

# A.S.H.A.: Automated System For Hospital Admission Using Image Processing

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**Abstract** - The objective of this paper is to obviate the further delay of form filling utilizing automatic face recognition with blood system utilized in the traditional method of admitting a patient to the hospital in case of an accident. The project also comes along with the facility of reducing time for completing police formalities i.e. a SMS is sent directly to nearest police station in case of extreme blood found on face. This project would help to save time delay as well as the proper treatment for the benefits of patients and also save time and money.

**Index terms** - Hospital; Patient; Hospital Admission; Microprocessors; Blood; Image Processing.

## 1. INTRODUCTION

Everything has ended up cutting edge as the world has advanced to the current timetable. With the progression in innovation there has likewise come numerous progressions in correspondence innovation and in addition database administration. Hospitals manage the life and strength of their patients. Great medicinal consideration depends on decently prepared specialists and attendants and on top notch offices and hardware. Great medicinal care likewise depends on quick and exact record keeping. Without exact, complete exceptional and available patient case notes, therapeutic work force may not offer the best treatment or may actually misdiagnose a condition, which can have genuine results. Written by hand preadmissions structures are relentless and frequently confusing for patients. Finishing and sending the obliged structures can take extensive time. Frustratingly for continuous doctor's facility guests, another arrangement of structures is needed for every new affirmation. Paper structures additionally cause inconvenience on the less than desirable end. Regulatory staff entering data into the doctor's facility record framework must decode poor hand composing and regularly need to pursue missing or indistinct data. These deferrals and ambiguities make it troublesome for healing facilities to finish preadmission exercises, plan assets viably, and when specialists can't get to a complete and exact clinical history, might adversely effect care quality. Having the capacity to utilize innovation for the welfare of person is an essential open territory of examination to correspondence innovation and other innovation zones. We intend to add to a model which will be proficiently used to minimize human causality by these customs for an individual met with any mishap. Our model is centered around attaining to a continuous stream of patients and data around healing centers. Complete, precise and

convenient data preceding affirmation is an establishment of patient stream.

## 2. BACKGROUND

A person met with any accident when brought to hospital has to go through many official formalities one of them is form filling and other being informing to police. Moreover, if the patient is critically injured it's very difficult to recognize his/her identity. To overcome this our project uses image processing for face detection. Since, the face of the patient cannot be recognized easily we use face vectors to identify the patient rather than traditional face detection systems. Cameras are incorporated in the black box for face recognition with light. Microcontroller is used as a major working component in the project. Face recognition systems are part of facial image processing applications and their significance as a research area are increasing recently. Also with face detection the admission form of patient gets automatically filled using our project, when patient reaches the hospital. Database of all the patients are collected on the basis of their previous medical history records. It's designed to help you increase efficiency and service reliability across your hospital. Now you can eliminate error prone and labor intensive tasks like entering information from handwritten forms. As patient information is received electronically and coded prior to admission, you can plan resources, such as theatre, and provide clinical staff with vital information about allergies and medications. As hospitals already have centralized databases of patients and their medical history updated from their previous records from different hospitals linked to each other through internet. Along with the normal details of patient the medical history (if there any) gets filled in the admission form. Another facility this project provides is of sending the SMS to nearest police station in case of extreme cases. For this GSM module is used which

automatically sends SMS due to previously programmed and filled details. Our solution puts patients in control of their pre-admissions paper work and gives hospitals the information they need to operate safely and efficiently. Patients benefit from superior convenience, support and privacy. Hospitals benefit from timely and complete information that is validated and provided in an electronic format ready for automated transfer to hospital information systems.

