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Pyroelectric Infrared (PIR) Sensor Monitoring System

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ABSTRACT: In previous days when we were entering the room in that time by human must be switch ON/OFF light system. This project is deserved for the purpose of saving the electricity and to save the wear and tear of the appliance. When the PIR doesn't senses the people the light will switch off automatically. In present days by using PIR sensor switching the light ON & OFF system. When the person entering the room the PIR sensor senses the human being and the light will be ON automatically. When the person leaving form the room the light will be automatically switch off.

I. INTRODUCTION

The scene analysis method examines a view from a particular vantage point. Representative examples of the scene analysis method are Easy Living, Motion Star, and Microsoft radio detection and ranging (RADAR), which use color stereo cameras, a dc magnetic tracker, and an IEEE 802.11 wireless LAN, respectively. Finally, the proximity method measures nearness to a known set of points. An example of the proximity method is smart floor that uses pressure sensors.

Alternatively, indoor location-aware systems can be classified according to the need for a terminal that should be carried by the resident. Terminal-based methods, such as active bats, do not recognize the resident's location directly, but perceive the location of a device carried by the resident, such as an infrared transceiver or radio frequency identification (RFID) tag. Therefore, it is impossible to recognize the resident's location if he or she is not carrying the device. In contrast, no terminal methods such as easy living and smart floor can find the resident's location without such devices. However, easy living can infringe on the resident's privacy, while the smart floor has difficulty with extendibility and maintenance.

We proposed the Pyroelectric infrared (PIR) sensor-based indoor location-aware system (PILAS) in a previous paper as one example of a no terminal-based location-aware system based on the proximity method. In this system, we used an array of PIR sensors to detect the presence of a resident. The PIR sensors were installed on the ceiling so that detection areas of adjacent sensors overlapped. By combining the outputs of multiple PIR sensors, the system could determine the location of a resident with a reasonable degree of accuracy.

This correspondence introduces an enhanced location-recognition algorithm using a Bayesian classifier to increase the accuracy of PILAS. The Bayesian classifier is a simple probabilistic classifier based on applying Bayes' theorem with feature vectors. Due to the precise and very simple nature of the probability model, it is known that the Bayesian classifier is very efficient in statistical pattern recognition.

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology



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and is compatible with the Industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry[1][2]. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

Memory Organization

MCS-51 devices have a separate address space for Program and Data Memory. Up to 64K bytes each of external Program and Data Memory can be addressed[3]-[6].

Program Memory

If the EA pin is connected to GND, all program fetches are directed to external memory. On the AT89S52, if EA is connected to VCC, program fetches to addresses 0000H through 1FFFH are directed to internal memory and fetches to addresses 2000H through FFFFH are to external memory[7].

Data Memory

The AT89S52 implements 256 bytes of on-chip RAM. The upper 128 bytes occupy a parallel address space to the Special Function Registers. This means that the upper 128 bytes have the same addresses as the SFR space but are physically separate from SFR space. When an instruction accesses an internal location above address 7FH, the address mode used in the instruction specifies whether the CPU accesses the upper 128 bytes of RAM or the SFR space. Instructions which use direct addressing access the SFR space[8].

For example, the following direct addressing instruction accesses the SFR at location 0A0H (which is P2). MOV 0A0H, #data Instructions that use indirect addressing access the upper 128 bytes of RAM. For example, the following indirect addressing instruction, where R0 contains 0A0H, accesses the data byte at address 0A0H, rather than P2 (whose address is 0A0H). MOV @R0, #data Note that stack operations are examples of indirect addressing, so the upper 128 bytes of data RAM are available as stack space.

Watchdog Timer (One-time Enabled with Reset-out)

The WDT is intended as a recovery method in situations where the CPU may be subjected to software upsets. The WDT consists of a 14-bit counter and the Watchdog Timer Reset (WDTRST) SFR. The WDT is defaulted to disable from exiting reset. To enable the WDT, a user must write 01EH and 0E1H in sequence to the WDTRST register (SFR location 0A6H). When the WDT is enabled, it will increment every machine cycle while the oscillator is running[9][10].

Using the WDT

To enable the WDT, a user must write 01EH and 0E1H in sequence to the WDTRST register (SFR location 0A6H). When the WDT is enabled, the user needs to service it by writing 01EH and 0E1H to WDTRST to avoid a WDT overflow. The 14-bit counter overflows when it reaches 16383 (3FFFH), and this will reset the device. When the WDT is enabled, it will increment every machine cycle while the oscillator is running. This means the user must reset the WDT at least every 16383 machine cycles. To reset the WDT the user must write 01EH and 0E1H to WDTRST. WDTRST is a write-only register. The WDT counter cannot be read or written. When WDT overflows, it will generate an output RESET pulse at the RST pin. The RESET pulse duration is 98xTOSC, where TOSC = 1/FOSC. To make the best use of the WDT, it should be serviced in those sections of code that will periodically be executed within the time required to prevent a WDT reset[11][12].

