I. INT~~O~~RODUCTION

~~The purpose of motor controls are to control the~~ The torque, speed, and position of a motor are controlled using a motor controller. ~~Because the t~~Torque generated by ~~of~~ the motor is proportional to the amount of current flowing through it~~.~~; therefore, direct~~ly~~ torque control ~~was~~ is ~~very~~ rarely used. In ~~almost every~~most applications, cascade control structure is used ~~as show in~~ (Fig. 1).

~~). This means that the~~ The ~~drive~~ electronic ~~drives~~ ~~that supplies~~ that controls the electrical energy supplied to the motor receives ~~gets~~ the control signal~~s~~ from the current controller, ~~that~~ which ~~gets~~ receives ~~it's set point~~its setpoint from ~~the~~ speed controller~~etc~~. The current controller is ~~called the~~ drive-specific~~, since~~ because its operation is ~~greatly~~ considerably ~~effected~~affected by the type of ~~the~~ motor. The position and speed ~~controller~~controllers are ~~called~~ task-specific because ~~it is~~they are ~~more~~ considerably affected by the motor-driven machine ~~being driven by the motor~~.

II. FUNDAMENTALS OF MOTOR CONTRO~~LLERS~~LS FUNDAMENTALS

In contrast to position controller or speed controller, ~~It is not necessary to use all three of the controls in all applications. In some cases position or speed control is not needed but~~ current controll~~er~~ is used in ~~every~~all ~~case~~applications~~. The reason of this is that the current control is not only~~ because it ~~ensuring~~ensures stable and controlled torque generation and current supply ~~but giving the possibility to limit the current of the machine, and with this function, it is able to be protected~~to prevent motor ~~from~~ overload [3~~]. The three controllers run at different speeds. For example the current controller is way faster than the speed controller.~~].

~~The f~~Feedback values of the ~~controlers~~ controllers ~~have to~~must be measured. ~~Measuring the c~~Current can be ~~completed~~measured ~~with~~ using a shunt resistor or a Hall ~~Effect~~ effect current transducer~~.~~, whereas ~~For~~ speed and position ~~measurement~~can be measured using quadrature encoders~~ can be used~~ [7-][10-]. ~~For position control usually proportional (P) or rarely proportional-diffrential (PD) controllers are used.~~The three controllers operate at different speeds; for example, the current controller is considerably faster than

the speed controller. ~~The type of the speed controller is usually p~~Proportional–integral (PI) controller is commonly used as a speed controller. For position control, usually proportional (P) controllers, or rarely proportional–differential (PD) controllers, are used. ~~We can get the current control with proportional integral (PI)~~ or hysteresis ~~hysteresys~~ controllers can be used for current control [8~~-~~].