### 3. COMPONENTS USED

The major components used in this project are highlighted below:

#### A. ATMEGA 168

The superior, low-power Atmel 8-bit AVR RISC-based microcontroller consolidates 16KB ISP flash memory, 1KB SRAM, 512B EEPROM, a 8-channel/10-bit A/D converter (TQFP and QFN/MLF), and debug WIRE for on-chip debugging. The device underpins a throughput of 20 MIPS at 20 MHz and works between 2.7-5.5 volts. By executing powerful directions in a single clock cycle, the device attains to throughputs approaching 1 MIPS every MHz, adjusting power utilization and transforming velocity. This is the mind of the model and all the summons are modified into this IC. It is a reprogrammable IC and can be set for any sort of assignment workable for the model

(PCINT14/RESET) PC6	1	28	PC5 (ADC5/SCL/PCINT13)
(PCINT16/RXD) PD0	2	27	PC4 (ADC4/SDA/PCINT12)
(PCINT17/TXD) PD1	3	26	PC3 (ADC3/PCINT11)
(PCINT18/INT0) PD2	4	25	PC2 (ADC2/PCINT10)
(PCINT19/OC2B/INT1) PD3	5	24	PC1 (ADC1/PCINT9)
(PCINT20/XCK/T0) PD4	6	23	PC0 (ADC0/PCINT8)
VCC	7	22	GND
GND	8	21	AREF
PCINT6/XTAL1/TOSC1) PB6	9	20	AVCC
PCINT7/XTAL2/TOSC2) PB7	10	19	PB5 (SCK/PCINT5)
(PCINT21/OC0B/T1) PD5	11	18	PB4 (MISO/PCINT4)
(PCINT22/OC0A/AIN0) PD6	12	17	PB3 (MOSI/OC2A/PCINT3)
(PCINT23/AIN1) PD7	13	16	PB2 (SS/OC1B/PCINT2)
(PCINT0/CLKO/ICP1) PB0	14	15	PB1 (OC1A/PCINT1)

Fig1: ATMEGA168[5]

#### B. FT232R - USB UART IC

The FT232R is the most recent device to be added to FTDI's scope of USB UART interface Incorporated Circuit Devices. The FT232R is a USB to serial UART interface with discretionary clock generator yield. Moreover, offbeat and synchronous bit blast interface modes are accessible. USB to serial plans utilizing the FT232R have been further rearranged by completely coordinating the outside EEPROM, clock circuit and USB resistors onto the device. The FT232R includes two new capacities contrasted and its antecedents, successfully making it a "3-in-1" chip for some application zones. The inside created clock (6MHz, 12MHz, 24MHz, and 48MHz) can be brought out of the device and used to drive a

microcontroller or outer rationale. A special number is blazed into the device amid production and is intelligible over USB, in this manner structuring the premise of a security dongle which can be utilized to shield client application programming from being duplicated. SIM300 is a Tri-band GSM/GPRS motor that chips away at frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz.

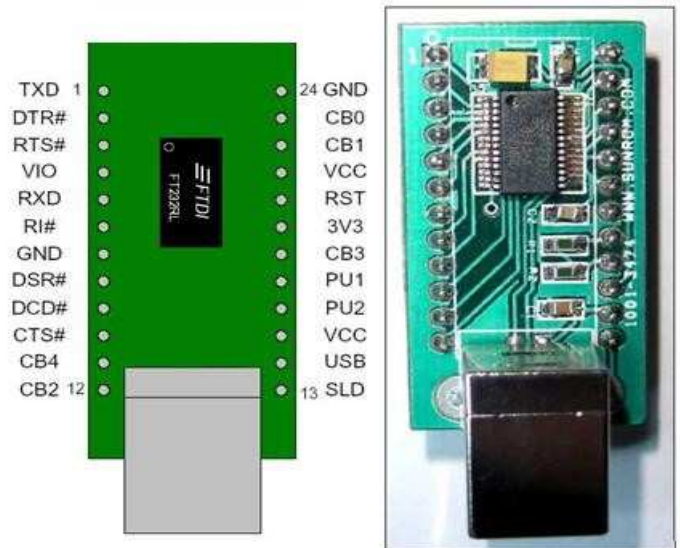


Fig3: FT232R - USB UART IC [6]

#### C. SIM 300 GSM Module

SIM300 gives GPRS multi-slot class 10 ability and backing the GPRS coding plans CS-1, CS-2, CS-3 and CS-4. With a little design of 40mm x 33mm x 2.85 mm, SIM300 can fit all the space necessity in your application, for example, Advanced cell, PDA telephone and other cell phone. The physical interface to the portable application is made through a 60 pins board-to-board connector, which gives all equipment interfaces between the module and clients' sheets with the exception of the RF radio wire interface.



