

ROBOT

**BORN IN CZECHIA,
KNOWN ALL OVER THE WORLD**

THE 24 OFFICIAL LANGUAGES OF THE EU

BULGARIAN **РОБОТ**

CROATIAN **ROBOT**

CZECH **ROBOT**

DANISH **ROBOT**

DUTCH **ROBOT**

ENGLISH **ROBOT**

ESTONIAN **ROBOT**

FINNISH **ROBOTTI**

FRENCH **ROBOT**

GERMAN **ROBTER**

GREEK **ρομπότ**

HUNGARIAN **ROBOT**

IRISH **RÓBAIT**

ITALIAN **ROBOT**

LATVIAN **ROBOTS**

LITHUANIAN **ROBOTAS**

MALTESE **ROBOT**

POLISH **ROBOT**

PORTUGUESE **ROBÔ**

ROMANIAN **ROBOT**

SLOVAK **ROBOT**

SLOVENE **ROBOT**

SPANISH **ROBOT**

SWEDISH **ROBOT**



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Karel Čapek

CZECH ROBOT,
CHILD OF THE PANDEMIC

1

Did you know that the internationally known word ROBOT was first heard in 1920, in the play R.U.R. by Czech author Karel Čapek?

A deadly virus

More than 100 years ago, fears of a viral pandemic gripped the world. Had it come from China? From Kansas? Or perhaps from a hospital in Étaples, France, where soldiers weakened from fighting in World War I contracted a bird virus that had initially infected pigs? In fact, the dreaded Spanish flu almost certainly did not originate in the Iberian Peninsula it takes its name after. That was the result of wartime censorship in the West and East, while in neutral Spain the scourge of mankind could be written about more freely.

In less than two years (1918-1920) the pandemic claimed perhaps as many as 100 million lives, about 45,000 to 80,000 of them in the Czech lands. Protective masks were not widespread in Europe, but in the USA, for example, not wearing a mask brought a risk of imprisonment.

Spanish flu's victims included famous artists such as Egon Schiele or Bohumil Kubišta, the playwright Edmond Rostand who wrote *Cyrano*, and also Guillaume Apollinaire, some of whose works the thirty-year-old Karel Čapek selected for his collection of translations, *French Poetry of the New Age*.

Čapek, a versatile author

The year 1920 also marked a milestone in the life of journalist, playwright and author Karel Čapek, born on 9 January 1890 in Malé Svatoňovice, East Bohemia. It was in that summer he made friends with his later wife Olga Scheinpflugová, a young actress from Prague's Švanda Theatre; and in the same year he met Věra Hružová, a charming young lady from Brno.

Despite his complicated personal life, Čapek published several important works in 1920:

- *A critique of words* – columns by a masterful journalist, analysing linguistic phrases and their misuse,
- *The Robber* – a comedy about love, relationships between the young and the older generation and the relativity of truth,
- *French Poetry of the New Age* – an anthology of Čapek's excellent Czech translations of modern poets, from Charles Baudelaire to the aforementioned Guillaume Apollinaire, but above all a play:

