An Embedded System Design for Early Diagnosis of Aspermia Using Artificial Intelligence System

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ABSTRACT:

In advanced medical diagnosis system, infertility conditions are detected in early stages with high precision. Sperm count in male is one of the major parameter to determine infertility. One of the challenging tasks is to provide clear cut algorithm and instantaneous results. For possible tests on fertility, it is very essential to determine the sperm cell count, volume of the cell, sperm motility, presence of leukocytes and finally the shape of the sperm. Any abnormal condition affects count, shape, movement and volume of the sperm in semen. Medical conditions like Oligospermia, Aspermia and Hypospermia affect the sperm cell count. Teratospermia indicates the presence of abnormal morphological sperm when observed from microscope. Asthenozoospermia and Necrospermia affect the movement of the sperm. Presence of huge number of leucocytes in seminal fluid affects sperm motility which is termed as leucospermia. normozoospermia is a terminology given for normal sperm which is normal in appearance and function and it is a normal characteristic exhibited by semen in seminogram. Finally, an embedded system-based approach becomes inevitable to detect the anomalous condition and develop an early diagnosis system for infertility and also evolve the conventional microscope on a large-scale.

KEY WORDS: USB 2.0 camera processor (VC0346), Quadrant 2 MPSOC Sensor,   Tablet
                 PC, Microscope

Introduction:

A prototype must be designed in order to determine the characteristics of sperm in the seminal fluid and also determines the abnormal conditions due to the change in the physical characteristics of the sperm. In accordance with semen analysis, the prototype has the ability to assist the microscope for normal operation with enlarged field of view. Any fertility related issues are taken great care but still most of the analyses are carried out manually. The main assessment of the sample must be done with the smart microscope which processes the image captured by the camera in the microscope and then used to determine the abnormal condition if any. Smart microscope has the tendency to capture the slide image and store them for future reference without the need for preserving the slides. It becomes indispensible to evolve the existing microscope to a smarter version in order to replace the manual efforts as well as increase the accuracy level of determination.

System Arrangement

Seamless integration of a 2-megapixel camera with a 10.1" tablet PC and powered by a Windows 8.1 OS, the SmartScope-X6 allows users to view live video, capture & measure images, and share documents with co-workers. For detail refer fig1. In an effort to guide the Clinical Technician's and to aid the futuristic Anemia Diagnosis Technology, I am creating this product with a collective knowledge of electronics and clinical parameters of a regular human to specialize the treatment.
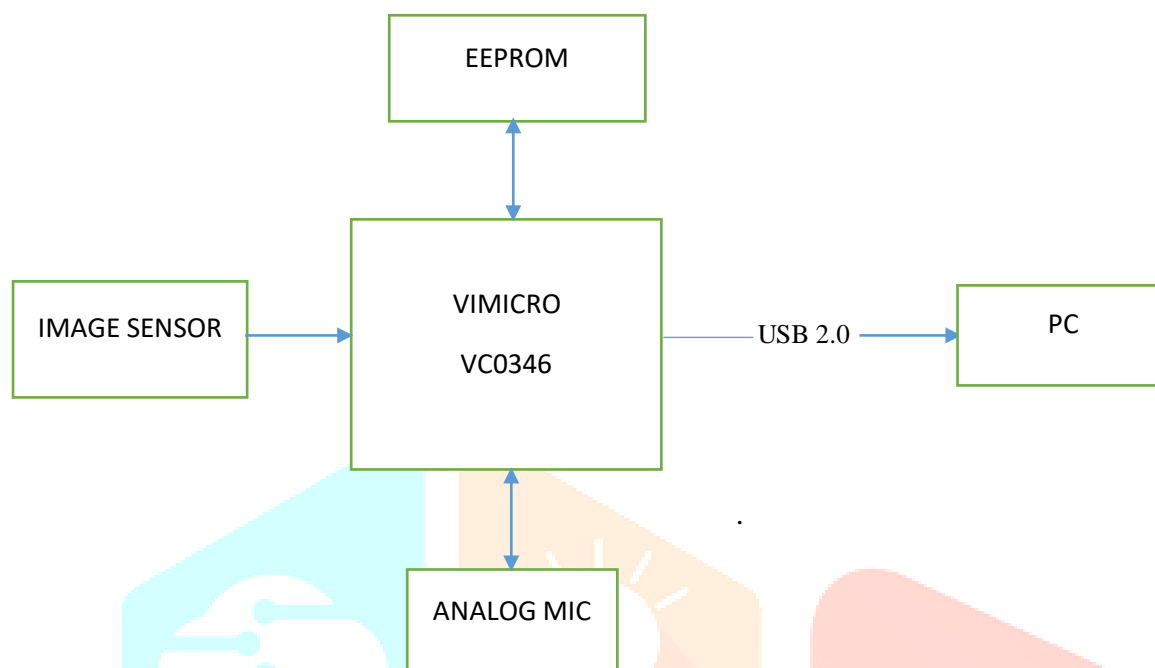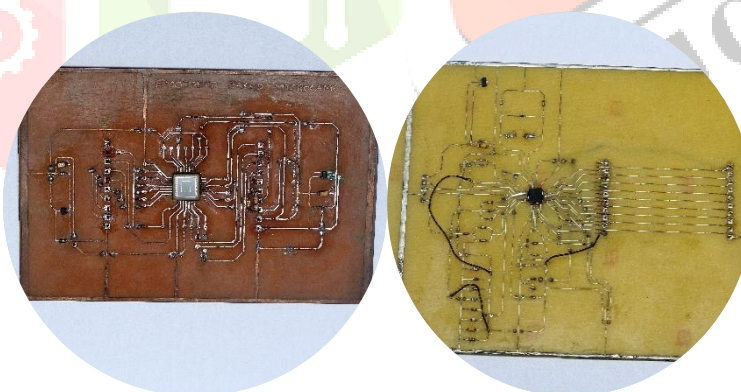
Fig.1 System block diagram