Fig3: SIM 300 GSM Module [7]

#### **D. Digital camera**

A digital camera (or digicam) is a camera that encodes digital pictures and features digitally and stores them for later multiplication.. Most cameras sold today are digital, and digital cameras are fused into numerous devices extending from PDAs and cellular phones (called camera phones) to vehicles. Digital and film cameras impart an optical framework, normally utilizing a lens with a variable stomach to concentrate light onto a picture pickup device. The diaphragm and shutter concede the right measure of light to the imager, generally as with film however the picture pickup device is electronic as opposed to compound. In any case, dissimilar to film cameras, digital cameras can show pictures on a screen promptly in the wake of being recorded, and store and erase pictures from memory. Numerous digital cameras can likewise record moving features with sound. Some digital cameras can crop and stitch pictures and perform other rudimentary picture altering.



Fig4: Digital camera [4]

#### **4. CIRCUIT DIAGRAMS**

We have a single circuit, for the ATmega168 PCB and the other Components used .SIM300 Module is connected externally.

#### **E. Main Circuit Board**

Microcontroller is used to send SMS using SIM300 module.SIM300 is a GPRS GSM 800MHz module. Power supply to the controller is given through regulator IC 7805.The output of 7805 is filtered through a 100µf capacitor. 7805 takes input from battery above 5.7volts till 12 volts. The output is obtained at pin number 3 of 7805 which is +5 volts. For proper operation of IC ATMEGA168 pin number 1 should be pulled up to VCC through 10kΩ resistor. For communication between PC and microcontroller FT232 IC is used which converts serial RS232 communication to USB communication. For proper operation and synchronization between all the modules we connect 16MHz crystal at microcontroller pin number 9 & 10. ATMEGA works at same crystal frequency and executes 1 machine cycle in 1- T state. The communication speed between all the modules is 9600 bps. The microcontroller has 1 physical (hardware) communication port for communication & hence the second module (FT232) needs to be connected on software generated serial port through a library called soft serial.