WDT during Power-down and Idle



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In Power-down mode the oscillator stops, which means the WDT also stops. While in Power-down mode, the user does not need to service the WDT[13]-[15]. There are two methods of exiting Power-down mode: by a hardware reset or via a level-activated external interrupt which is enabled prior to entering Power-down mode. When Power-down is exited with hardware reset, servicing the WDT should occur as it normally does whenever the AT89S52 is reset. Exiting Power-down with an interrupt is significantly different[16][17].

The interrupt is held low long enough for the oscillator to stabilize. When the interrupt is brought high, the interrupt is serviced[18]. To prevent the WDT from resetting the device while the interrupt pin is held low, the WDT is not started until the interrupt is pulled high. It is suggested that the WDT be reset during the interrupt service for the interrupt used to exit Power-down mode. To ensure that the WDT does not overflow within a few states of exiting Power-down, it is best to reset the WDT just before entering Power-down mode. Before going into the IDLE mode, the WDIDLE bit in SFR AUXR is used to determine whether the WDT continues to count if enabled.

II. RF TRANSMITTER & RECEIVAR

In general, the function of a radio frequency (RF) transmitter is to modulate, up convert, and amplify signals for transmission into free space. An RF transmitter generally includes a modulator that modulates an input signal and a radio frequency power amplifier that is coupled to the modulator to amplify the modulated input signal. The radio frequency power amplifier is coupled to an antenna that transmits the amplified modulated input signal.

Power amplifiers are required in radio telecommunication systems to amplify signals before transmitting, because a radio signal attenuates on the radio path. For efficiency, the amplifier is often a non-linear amplifier operated near its peak capacity. To avoid distortion of the transmitted signals due to the non-linearity, the signals are pre-distorted by a predistorter before they are transmitted.

The predistortion is required to prevent transmitter from transmitting signals on channel bands other than the band assigned to the transmitter. Digital predistortion may be performed by multiplying the modulated signals prepared for transmission by a set of predistortion values. The predistortion values are chosen such that the product values entering the power amplifier will be distorted by the power amplifier to return to a substantially linear amplification of the modulated signals.

A direct conversion transmitter system to produce a transmission signal is generally comprised of a low oscillator (LO), a phase locked loop (PLL), a quadrature generator, a modulator, a power amplifier (PA), and one or more filters. The low oscillator, coupled to the PLL, produces a signal with a frequency that is substantially equal to the frequency of a desired RF transmission signal. The quadrature generator is coupled to the low oscillator and the modulator. The PA is coupled to the quadrature generator, and receives the transmission signal and amplifies it.

The amplified signal may go through a filter to reduce noise or spurious outputs outside of the transmission band. High quality RF transmitters typically include band pass filters, such as surface acoustic wave (SAW) filters provide excellent performance. A typical cell phone may employ a band pass filter following the power amplifier to reduce undesired noise present at the.

The optimal functioning of a transmitter in a telecommunications system depends upon the suitability of the bandwidth of the transmitted signal to its data rate and modulation type. Cellular phones are designed to operate within the environment of one of several mobile communications networks. Transmitters and receivers for communication systems generally are designed such that they are tuned to transmit and receive one of a multiplicity of signals having widely varying bandwidths and which may fall within a particular frequency range.

III. RELAY



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A relay is an **electrically operated switch**. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are **double throw (changeover)** switches.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see the page on switches.

Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

RF Transmitter:

Radio transmitter design is a complex topic which can be broken down into a series of smaller topics. A radio communication system requires two tuned circuits each at the transmitter and receiver, all four tuned to the same frequency.[1] The transmitter is an electronic device which, usually with the aid of an antenna, propagates an electromagnetic signal such as radio, television, **RF** or other telecommunications.

RF Receiver:

A tuned radio frequency receiver (TRF receiver) is a radio receiver that is usually composed of several tuned radio frequency amplifiers followed by circuits to detect and amplify the audio signal. A 3 stage TRF receiver includes a RF stage, a detector stage and an audio stage. Generally, 2 or 3 RF amplifiers are required to filter and amplify the received signal to a level sufficient to drive the detector stage. The detector converts RF signals directly to information, and the audio stage amplifies the information signal to a usable level.

IV. INFRARED SENSOR

Infrared' (IR) light is electromagnetic radiation with a wavelength between 0.7 and 300 micrometers', which equates to a frequency range between approximately 1 and 430 THz.

IR wavelengths are longer than that of visible light, but shorter than that of terahertz radiation microwaves. Bright sunlight provides an irradiance of just over 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared radiation, 445 watts is visible light, and 32 watts is ultraviolet radiation.

V. CONCLUSION

Based on several experiment conducted under various conditions, we verified that PILAS with a Bayesian classifier can estimate residents location with acceptable accuracy. Comparison of the conventional and the enhanced location-recognition algorithm shows that the accuracy of the enhanced algorithm is considerably improved from that of the conventional one. The system seems to be a very practical basis for an intelligent location-based service.

With the improved accuracy, for example, lighting and air conditioning can follow the resident more closely, and security cameras may take a closer view of any person in the smart home.



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However, because the location accuracy of this system is dependent on the number of sensor and sensor arrangement, it is necessary to determine the optimal sensor arrangement that offers the greatest location accuracy. In addition, the proposed PILAS should be extended to deal with a room occupied by two or more residents. These remain subjects for future work.

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