

ROBOTIC COMPUTERIZED SYSTEM REVOLUTIONIZED MACHINE-MAN INTERACTION

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Abstract— A major technological breakthrough has been achieved with the invention of a software for a “Robotic” real-time fully automated computerized system which has revolutionized the interaction between “Machine”(Computer) and “Man”(human participants of the system) by using AI in a novel kind of way. For the first time in computing history “Machine” acts as the sole driving force in the interaction with “Man” by dictating them to do tasks, then monitoring their performance and taking necessary action for any delay.

Index Terms—Artificial Intelligence, Computing, Real-Time System, Robotic



1 INTRODUCTION

THIS article relates to an invention in a hitherto unknown field of computing which is “Robotic Computerized Real-Time System” with total responsibility for conducting, dictating and monitoring tasks of human operators involved in the system. The robotic system acts as the sole driving force in performing business operations as distinct from the currently prevailing online “Real-Time” systems [1] that are only for aiding the business of the organisation without any impact on the activities of their staff.

Truly of late we have experienced a phenomenal advancement in computerized online real-time systems like online banking and ordering of goods, and also in other fields of “Robotics” [2] such as human like robots. However in all of these cases, interaction between “Man” and “Machine” is controlled by “Man” for getting benefit, help or entertainment offered by the “Machine”. Activities of the “Machine” are restricted to the limitations set by “Man”, be it a real-time computerized system offering online facilities or be it a robot behaving like human.

Up until now a robot in any form can not dictate and pursue human operators to carry out tasks. Some online banking systems may send alerts to customers for taking an action or else face a penalty payment but can never pursue them to get things done.

This robotic computerized system which has been patented [3] in USA, works in the totally opposite direction where “Machine” is in the driving seat conducting the operations as the sole driver. In doing so the robotic computerized system dictates human operators to perform a job, monitors their performance and if they fail to complete the job on

time, reports the matter to the designated high authorities via links that are set up in the system. These higher authorities are supposed to respond with their advice to resolve the issue. But even that type of interaction for seeking human advice is driven by the robotic system itself and not imposed by any human operator of the system. Furthermore the responsibility of human authority is limited only to giving advice to the robotic system about what to do under the circumstances while the system still drives and controls operations including those advised by the authorities who only play a passive role.

2 LEARNS AI AS SYTEM GOES ON – A NOVELTY

Artificial Intelligence (AI) [5] is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence.

There have been numerous applications of AI of diverse nature recently but ideally the importance of AI lies in its capability to expand and exceed human like intelligence rather than copying and retaining just what has been taught. In this regard this robotic system is quite outstanding because it not only dynamically learns new intelligence while contacting higher authorities for solving a problem during live operation, but can also apply this knowledge to resolve similar or nearly similar issues later by itself.

3 SALIENT FEATURES OF ROBOTIC SYSTEM

This invention of a robotic computerized system is the first endeavour to make “Machine” the dominating force in interaction with “Man”. It is a fully automated 24x7 real-time system managing the business

operations under its responsibility of all types of organisations, private or governmental. The following are the salient features of the “Robotic System”.

3.1 Machine Driven

“Machine” based computerized system replaces “Man” to become the sole driving force in carrying out business operations under its responsibility of any organisation involving both “Man” and “Machine”. The robotic system takes full charge of conducting and managing the relevant business operations and for the first time “Man” can leave management of all such operations entirely to “Machine” which works 24x7 in real time. *This machine based robotic manager doesn't need any break or holiday that humans need for biological necessity.*

3.2 Use of Servomechanism Principle Suitably Adapted for Automation of Non-Mechanical System

Age-old “Principle of Servomechanism” [4] that was applied with great success in the automation of mechanical machines in the early days has been used in this new technology by adapting it to suit the non-mechanical system. The adapted principle still works as a “Closed Loop Auto Generated Feedback Control System” for automatically generating feedback for driving the next activity, but instead of correcting motion in mechanical instruments based on error signal in the feedback, it takes next appropriate action indicated by the feedback automatically without any need for human prompt and interference at any stage.

This technique imparts the vital and essential capability to the system to work fully automatically like a “Robot” in carrying out and controlling the operational activities that include involvement of human operators.

The system controls activities of human operators involved by directing them to do tasks, and then by monitoring their performance and taking necessary action for any delay.

3.3 Elaboration of Adapted Closed Loop Auto-Generated Feedback Control System

To reiterate, the ability of the robotic system to conduct business activities automatically by acting as the main driving force has been possible due to automation of the software by the adapted principle of servomechanism. This is a kind of AI to enable the system to generate feedback automatically from its own data tables which are initially set up with basic intelligence about the organisation's operating rules and policies that include conditional alternative actions. The feedback generated from within itself

depending on the condition prevailing at a certain point in time determines the next activity to be conducted. The adapted servomechanism closed loop feedback control system of this non-mechanical real-time business machine works round the closed loop in the following manner.