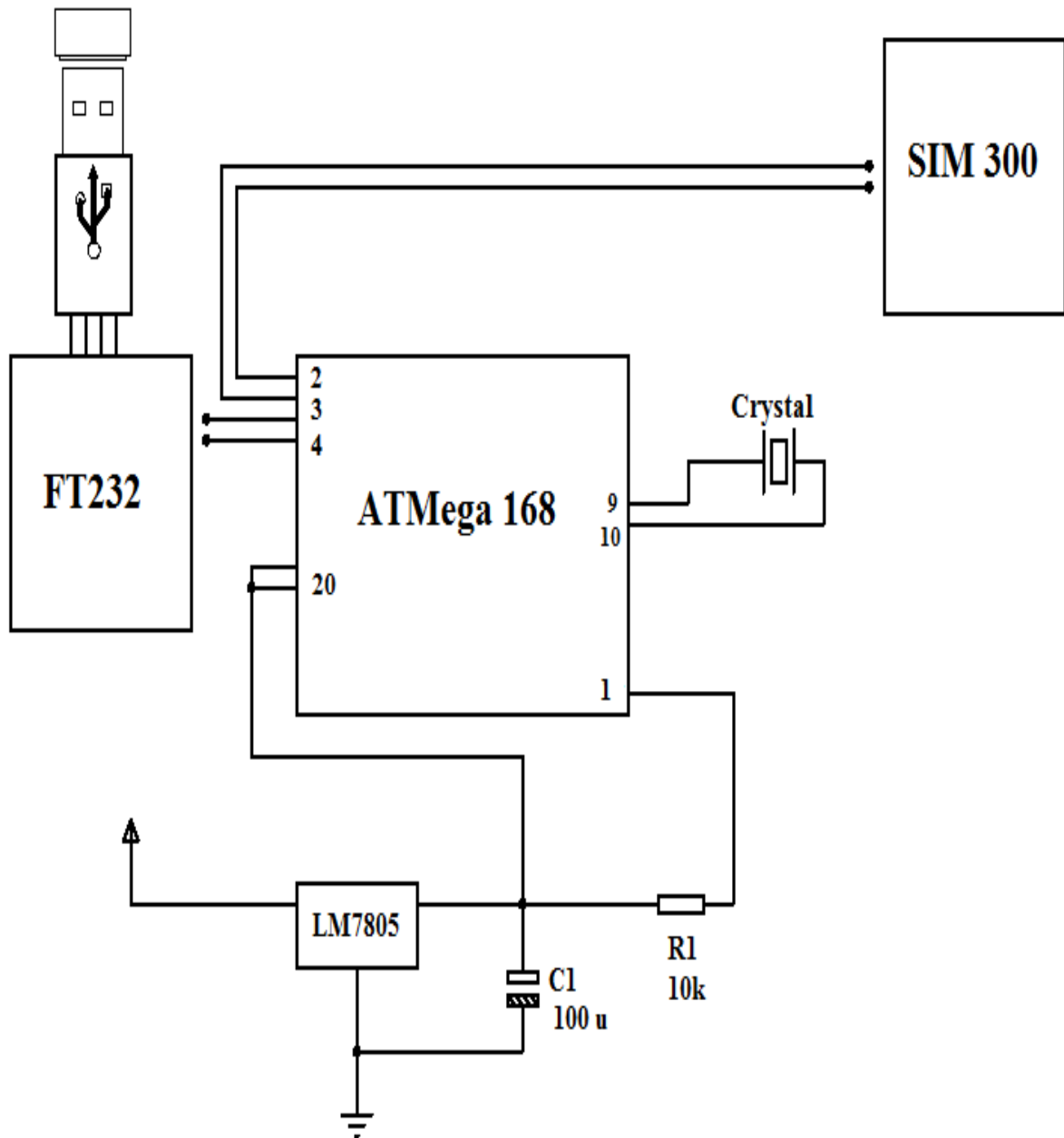


Fig5: Circuit Diagram

## 5. WORKING

Typically, Power supply is given to all the blocks as shown in the block diagram. Image acquisition system camera is used for recognition. Microcontroller is used as a major working component in the project. Also with face detection the admission form of patient gets automatically filled using our

project, when patient reaches the hospital. As hospitals already have centralized databases of patients and their medical history updated from their previous records from different hospitals linked to each other through internet. Along with the normal details of patient the medical history gets filled in the

admission form. Another facility this project provides is of sending the SMS to nearest police station in case of extreme cases. For this GSM module is used which automatically sends SMS due to previously programmed and filled details. Power supply is given to all the blocks as shown in the block diagram. Image acquisition system camera is used for recognition. FT232 is used to connect computer and microcontroller. It converts serial RS232 communication into USB communication. USB connection is used as an interface between camera and computer and is also used for brightness control of the LEDs on the camera. GSM module is used to send SMS to police in case of an accident. Microcontroller communicates to GSM module through RS232 which is a serial interface. Microcontroller is used to send SMS using SIM300 module. SIM300 is a GPRS GSM 800MHz module. Power supply to the controller is given through regulator IC 7805. The output of 7805 is filtered through a 100 $\mu$ f capacitor. 7805 takes input from battery above 5.7volts till 12 volts. The output is obtained at pin number 3 of 7805 which is +5 volts. For proper operation of IC ATMEGA 8/168/328 pin number 1 should be pulled up to VCC through 10k $\Omega$  resistor. For communication between PC and microcontroller FT232 IC is used which converts serial RS232 communication to USB communication. An approach to the detection and identification of human faces is presented, and a working, near-real-time face recognition system which tracks a subject's head and then recognizes the person by comparing characteristics of the face to those of known individuals is described. This approach treats face recognition as a two-dimensional recognition problem, taking advantage of the fact that faces are normally upright and thus may be described by a small set of 2-D characteristic views. Face images are projected onto a feature space ('face space') that best encodes the variation among known face images. The face space is defined by the 'eigenfaces', which are the eigenvectors of the set of faces; they do not necessarily correspond to isolated features such as eyes, ears, and noses. The framework provides the ability to learn to recognize new faces in an unsupervised manner. For proper operation and synchronization between all the modules we connect 16MHz crystal at microcontroller pin number 9 & 10. ATMEGA works at same crystal frequency and executes 1 machine cycle in 1- T state. The communication speed between all the modules is 9600 bps. The microcontroller has 1 physical (hardware) communication port for communication & hence

the second module (FT232) needs to be connected on software generated serial port through a library called soft serial.