PCB Design

(a) Manual sensor board   (b) Manual Processor Board Design

Fig.2 PCB

We have designed PCB, which is depicted in fig2. Manual PCB Design Using Screen Printing was successfully achieved and proceeds to the next level for Multi-Layer PCB Designing

USED COMPONENTS:

HARDWARE:

- USB 2.0 camera processor (VC0346),.

- Quadrant 2 MP SOC Sensor.

- Tablet 10.1.

- PC widows 8.1.

- Microscope.

SOFTWARE:

- LabVIEW

- .net,c#

RESULT:

❑ Smart Scope X6 is the Name of the product which is successfully designed with the help of Embedded Systems.

❑ Example Images captured for different fields were given below in fig3

❑ Anemia Diagnosis software is under Testing in KMCH Hospital (Clinical Laboratory). A single anemic patient data with screenshot is attached below in fig4
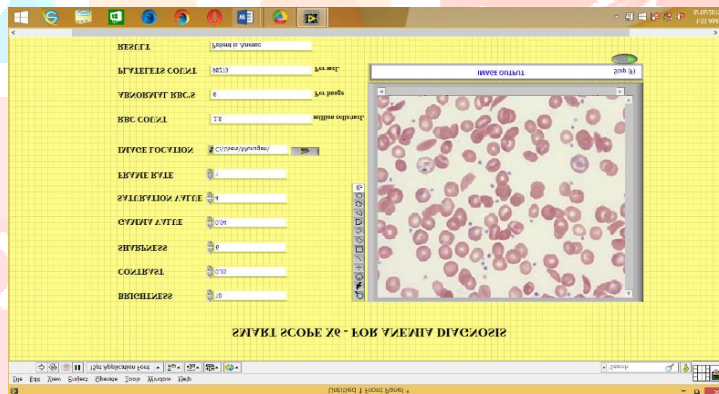
Fig.3 Example Images From Smart Scope X6
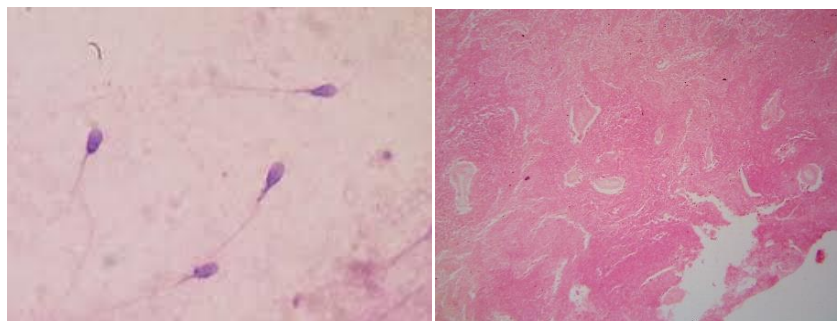
Aspermia sperm   Thyroid

Fig.4

CONCLUSION:

Based on my analysis these are the futuristic scope

01, Sperm Count Analysis

    Very Useful for Sperm Count analysis.

02, Hematology analysis.

    Useful to replace Hematology Instruments.

03, Cancer Stage Analysis.

    To identify different Stages of Cancer to reduce Biopsy Centre Laboratories work procedures.

04, Multiple Disease Analysis.

    Useful for handicapped people

REFERENCE:

1) ZEISS, GERMANY Virtual Reality Visualization of Complex Data Sets Acquired on ZEISS Microscopes Published: 12th November 2015 Note: Oculus Integration

2) OLYMPUS CORPORTAION, TOKYO Olympus Stream Published: 5th Aug 2014 Note: 1. Universal Software 2. Validation Code