- **R.U.R. (Rossum's Universal Robots)**

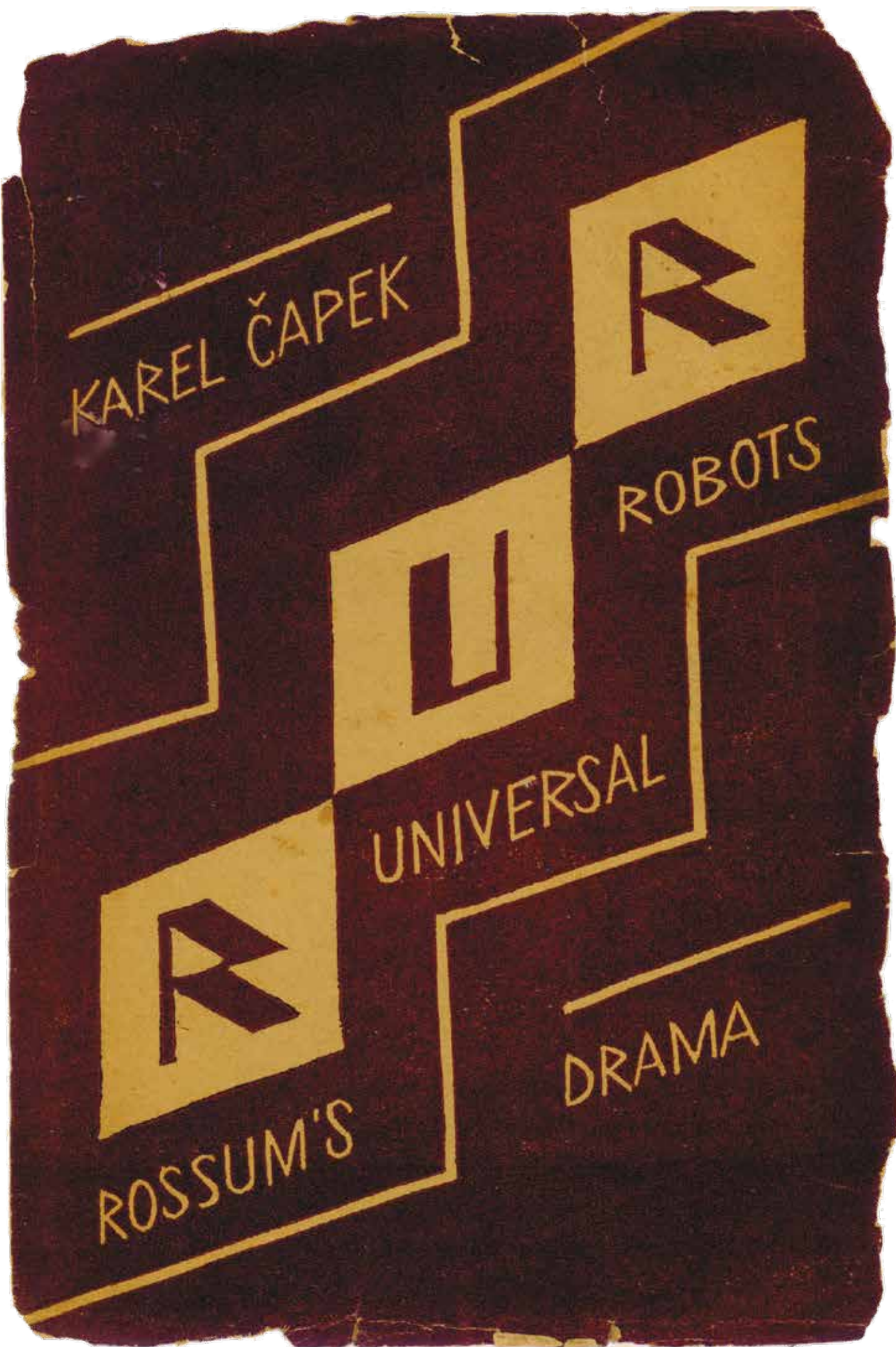
The place where it was written is commemorated by a plaque in Trenčianské Teplice, Slovakia, where the doctor Antonín Čapek worked until 1923. His son Karel would often visit him and also liked to write there – the Hotel Pax now stands on the site of the former Poniatowski Spa House.

Asimov & the Laws of Robotics

Isaac Yudovich Ozimov (1920–1992) escaped the fate of many members of the Jewish community in his native Russia, which he left with his parents for the United States. There he later helped popularise science fiction under the name Isaac Asimov. He studied biochemistry, was instrumental in bringing the subject of artificial beings into the public consciousness and coined the term robotics. He is also known for the three laws of the field, which he formulated in 1942:

- A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
- A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Asimov, however, had no love for Čapek's *R.U.R.*: "The play was produced in 1921 and was popular enough (although when I read it I thought it was terrible, in my purely personal opinion) for the word 'robot' to come into general use..." Nevertheless, he acknowledged that Čapek had brought the Frankenstein complex from the private sphere of master versus servant into a public space of global proportions.



