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Instant Iot Aoutomatic Covid Testing Booth

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Abstract : In view of current pandemic Covid testing plays a key role in fighting the pandemic. The main aim of this project is to design a completely automated instant contactless Covid testing booth system by which person details is monitored using RFID technology. This project makes use of micro controller. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. We use controller memory to dump some set of assembly instructions. When the micro controller gets the data from the RFID Reader, Automatically the tag details related to the person along with the sample collection details will be sent as an SMS along with the test results to the stored mobile number. The system also provide both audible and visual alerts using LCD and Buzzer.

During the pandemic period, testing of Covid is a key role in order to fight the contagious virus. It is quite significant that this Covid testing is being carried out only in the Covid testing centers, but there are a lot of disadvantages with regard to manual testing methodology. The reason being some of the tests are time consuming and delayed, wherein it is subjected to human errors due to a large amount of sample collection.

IndexTerms **- KVR microcontroller, Power supply, RFID tag, RFID reader, Wi-Fi ESP8266 module, GSM modem,etc.**

I. INTRODUCTION

Internet of Things (IoT) is rapidly increasing technology. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity. which enables these objects to collect and exchange data. In this paper, we are developing a system which will automatically test the person with covid instantly with contactless testing booth. This project makes use of an onboard computer, which is commonly termed as micro controller. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The controller is provided with some internal memory to hold the code. This memory is used to dump some set of assembly instructions into the controller. And the functioning of the controller is dependent on these assembly instructions. The design of this system is very much sensitive and should be handled with utmost care because interfacing RFID reader and GSM to the micro controller is sensitive. So every small parameter should be given high importance while designing the interfacing circuit because if we use single sided board then lot of parts are being used in a small space then it may be difficult to make a single sided board without jumping over traces with a cable. The main idea is to design a completely automated instant contactless COVID testing booth system by which person details is monitored using RFID technology. It is used for ensuring the person details like name, aadhar scan specific information by which the system totally isolates the test person from the user and also makes the process fast and error free by automating registration process too. When the Micro controller gets the data from the RFID Reader, Automatically the tag details related to the person along with the sample collection details will be sent as an SMS along with the test results to the stored mobile number. Thus we fully automate the Covid booth testing process, making it faster, safer and error free to help fight the pandemic in a better manner.

II. LITERATURE SURVEY

loT-based System for COVID-19 Indoor Safety Monitoring In this paper, we introduce an affordable loT-based solution aiming to increase COVID-19 indoor safety, covering several relevant aspects: like contactless temperature sensing, mask detection, social distancing check. Contactless temperature sensing subsystem relies on Arduino Uno using infrared sensor or thermal camera, while mask detection and social distancing check are performed by leveraging computer vision techniques on camera-equipped Raspberry Pi. Jingyi Xiao Non-pharmaceutical Measures for Pandemic Influenza in Non-healthcare Settings Personal Protective and Environmental Measures review the evidence base on the effectiveness of non-pharmaceutical personal protective measures and environmental hygiene measures in non-healthcare settings and discuss their potential inclusion in pandemic plans although mechanistic studies support the potential effect of hand hygiene or face masks, evidence from 14 randomized controlled trials of these measures did not support a substantial effect on transmission of laboratory-confirmed influenza.

Sujithraa Sampath, Respiratory viruses like coronavirus disease (COVID-19) spread when mucus or droplets containing the virus get into your body through your eyes, nose or throat. The virus can spread from one person to the next, if a healthy person touches a

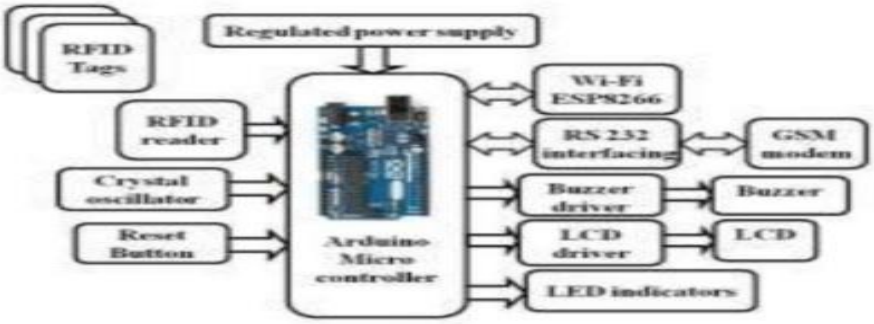
surface which was previously touched by an infected person. With this system in place, you can turn on or turn off your room lights just by entering or leaving the room.