Initial Activity: Upon receiving a notification about an external event triggering commencement of a new business operation, the system conducts the initial activity for that kind of business operation from the intelligence stored in its dataset.

Generates Feedback: Generates a feedback from within itself to identify the immediate next activity required to be conducted.

Conducts Feedback Activity: Conducts the activity indicated by the last feedback.

Repeats Generation of Feedback: Repeats the step “Generates Feedback” thus closing the loop.

Continues Round Closed Loop: The system continues to do the above steps successively in cycles round the closed loop until the system generates a feedback that identifies a terminator activity of that occurrence of the business operation.

Such application of servo-mechanism principle in non-mechanical systems has not yet been conceived anywhere but is a revolutionary technology for automation of non-mechanical computerized business systems like this one.

3.4 Ongoing Acquirement of Artificial Intelligence from Human Authorities

Every operation under the scope of this system is driven solely by this robotic system with the basic intelligence stored in its database. Role of human operators is limited to inform the robotic system about all relevant external events and confirmation of completion of jobs assigned to them. However, if any job is not completed on time by the human operators creating a stalemate situation, the robotic system requires further intelligence about how to resolve the issue. In such cases the necessary advice is sought from the designated higher human authorities of the organisation via “HIG” (Human Interface Gateway) system as outlined in the Section 3.5.

This ongoing acquirement of AI in real time is a novel technique not practised anywhere yet but is extremely useful for robotics of any kind. It not only provides more wisdom to the robotic system for resolving similar situations in future but also enables it to remain in control of the business operations while human authorities only play a passive role.

3.5 Architecture of Communication System “Human Interface Gateway(HIG)” In-between “Machine” and “Man”

The robotic system conducts and dictates what tasks need to be done where and how by human operators. Any requirement of human involvement is initiated by the automated control system with alert passed to them, through the “Human Interface Gateway” (HIG) system for two way communication between the automated system and human operators. On completion of a job, human operators send confirmation through the same.

However, If a stalemate situation arises because of failure of human operators to complete a job on time, the automated system reports the matter to the designated higher authorities seeking their advice. Two way communication with the designated higher authorities is also done via the HIG.

The most notable aspect of the HIG is that it symbolises dominance of the automated system over human counterpart. Human operators including even higher authorities cannot send commands directly to the “Machine” but only allowed formatted messaging via HIG System.

The design of the robotic system makes a total segregation of “Automated System Operation” and “Human Operators”. Fig. 1 depicts the segregation of the robotic “Automated System Operation” and “Human Operators” with HIG system in-between for interaction.

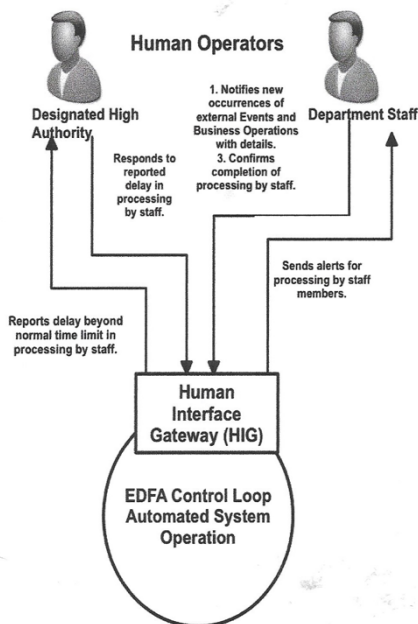


Fig.1. Segregation of “Machine” (Automated System) and “Man” (Human Operators) with HIG in-between.

HIG will format and forward all outgoing messages from the automated system to the relevant departments or designated high authorities. Alerts to human operators are sent directing to carry out specific tasks assigned to them. Messages to the designated high authorities are about any delay in the tasks being performed by human operators.

HIG will transfer all incoming messages received from human operators in proper format to the automated system. These include notifications of new external events that trigger new business operations, replies to earlier alerts sent to concerned departments confirming completion of tasks by the human operators and advice from high authorities in response to reports about delay in performing jobs assigned to human operators.

4 PROTOTYPE OVERVIEW

A prototype of the robotic computerized system has been built and simulated to demonstrate its workability and the distinctive features in conducting business activities for one example of business operation.

For getting the robotic system built and running for any business, there are three stages.