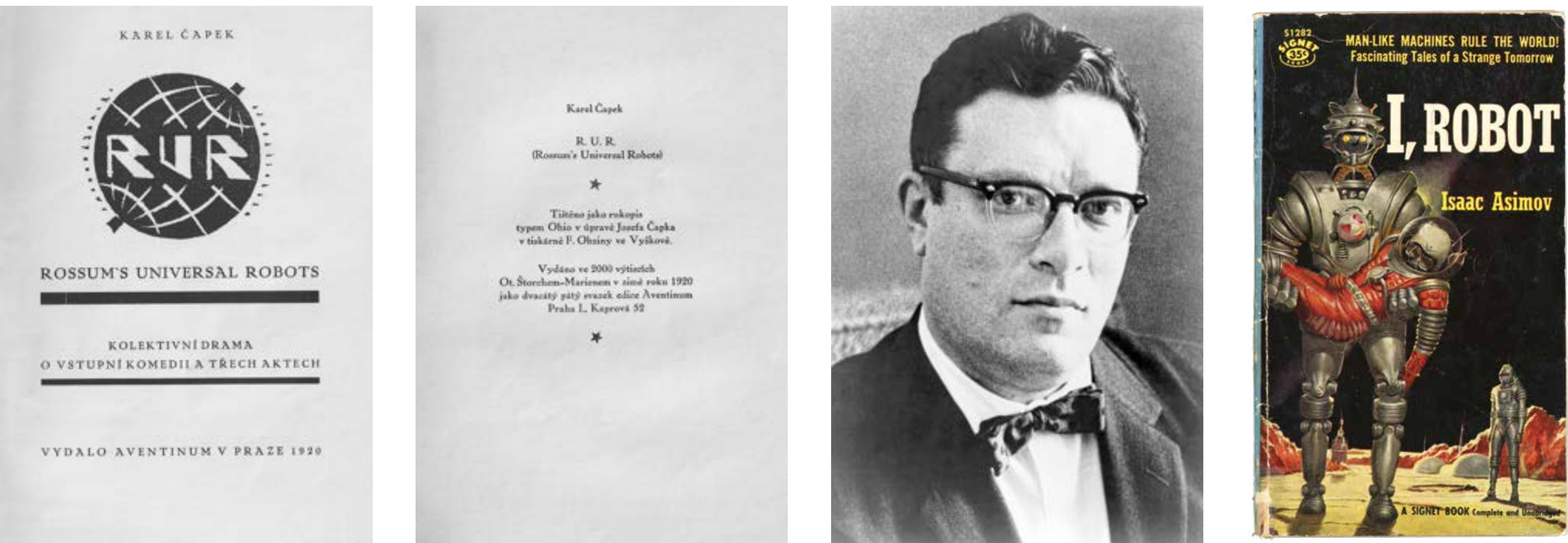
The very first Czech edition with a modern cover designed by Josef Čapek, printed in an edition of 2000 copies in winter 1920



The Spanish flu claimed tens of millions of lives...



In 1920, Karel Čapek (1890–1938) met a budding actress, his future wife Olga Scheinpflugová (1902–1968)



Isaac Asimov (1920–1992), author of, among other things, *The Three Laws of Robotics*, acknowledged the importance of Čapek's *R.U.R.* However, he had no love for the famous drama.



Another highlight of 1920: *Golem*, the legendary monster of Jewish Prague, was terrifying audiences. *Der Golem, wie er in die Welt kam* is one of the classics of German cinema.

A ROBOT
IN EVERY HOME!

2

Is industrial production of standardised products the beginning of the end for humanity?

Organised modernity

The Scottish economist Adam Smith (1723–1790) explained why the division of labour increased productivity – in one factory by a factor of 240. A century later, his ideas were put into practice by the American Frederick W. Taylor (1856–1915). What’s more, Henry Ford (1863–1947) understood the need to stimulate consumption by continually lowering product prices while wages rose. Once a luxury item, even brand-new cars could suddenly be afforded by the working man.

It is also thought that one of the inspirations for *R.U.R.* was the pair of expressionist plays by the German author Georg Kaiser (1878-1945), *Gas I* and *Gas II* from 1918 and 1920. In these plays, the clash between the individual and the masses, workers reduced to machines, questions the belief in civilisation’s technical progress. The Čapek brothers’ collection *Giant’s Garden* was first published at the same time as *Gas I* (1918). It opens with the short story *The System*. In it, Riplaton, a factory and plantation owner, tells how his factory gradually dismantles its workers’ independent thought and human needs – in short, an ideal “Operarius utilis Riplatoni design”. The story ends with the workers revolting, destroying the factory and slaughtering the factory owner’s family.

Čapek: “I was not concerned with robots, but people”

R.U.R.’s factory boss Harry Domin explains his motives as follows: “I wanted man to become the master, so that he shouldn’t live merely for a crust of bread! I wanted not a single soul to be broken by other people’s machinery. (...) I wanted to turn the whole of mankind into an aristocracy of the world. Unrestricted, free and sovereign man. And maybe more than man.”

Karel Čapek responded to the first critics by explaining, “If I thought hard about anything when I was constructing the play, it was about the six or seven people who were to be the representatives of humanity. Yes, I wanted fervently that at the moment when the attack of the Robots occurs, the audience should feel that something infinitely precious and great is now at stake, and that this is mankind, people, us (...) And the miracle which, in the last act, re-establishes man’s existence in the world – do not attribute that miracle to nature or to God...; it is the miracle of people..., the only woman among them embodies the will to live in love and motherhood; and that will to live outlasts mankind itself and breaks through, as in a shaft, into the light again (...) If I had no faith in life, I might as well hang myself. Nothing with me ends in death... and I beg you not to deny me this reconciliatory aspect.”