Eftychios G. Christoforou, Medical telerobotic systems: current status and future trends This study presents a systematic review of the relevant literature between the years 2004 and 2015, focusing on medical tele operated robotic systems which have witnessed tremendous growth over the examined period. A thorough insight of tele robotics systems discussing design concepts, enabling technologies (namely robotic manipulation, telecommunications, and vision systems), and potential applications in clinical practice is provided, while existing limitations and future trends are also highlighted.

III. IMPLEMENTATION

IOT INSTANT CONTACTLESS COVED TESTING BOOTH AUTOMATION

3.1 Block diagram



The design can be implemented with following as we No need for separate registration, the system uses RFID technology for instant aadhar card scan registration details monitoring. The Test person provides the sample number of the person from inside the booth using provided RFID tag. The system uses buzzer to inform patient that his test is done and next person to come forward. The data collected by the time is transferred over to Lab using IOT ESP8266 Wi-Fi module automatically before next person comes ahead. The lab in-charge can view the no of samples tested in real time and can update sample test results too on IOT server through Wi-Fi module. When lab in-charge updates test result of a sample, an SMS using GSM modem is instantly sent to the respective person by the system itself. Thus we fully automate the Covid booth testing process, making it faster, safer and error free to help fight the pandemic in a better manner. This project makes use of an onboard computer, which is commonly termed as micro controller. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The controller is provided with some internal memory to hold the code. This memory is used to dump some set of assembly instructions into the controller. And the functioning of the controller is dependent on these assembly instructions.

3.1Population and Sample

KSE-100 index is an index of 100 companies selected from 580 companies on the basis of sector leading and market capitalization. It represents almost 80% weight of the total market capitalization of KSE. It reflects different sector company's performance and productivity. It is the performance indicator or benchmark of all listed companies of KSE. So it can be regarded as universe of the study.Non-financial firms listed at KSE-100 Index (74 companies according to the page of KSE visited on 20.5.2015) are treated as universe of the study and the study have selected sample from these companies.

The study comprised of non-financial companies listed at KSE-100 Index and 30 actively traded companies are selected on the bases of market capitalization.And 2015 is taken as base year for KSE-100 index.

3.2 Data and Sources of Data

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE - 100 Index is taken from yahoo finance.

3.3 Theoretical framework

Variables of the study contains dependent and independent variable. The study used pre-specified method for the selection ofvariables. The study used the Stock returns are as dependent variable. From the share price of the firm the Stock returns are calculated. Rate of a stock salable at stock market is known as stock price.

Systematic risk is the only independent variable for the CAPM and inflation, interest rate, oil prices and exchange rate are the independent variables for APT model.

Consumer Price Index (CPI) is used as a proxy in this study for inflation rate. CPI is a wide basic measure to computeusualvariation in prices of goods and services throughout a particular time period. It is assumed that arise in inflation is inversely associated to

security prices because Inflation is at lastturned into nominal interest rate andchange in nominal interest rates caused change in discount rate so discount rate increase due to increase in inflation rate and increase in discount rateleads todecreasethe cash flow's present value (Jecheche, 2010). The purchasing power of money decreased due to inflation, and due to which the investors demand high rate of return, and the prices decreased with increase in required rate of return (Iqbal et al, 2010).

Equations

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I. RESEARCH METHODOLOGY

The methodology section outline the plan and method that how the study is conducted. This includes Universe of the study, sample of the study,Data and Sources of Data, study's variables and analytical framework. The detailsare as follows;

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Exchange rate is a rate at which one currency exchanged with another currency. Nominal effective exchange rate (Pak Rupee/U.S.D) is taken in this study.This is assumed that decrease in the home currency is inverselyassociated to share prices (Jecheche,2010). Pan et al. (2007) studied exchange rate and its dynamic relationship with share prices in seven East Asian Countries and concludethat relationshipof exchange rate and share prices varies across economies of different countries. So there may be both possibility of either exchange rate directly or inverselyrelated with stock prices.Oil prices are positively related with share prices if oil prices increase stock prices also increase (Iqbal et al, 1012).Ataullah (2001) suggested that oil prices cause positive change in the movement of stock prices. The oil price has no significant effect on stock prices (Dash & Rishika, 2011).Six month T-bills rate is used as proxy of interest rate. As investors arevery sensitive about profit and where the signals turn into red they definitely sell the shares. And this sensitivity of the investors towards profit effects the relationship of the stock prices and interest rate, so the more volatility will be there in the market if the behaviors of the investors are more sensitive. Plethora (2002)has tested interest rate sensitivity to stock market returns, and concluded an inverse relationship between interest rate and stock returns. Nguyen (2010) studies Thailand market and found thatInterest rate has aninverse relationship with stock prices.

