curbed by a series of factors, on top, the water pressure and limited camera sensitivity, what reduced the detection and suppression range to a radius inferior to 3 meters. To make a safe approximation, if similar devices were to be combined in a grid, the operability range of each one is around 2m2, resulting in an approximate cost of 150 €/m2. In fact, the cost could be reduced to well under €100 by using retail parts, such as generic CCD or IR camera, step motors and a microprocessor (still accounts for most of the cost, Arduino or PIC considered). Even in case production costs eventually drop under €50 per unit and the coverage area can be increased to over 3m2, the most optimistic estimative would yield around 16 €/m2. Considering the case in study is not a replacement for Fire Sprinkler Systems altogether, but merely an alternative for replacement of individual fire sprinklers, most of the related installation costs would remain, such as piping, pumps, etc. Clearly the costs of including smart sprinklers in the system would add up, increasing proportionally to the smartly protected area.

Table I: Comparison chart.

Sprinklers	Spread	Smart
Added cost	0	+16 to150 €/m2
Water Damage	Spread	Localized
Detection and response	As heat/flames reach the ceiling	Early with first IR emission spotted
Powering	Not required	Required

When taking into account the potential water damage that can be adverted and the capacity of early suppression of small flames, in opposition to traditional sprinklers, activated only when the heat has reach the top of the room, the smart alternative clearly provides added protection, particularly interesting in small, sensitive spaces.

4. ALGORITHUM

Step1: start.
Step2: When ever sensor will activate.
Step3: Alarm should alert the passengers.
Step4: Sensors at the transmitter and receiver are activated.
Step5: Information should pass through the station and guard through walky-talky.
Step6: then power should get off.
Step7: automatically water should sprinkle.
Step8: stop

5. CONCLUSIONS

In this project a prototype was assembled usingavailable components, demonstrating successfully the suitability of the proposed alternative to replace conventional fire sprinklers. Upon activation the water damage in minimized in opposition to the extensive water

damage caused to electronic equipment, furniture, books and paperwork by conventional sprinklers.

Many regulations worldwide demand fire prevention systems to be installed in offices, public buildings, schools and, for some regions [6], even residences, despite potential water hazard caused to cases aforementioned, for which the proposed model could be offered as a better alternative. The main differential of the proposed model is related to a key factor in controlling fire: Quick response. Tests carried out by the Building Research Establishment (BRE) of the United States determined that unless a fire is tackled within the first two to three minutes, it is 'highly unlikely' it can be controlled, saving the building and its contents. Sprinkler systems respond just as quick as the heads are activated by the heat of flames, what implies the fire has been raging long enough for it to affect the high of the ceiling. Most heads are activated by temperatures above 70°C, only then delivering water indiscriminately over the entire area, not considering the nature of the fire, either extinguishing it or keeping it under control until the Fire and Rescue Service arrives.

The final conclusion pricewise is that, complying to many commercial protection and insurance products available, the price-benefit ratio is apparently low, until one eventually need it. The consumer decision to invest in safety is usually risk based, a decision not only involving a financial cost, but a potential toll in property and lives. Fire sprinklers will surely remain the active fire suppression technology of choice for protecting property, assets and improving safety at work and home for many years to come. However, considering different scenarios, given more alternatives, comparing costs and benefits, consumers may have diverging ideas about the price of protection, given a choice.

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