4.1 Stage 1 – Business Activity Flowchart

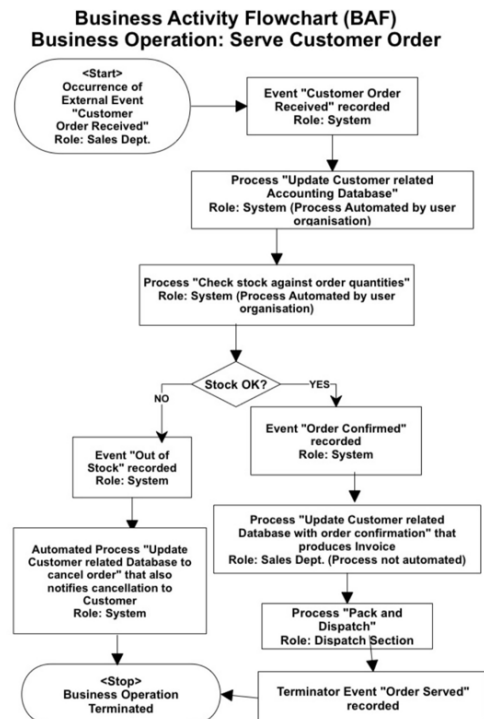


Fig. 2. Example of a Business Activity Flowchart (BAF)

“Business Activity Flowchart” (BAF) is a flowchart showing the conditional branching of the sequences of events and processes based on the procedures and policy of the organisation in regard of a business operation. In the initial setup stage of the installation of the system, such BAFs for all relevant business operations are required to be prepared by the user organisation. Fig. 2 is an example of a BAF.

4.2 Stage 2 – Impart Basic intelligence

In this stage the information contained in the BAF for business activities (Processes and Events) is fed to a built-in program of the software to create and populate data tables imparting the basic intelligence about the policies and procedures of the organisation relating to the chosen business operation.

4.3 Stage 3 – Feedback Closed Loop System

In this stage the live system is up and running. Working of “Feedback Closed Loop Control System” is simulated in this stage for the chosen business operation and the details are shown in Fig. 3/1 *which is continued to Fig. 3/2.*

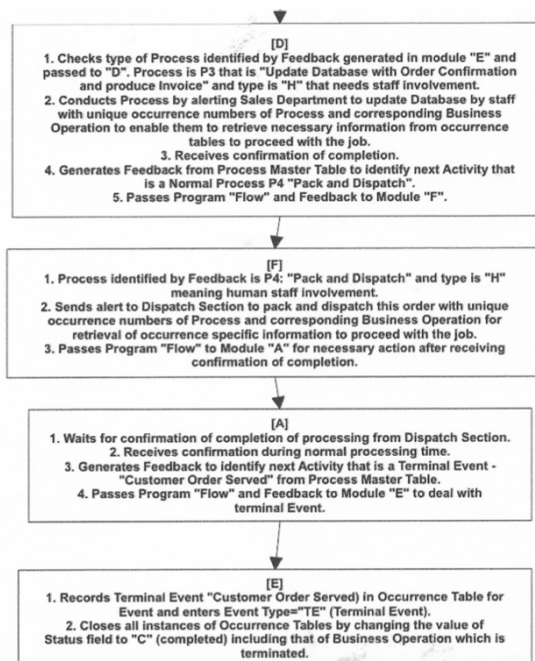


Fig.3/2 (Prototype Stage 3) Continuation from Fig. 3/1.

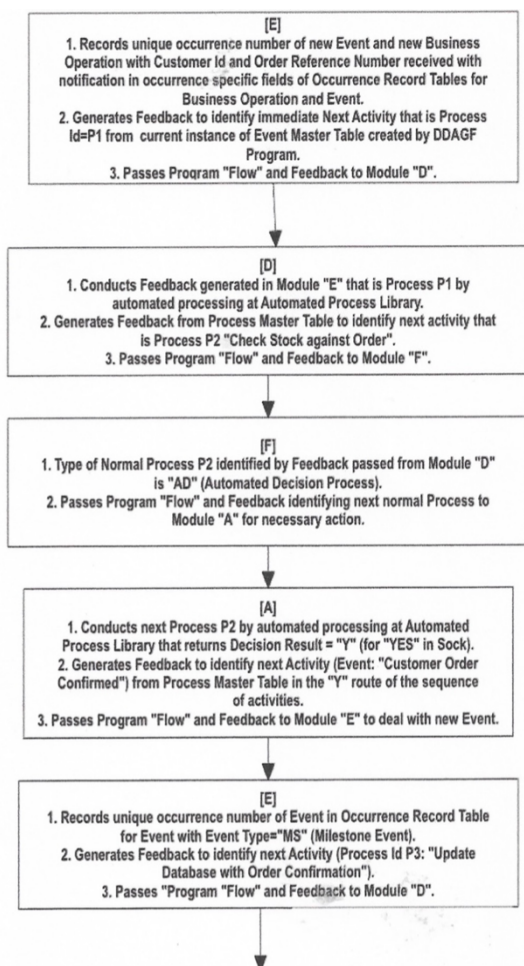


Fig.3/1 (Prototype Stage 3) Working of the Feedback Closed Loop Control System continued to Fig. 3/2.