KSE-100 index is used as proxy of market risk. KSE-100 index contains top 100 firms which are selected on the bases of their market capitalization. Beta is the measure of systematic risk and has alinear relationship with return (Horn, 1993). High risk is

associated with high return (Basu, 1977, Reiganum, 1981 and Gibbons, 1982). Fama and MacBeth (1973) suggested the existence of a significant linear positive relation between realized return and systematic risk as measured by β. But on the other side some empirical results showed that high risk is not associated with high return (Michailidis et al. 2006, Hanif, 2009). Mollah and Jamil (2003) suggested thatrisk-return relationship is notlinear perhaps due to high volatility.

3.4Statistical tools and econometric models

This section elaborates the proper statistical/econometric/financial models which are being used to forward the study from data towards inferences. The detail of methodology is given as follows.

3.4.1 Descriptive Statistics

Descriptive Statics has been used to find the maximum, minimum, standard deviation, mean and normally distribution of the data of all the variables of the study. Normal distribution of data shows the sensitivity of the variables towards the periodic changes and speculation. When the data is not normally distributed it means that the data is sensitive towards periodic changes and speculations which create the chances of arbitrage and the investors have the chance to earn above the normal profit. But the assumption of the APT is that there should not be arbitrage in the market and the investors can earn only normal profit. Jarque bera test is used to test the normality of data.

3.4.2 Fama-Mcbeth two pass regression

After the test statistics the methodology is following the next step in order to test the asset pricing models. When testing asset pricing models related to risk premium on asset to their betas, the primary question of interest is whether the beta risk of particular factor is priced. Fama and McBeth(1973)develop a two pass methodology in which the beta of each asset with respect to a factor is estimated in a first pass time series regression and estimated betas are then used in second pass cross sectional regression to estimate the risk premium of the factor. According to Blum (1968) testing two-parameter models immediately presents an unavoidable errors-in-the variables problem.It is important to note that portfolios (rather than individual assets) are used for the reason of making the analysis statistically feasible.Fama McBeth regression is used to attenuate the problem of errors-in-variables (EIV) for two parameter models (Campbell, Lo and MacKinlay, 1997).If the errors are in the β (beta)of individual security are not perfectly positively correlated, the β of portfolios can be much more precise estimates of the true β (Blum, 1968).

The study follow Fama and McBeth two pass regressionto test these asset pricing models.The Durbin Watson is used to check serial correlation and measures the linear association between adjacent residuals from a regression model. If there is no serial correlation, the DW statistic will be around 2. The DW statistic will fall if there is positive serial correlation (in worst case, it will be near zero). If there is a negative correlation, thestatistic will lie somewhere between 2 and 4. Usually the limit for non-serial correlation is considered to be DW is from 1.8 to 2.2. A very strong positive serial correlation is considered at DW lower than 1.5 (Richardson and smith, 1993).

According to Richardson and smith(1993) to make the model more effective and efficient the selection criteria for the shares in the period are: Shares with no missing values in the period, Shares with adjusted $R^2 < 0$ or F significant (p-value) >0.05of the first pass regression of the excess returns on the market risk premium are excluded. And Shares are grouped by alphabetic order into group of 30 individual securities (Roll and Ross, 1980).

3.4.2.1 Model for CAPM

In first pass the linear regression is used to estimate beta which is the systematic risk.

$$R_i - R_f = (R_m - R_f)\beta \qquad (3.1)$$

Where $R_i$isMonthly return of thesecurity, R_f isMonthly risk free rate, R_m isMonthly return of market and βis systematic risk (market risk).

The excess returns R_i - R_f of each security is estimated from a time series share prices of KSE-100 index listed shares for each period under consideration. And for the same periodthe market Premium R_m - $R_f$also estimated. After that regress the excess returns R_i - R_f on the market premium R_m - $R_f$to find the beta coefficient (systematic risk).

