Use of Simple Embedded Systems in

Automatic Washing Machine

Block Diagram:-

EMI

Filter

PFC Controller

Power Supply Unit

Transistor Array

Isolation & Gate Drivers

Valve

IPD

Motor Controller

Wireless Connectivity

IPM

BLDC

MCU

Sensor

Touch & Front Panel Controller

Haptics

Panel key / LED

Relay

Buzzer

Requirements of the device and component thus used:-

1. PFC Circuit: -

Requirement: - MOSFET is suitable for full switching solutions and microcomputer can be used for PFC control.

Component Selected: - DTMOS MOSFET is suitable for high efficiency power supply switching, photocoupler with excellent environmental resistance and MCU with low power consumption and high performance.

1. Main Motor Drive Unit: -

Requirement: - Motor drive circuit with high voltage can be realized to make it easy to drive a three phase brushless motor under inverter control, signal isolation is required

Component Selected: - Three-phase brushless DC motor driver and high voltage IPD alongwith transistor output photocoupler and fast recovery diode.

1. Communication Unit: -

Requirement: - Low RDYN characteristic, resistance to noise generated by the motor drive unit, prevent circuit malfunction and accurately capturing changes of consumption current.

Component Selected: - ESD protection diode (TVS) is significant indicator of ESD protection performance, TVS diode and Low noise operational amplifier.

1. Operational Unit:-

Requirement: - High current and high efficiency driver and low loss is suitable for driving LED or touch panel in operation unit.

Component Selected: - DMOS FET and transistor array.

Use of Simple Embedded Systems in

Smart Watch

Steps Measurement Sensor

Heart Beat Measurement Sensor

Bluetooth

Voltage Regulator

Micro Controller

Power Button

Humidity

Sensor

Accelerometer

Temperature

Sensor

Blood Pressure Monitoring

LCD (EPD/TFT)

Memory Chip

Requirements of the device and component thus used:-

1. Data acquisition or sensor subsystem: -

Requirements: -

Monitoring the motion of a human body in all dimensions.

For analog sensors conditioning and converting the analog signal to a digital signal that can be processed by the CPU.

Components Used: -

Complex one having a dedicated sensor hub to interface with the sensors SPI communication interface. Examples of these sensors include3-axis accelerometers, gyroscopes, magnetometers, and barometric altimeters, etc.

2. Hardware:-

Requirements:-

Stringent Power and performance requirements.

Components Used:-

Semiconductor Based Wearables Reference Platforms

3. User interface (UI) system: -

Requirements: - Interactions should be as intuitive as possible to minimize the complexity. Capacitive touch sensing is the most intuitive UI available today. Depending on the application, capacitive UI is implemented in many forms such as touch screens, buttons, and sliders.

Components Used: - UIelements such as LEDs, buzzers, and vibrating motors help to implement alerts and feedback from the device to the user. Pulsewidth modulation (PWM) is essential in driving these elements. PWM issued to implement various effects such as dimming on the LED and is also used to provide various vibration effects for haptic feedback. These techniques require accurate timing and frequent CPU attention if implemented in firmware. So it is important to choose a controller that supports hardware PWM.