## **6. OTHER APPLICATIONS**

Apart from being a great time and life-saver, it can also be used for other applications as well.

## **F. Maintaining Databases of All Patients**

Good records care also ensures the hospital's administration runs smoothly: unneeded records are transferred or destroyed regularly, keeping storage areas clear and accessible; and key records can be found quickly, saving time and resources. Records also provide evidence of the hospital's accountability for its actions and they form a key source of data for medical research, statistical reports and health information systems.

## **G. Hospital's Connected**

Hospitals Can have their databases of patients shared with other hospitals and can be accessed and produced whenever required though the internet which can have encryption on both the ends to avoid any forgery. Thus Many hospitals benefit by having a common and shared databases, instead of having huge databases which cannot be shared.

## **H. Knowing a Patients's full medical history.**

By maintain databases a patient's medical history is know before operating on this patient. This hugely reduces the chances of wrong medication according to the Patient's Allergies, diabetes ,blood group or any other medical condition that should be know prior to operation.

## **7. ADVANTAGES/DISADVANTAGES**

### **I. Advantages**

- 1) This project saves a lot of time and hence this proves as a "lifesaving system" to people.
- 2) The project also provides the feature of "automatic history" of patient can be known .
- 3) The project is not a very complex apparatus and hence is "portable".
- 4) This project is very efficient and also is quite "cost efficient".
- 5) Along with all these features it has got a very special feature of "sending SMS automatically" to police..

### **J. Disadvantages**

- 1) One of the most important drawback of the project is in this, databases are required.
- 2) Along with this a Personal Computer, available all the time is required for referring databases history.
- 3) For sending SMS GSM network is must in this project

## **8. FUTURE SCOPE**

Technology is perhaps the greatest agent of change in the modern world. While never without risk, technological breakthroughs promise innovative solutions to the most pressing global challenges of our time. The A.S.H.A. is a prototype that can be developed further using enhanced technologies. The monitoring and control can be made easy

using better cameras with higher wireless range and better sensors. Also, by using other biometric sensors other parameters such as blood pressure, body temperature, blood sugar level can also be implemented further widening its use. Databases that can be shared between multiple hospitals both locally or internationally can also reduce the burden of maintain huge databases single-handedly. Also, by using it with the prevalent implementations used by the government such as ADHAAR CARD, the impact and the overall use of our A.S.H.A prototype can be increased by many folds. Our prototype is focused on achieving an uninterrupted flow of patients and information around hospitals. Complete, accurate and timely information prior to admission is a foundation of patient flow. Ideal for use by general, maternity, and pediatric patients, eAdmissions is fully customizable according to patient type and admitting facility. A wizard guides patients smoothly through the process presenting only relevant questions. The system can be used for both pre-admission registration as well as on-site check-in.

## 9. CONCLUSION

Handwritten pre-admissions forms are laborious and often perplexing for patients. Completing and sending the required forms can take considerable time. Frustratingly for frequent hospital visitors, a new set of forms is required for each new admission. Paper forms also cause trouble on the receiving end. These problems include; illegibility, lateness and information incorrectly entered. Administrative staff entering information into the hospital record system must decipher poor hand writing and often need to chase missing or unclear information. These delays and ambiguities make it difficult for hospitals to finalize pre-admission activities, plan resources effectively, and when doctors can't access a complete and accurate clinical history, may negatively impact care quality. This system is very useful for critical condition patients after meeting accidents. Our Project is focused on achieving an uninterrupted flow of patients and information around hospitals. Complete, accurate and timely information prior to admission is a foundation of patient flow. Patients benefit from superior convenience, support and privacy. Hospitals benefit from timely and complete information that is validated and provided in an electronic format ready for automated transfer to hospital information systems. The Need For Personal Computer for this can be avoided with stand-alone system using microcontroller like ARM system. Database can be made compulsory for all the doctors throughout the world.

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