Then a cross sectional regression or second pass regression is used on average excess returns of the shares and estimated betas.

$$\hat{R}_i = \gamma_0 + \gamma_1\beta_1 + \epsilon \qquad (3.2)$$

Where λ_0= intercept, $\hat{R}_I$is average excess returns of security i,$\beta_I$isestimated be coefficient of security I and Є is error term.

3.4.2.2 Model for APT

In first pass the betas coefficients are computed by using regression.

$$R_i - R_f = \beta_i f_1 + \beta_{i2} f_2 + \beta_{i3} f_3 + \beta_{i4} f_4 + \epsilon \qquad (3.3)$$

Where Ri is the monthly return of stock i,R_f is risk free rate, β_i is the sensitivity of stock i with factors and ϵ is the error term.

Then a cross sectional regression or second pass regression is used on average excess returns of the shares on the factor scores.

$$\hat{R} = \gamma_0 + \gamma_1\beta_1 + \gamma_2\beta_2 + \gamma_3\beta_3 + \gamma_4\beta_4 + \epsilon_i \qquad (3.4)$$

Where$\hat{R}$ is average monthly excess return of stock I, λ = risk premium, β_1 to β_4 are the factors scores and ε_i is the error term.

3.4.3 Comparison of the Models

The next step of the study is to compare these competing models to evaluate that which one of these models is more supported by data.This study follows the methods used by Chen (1983), the Davidson and Mackinnon equation (1981) and the posterior odds ratio (Zellner, 1979) for comparison of these Models.

3.4.3.1 Davidson and MacKinnon Equation

CAPM is considered the particular or strictly case of APT. These two models are non-nested because by imposing a set of linear restrictions on the parameters the APT cannot be reduced to CAPM. In other words the models do not have any common

variable. Davidson and MacKinnon (1981) suggested the method to compare non-nested models. The study used the Davidson and MacKinnon equation (1981) to compare CAPM and APT.
This equation is as follows;

$$R_i = \alpha R_{APT} + (1-\alpha) R_{CAPM} + e_i \qquad (3.5)$$

Where$R_{i=}$ the average monthly excess returns of the stock i, $R_{APT=}$ expected excess returns estimated by APT, $R_{CAPM=}$ expected excess returns estimated by CAPM and α measure the effectiveness of the models. The APT is the accurate model to forecast the returns of the stocks as compare to CAPMif α is close to 1.

3.4.3.2 Posterior Odds Ratio

A standard assumption in theoretical and empirical research in finance is that relevant variables (e.g stock returns) have multivariate normal distributions (Richardson and smith, 1993). Given the assumptionthat the residuals of the cross-sectional regression of the CAPM and the APT satisfy the IID (Independently and identically distribution) multivariate normal assumption (Campbell, Lo and MacKinlay, 1997), it is possible to calculate the posterior odds ratio between the two models.In general the posterior odds ratio is a more formal technique as compare to DM equation and has sounder theoretical grounds (Aggelidis and Maditinos, 2006).
The second comparison is done using posterior odd radio. The formula for posterior odds is given by Zellner (1979) in favor of model 0 over model 1.
The formula has the following form;

$$R = [ESS_0/ESS_1]^{N/2} N^{K_0 - K_1/2} \qquad (3.6)$$

WhereESS_0iserror sum of squares of APT, ESS_1iserror sum of squares of CAPM, Nisnumber of observations, $K_0$is number of independent variables of the APT and K_1 isnumber of independent variables of the CAPM.As according to the ratio when;
R> 1 means CAPM is more strongly supported by data under consideration than APT.
R < 1 means APT is more strongly supported by data under consideration than CAPM.

IV. RESULT

The project "IOT INSTANT CONTACTLESS COVID TESTING BOOTH AUTOMATION" was designed a completely automated instant contactless COVID testing booth system by which person details are monitored using RFID technology. The data collected by the time is transferred over to Lab using IOT ESP8266 Wi- Fi module automatically before next person comes ahead. The lab in-charge can view the no of samples tested in real time and can update sample test results too on IOT server through Wi-Fi module along with test result of a sample. an SMS using GSM modem is instantly sent to the respective person by the system itself

II. ACKNOWLEDGMENT

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