A Czech word conquers the world

Robota, the Czech word for the forced labour of serfs under feudalism, gave rise to the word robot – an artificial being without rights forced by humans to work. Karel Čapek attributed the idea to his elder brother Josef Čapek (1887–1945): “In one unguarded moment, the author came up with the idea for the play. While the idea was still warm, he ran to his brother Josef, a painter, who was just standing at the easel and painting on the canvas with such vim that the brushstrokes were audible.

‘Hey, Josef,’ began the author, ‘I have an idea for a play.’

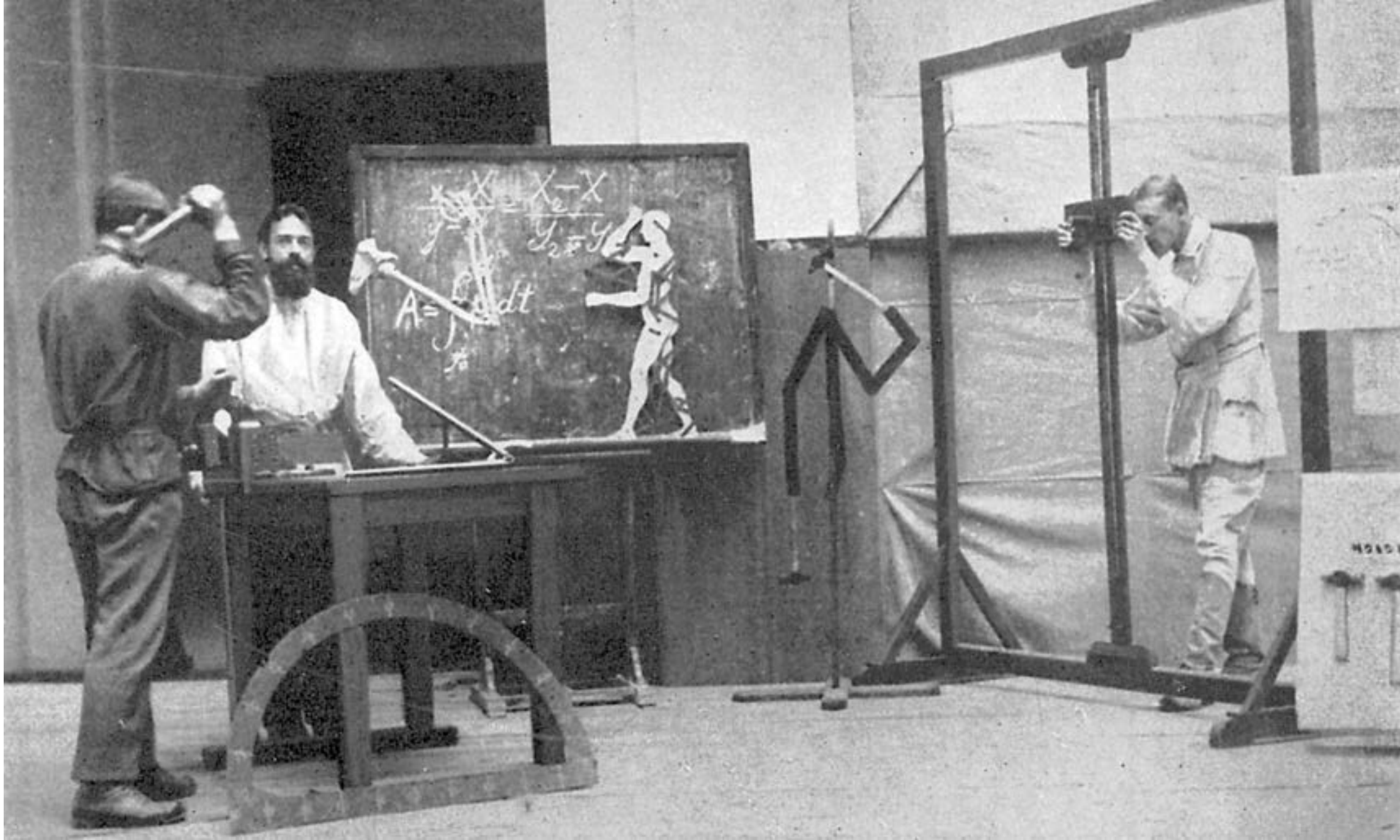
‘What?’ mumbled the painter (truly mumbled, for he was holding a brush in his mouth).

The author told him as succinctly as he could.