Module [E] is for storing information about “Event”, [D] for “Accounting Database Update” (see Section 5.2), [F] for generation of “Feedback” and [A] for “Action” to conduct the next activity identified in “Feedback”. Modules [F] and [A] are the two essential components of the closed loop operation. Module [E] stores information about external events including those triggering new business operations and also all internal events which are mainly the results after completion of the previous processing activities such as “Order Served” event after a successful “Pack and Dispatch” process.

5 PROCESS AUTOMATION

Although this robotic system does not have any role regarding automation of processes, such automation helps it to work more efficiently.

5.1 Automated Process Library(APL)

There is an “Automated Process Library” (APL) of executable programs of automated processes in the system that do not require any human involvement for execution. Any of such processes is instantly and automatically triggered by the robotic system from the APL whenever this needs to be conducted by the system with substantial saving in time and manpower. So as more processes are added to this library avoiding any human involvement, the merrier for the system

5.2 Accounting Database Update

One example of processes that are usually carried out by members of staff in the IT department is to update accounting databases of the organisation at different points during business operational activities. This is usually done in an online dialogue session by feeding necessary data as prompted on the screen. This practice is not only time consuming but can also seriously affect subsequent important financial transactions such as invoicing or payment if not updated timely. Nowadays this dialogue session can be converted into a batch process with necessary data being fed automatically at appropriate points to replicate dialogue session. Such batch processes can be added to the APL with considerable benefit.

Although "update accounting database" is a process activity like other processes for the closed loop control system, this is handled by this robotic system in a separate module [D] by either alerting appropriate staff to do manually or executing batch process from the APL.

6 FUTURE PROSPECTS

Future prospects of using this technology is truly mind-blowing. Some of the exciting applications envisaged in future are listed here.

6.1 Anti-Corruption System

In some of the developing countries a substantial portion of fund allocated by the government to development projects for construction of roads, bridges, hospitals and others gets "eaten" away through shameful "racket" that exists for dishonest way of making money involving some unscrupulous administrators, suppliers, contractors and even politicians.

A Robotic computerized administrator can prevent such misappropriation by contacting and engaging third party experts for checking quality of different aspects of the project such as materials supplied and construction work done.

A paper [6] relating to this aspect was submitted at the IFORS(International Federation of OR Societies) conference held at Queens College, Cambridge in 1989.

6.2 Pandemic Trace and Track System

A computer ridden robotic manager can be linked to all mobile networks with authorisation to trace contacts of any mobile number. When a patient is confirmed positive after pandemic test, immediately the robotic manager will take over, find their appropriate contact details from the relevant network

and send notifications to them to start prescribed quarantine procedure as necessary and also inform corresponding enforcement authorities such as Police in case they do not respond or comply.

The computerized robotic system works in 24x7 real time and the actions are instantaneous no matter how many cases are handled simultaneously which is the biggest advantage of a fully automated computerized system operating in "Machine Drives Man" mode over the present slow "Man-Machine Interaction" mode of operation under current practice for "trace and track" procedures.

6.3 Judicial System

At present judicial procedures are lengthy and time consuming. Robotic computerized system can schedule and organize judicial cases much more efficiently by interacting with concerned courts, judges, police, defence lawyers and others as necessary by communication links automatically.

6.4 Global Controllers

Robotic computerized systems of this kind may even evolve for the welfare of entire mankind to maintain world peace, global climate and pollution control and a lot more.

7 SUMMARY

Computing Technology and Artificial Intelligence have come a long way to its current excellence. This robotic system has pioneered a new kind of artificially intelligent robotic manager which drives human participants of the system. It not only dictates and pursues human operators in getting jobs done on time but is also very keen to learn and acquire more intelligence from human authorities to resolve any exceptional issues. But even this learning process is initiated by the system itself and not imposed by human users of the system. The robotic system keeps full control in managing business operations round the clock. *For the first time in computing history, "Man" can leave such responsibility entirely to "Machine".*

There is also tremendous scope and potentials for its use in the future in mind-blowing applications for the benefit of the entire mankind.

8 CONCLUSION

Recently robotics and AI have advanced by leaps and bounds demonstrating spectacular human like robots and outstanding AI applications. The trend clearly points to future robotics taking dominance over humans in various ways. This invention is a modest start of that kind of robotics being capable of dictating, monitoring and pursuing human operators

in performing their tasks even today in managing the processes involving human operators of an organisation.

Such innovation paves the way for a new technologically enriched global value and ethics that will add to the sustainability of our social and business advancement. Gradually “Machine Drives Man” concept will become integral parts of our lives and we can only look forward to more reforms in terms of system changes and their positive impact on our life and society.

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