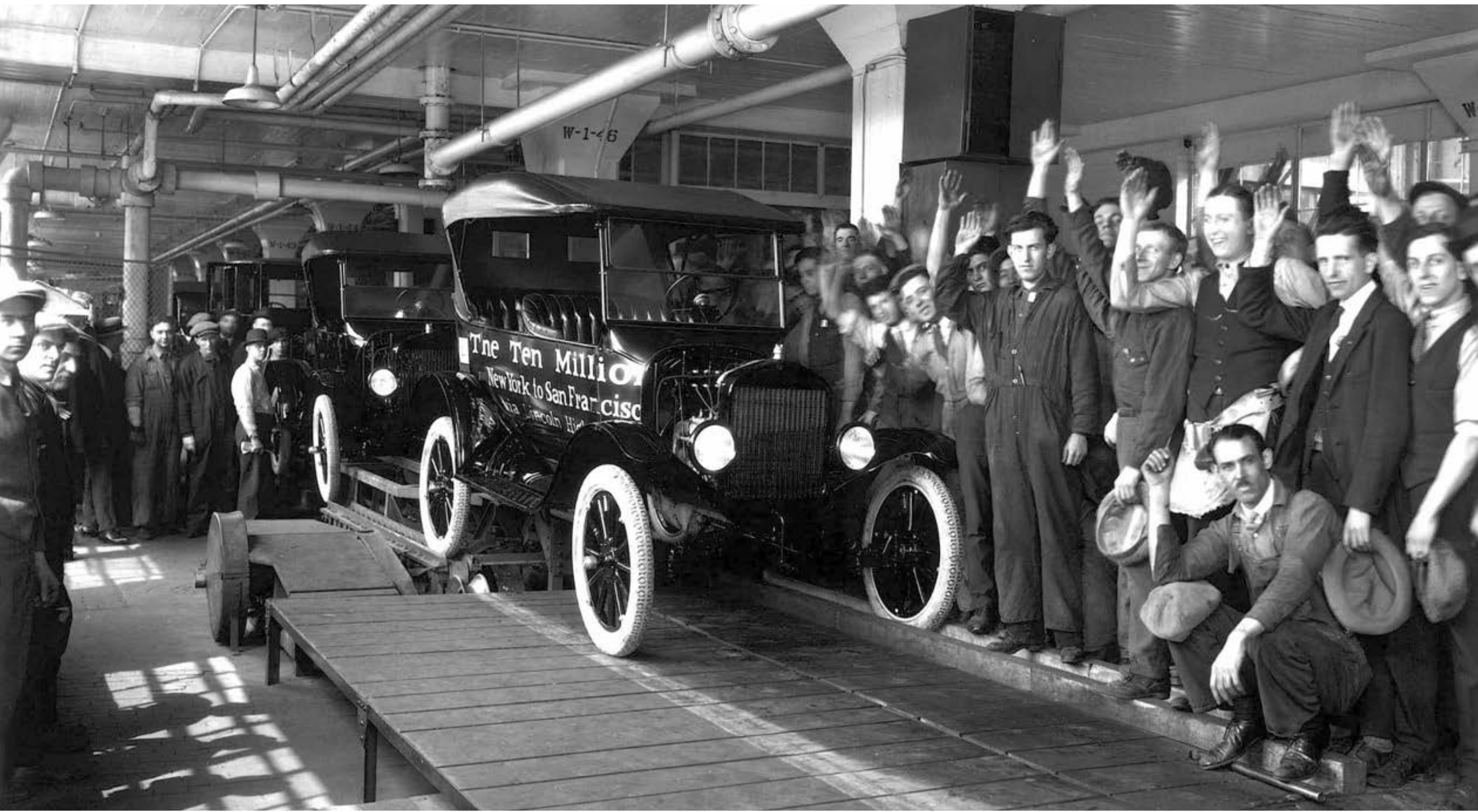
‘Then write it,’ said the painter, without taking the brush out of his mouth or ceasing to paint. It was a display of almost insulting indifference.

‘But I don’t know,’ said the author, ‘what to call these artificial labourers, but it doesn’t sound quite right, it’s too dry.’

‘Call them robots,’ the painter mumbled, brush in mouth, and kept painting. And that was that.”



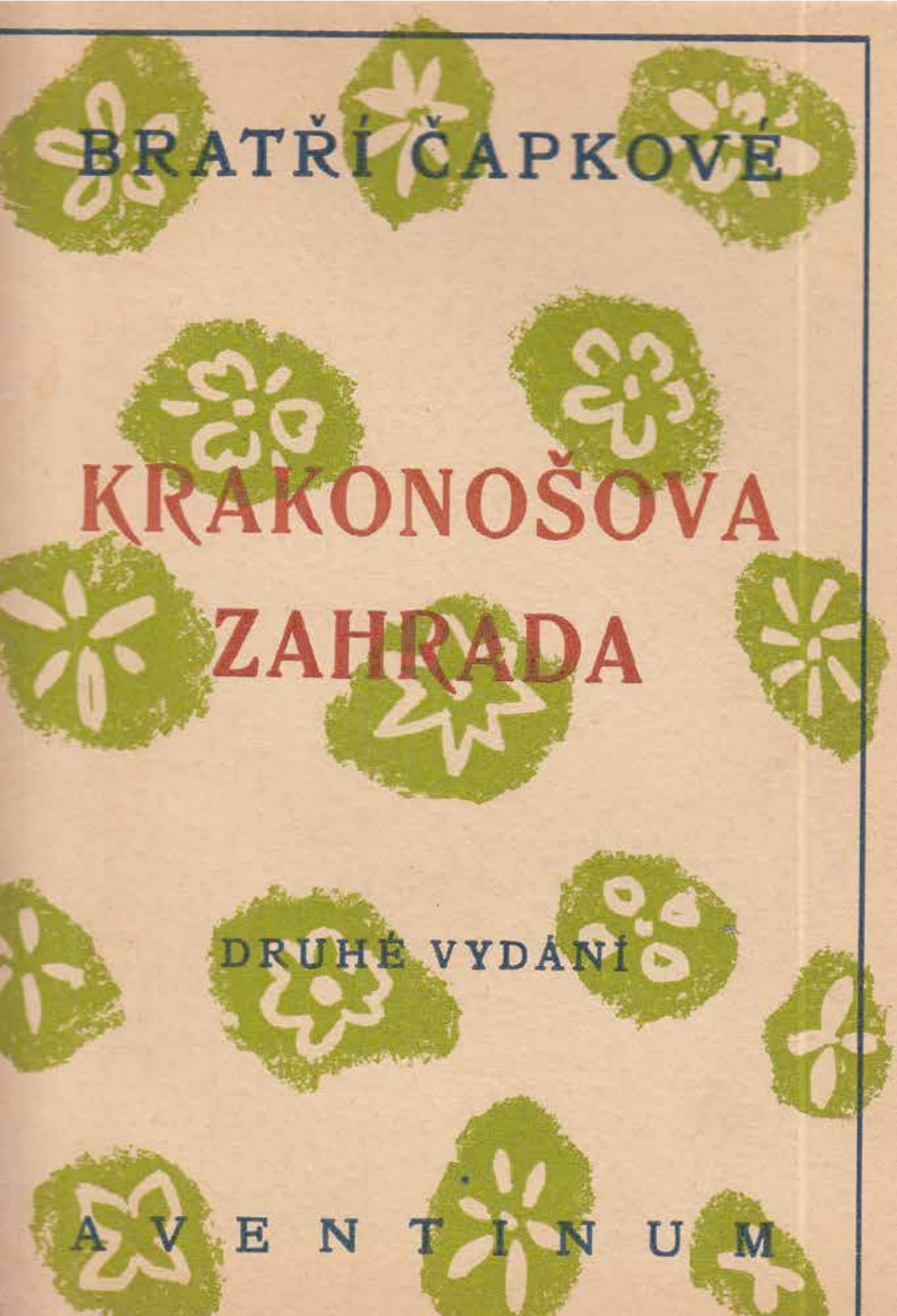
K. Čapek in his own words: “Then he tears himself away and, having chipped away the secondary idea of Taylorism from *Ants*, sets about writing *Robots*.” Pictured is Frederick W. Taylor, pioneer of the scientific organisation of work.



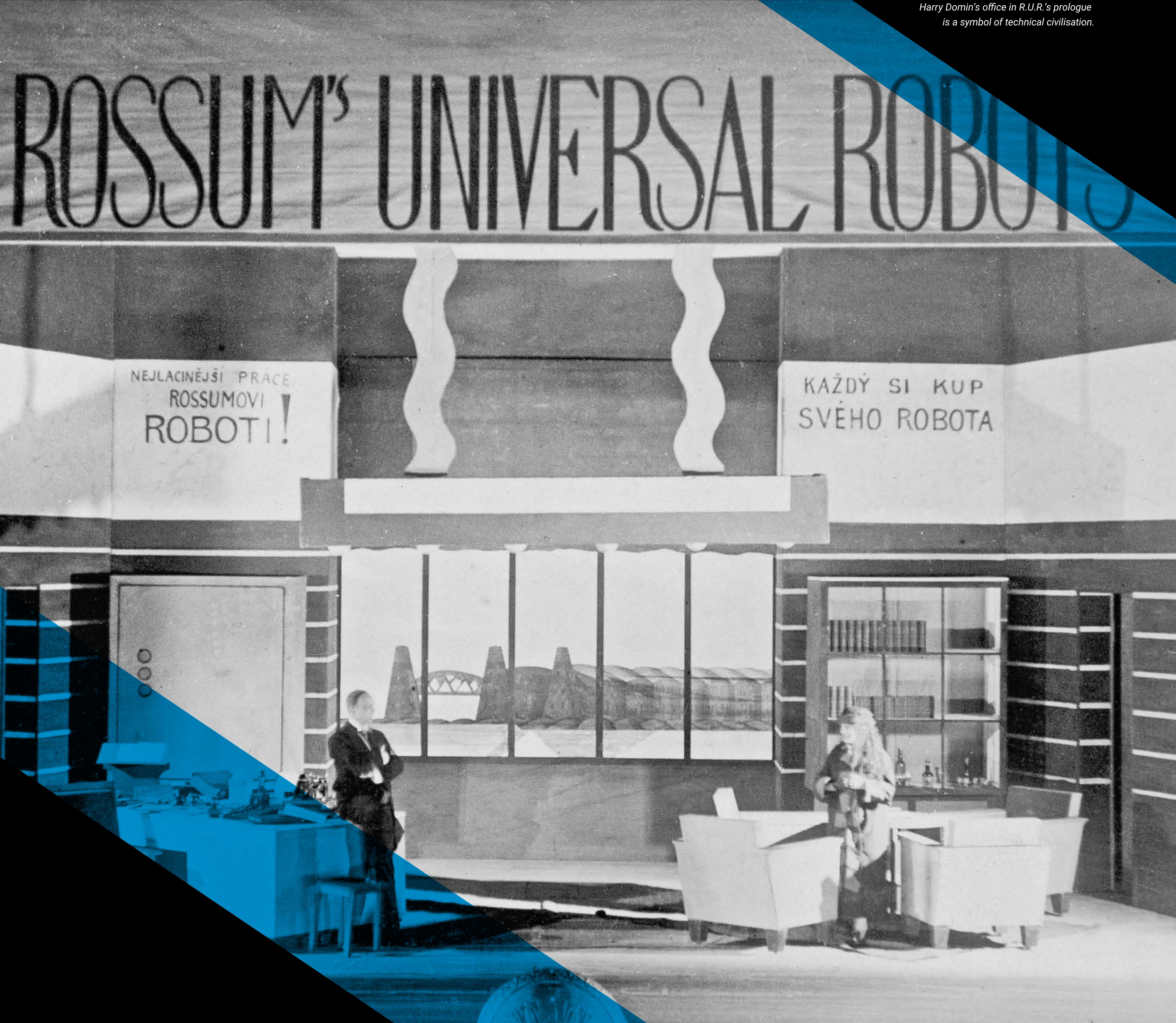
Shortly before the outbreak of World War I, Henry Ford introduced conveyor-belt production of the Model T. He gradually brought down the price of the family car to under \$300, while paying workers five dollars for an eight-hour shift.



It wasn't only in this photo that his brother Josef, almost three years older and the author of the word robot, remained in the shadow of the more famous Karel. Robot is taken from robota, the Czech word for forced labour under feudalism.



Giant Garden from the pen of the Čapek brothers (1918) opens with the short story *The system*, a precursor to *R.U.R.*



Harry Domin's office in *R.U.R.*'s prologue is a symbol of technical civilisation.

ROBOTS

CROSS BORDERS

3

R.U.R. soon attracted attention abroad. Germany was one of the countries it was a big hit in, but in France the release was delayed.

Werstand's Universal Robots

Only nine months after the Czech premiere of *R.U.R.*, on 6 October 1921, Stadttheater Aachen, i.e. the Municipal Theatre in the western German city of Aachen, staged the play. A high-quality translation had been produced by Čapek's contemporary, the Prague-based German journalist, critic, translator, writer and poet Otto Pick. It was he who changed the title of the drama from Rossum's *Universal Robots* to Werstand's *Universal Robots*. Pick replaced the name of the inventor Rossum (which alluded to the Czech word for reason, *rozum*) with the German equivalent *Verstand* in the form Werstand.

W.U.R. was also a success two years later in Berlin. It was an exceptionally powerful, truly avant-garde production, probably overshadowing even the version staged in Prague. The Theater am Kurfürstendamm approached the director John Gottowt and he in turn approached the thirty-three-year-old architect Friedrich Kiesler, originally from Chernivtsi in present-day Ukraine. The play about robots launched his stellar career. Kiesler's monumental "electromechanical" set for *W.U.R.* consisted of rhythmically moving machine pistons and other spectacular elements. A seismograph in the centre of the stage depicted the success of the robot manufacturing company. Kiesler combined the painted backdrop with a film projection – one of the first times this was ever done. The factory director Harry Domin showed Helen Glory the production area via a kind of television. However, the complicated apparatus creating the spectacular illusion reportedly set off the fire alarm, and the police repeatedly came to the theatre during the performance. Kiesler solved the problem by projecting the factory images onto a stream of running water instead of a moving screen. Neon lights in abstract shapes flashed on stage, and a light cone made of a 210 cm diameter lens also illuminated part of the auditorium. Sound effects included the distortion of the robots' voices using hidden speakers.

Reson's Universal Robots

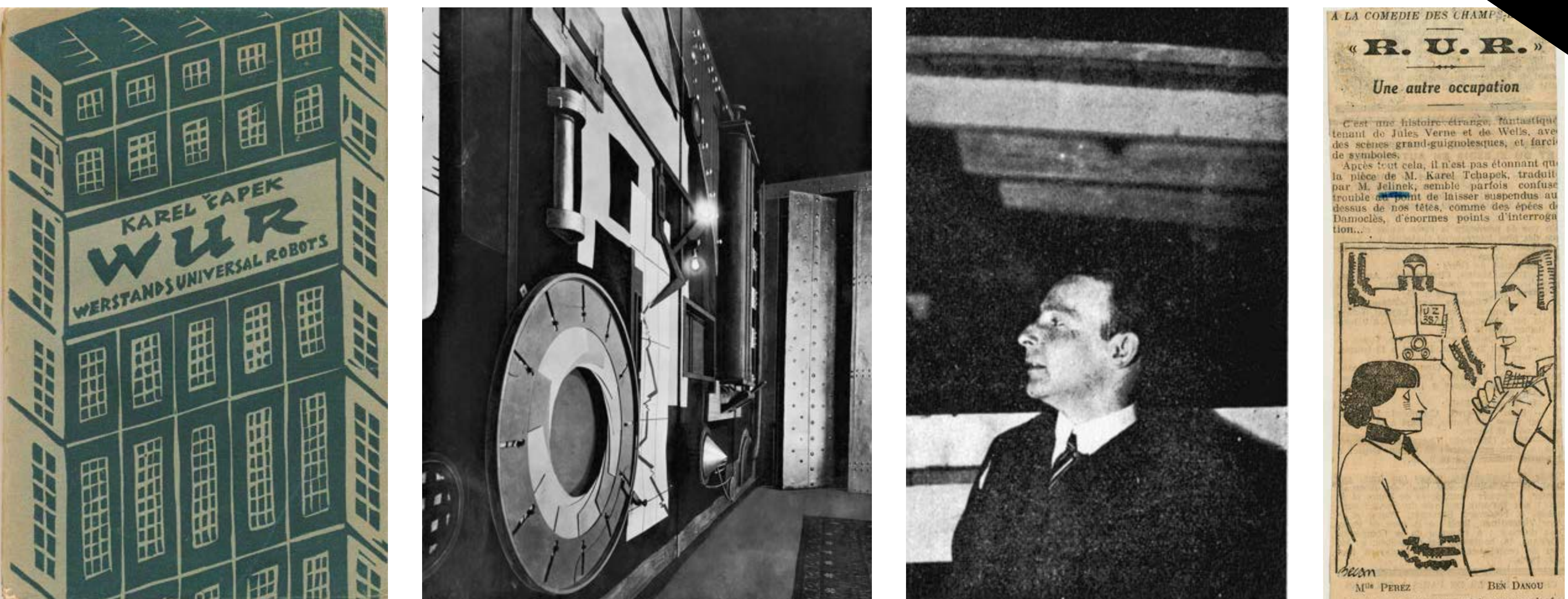
The poet and diplomat Hanuš Jelinek translated *R.U.R.* into French in the spring of 1921, but it was not until March 1924 that he managed to get it performed at the Comédie des Champs-Élysées in Paris. One point of contention in the lengthy negotiations was the theatre's demand for a subsidy

of 10,000 francs. This was eventually waived, and the matter dragged on for another two years – but eventually *R.U.R.* was staged. It had already been a success in Berlin, London and New York. Unlike in the Czech production, the plot was not set in the distant future, nor was the set particularly avant-garde. Although local critics tried to outdo each other by listing older utopian works with similar themes, without directly accusing the author of plagiarism, positive reviews prevailed. On the other hand, the Czech reviewer Miroslav Rutte wrote: *"In their [the French] production, the utopian comedy is narrowed down to a conversational comedy in which the main emphasis is placed on witty and snappy dialogue, love scenes and the arresting robots who, in their square black uniforms, thundering boots and headgear made of black waxed canvas, look like gargantuan firemen (...) Harry Domin's jacket was nicely cinched at the waist with an elastic band, though it didn't look particularly American, and Helen Glory gesticulated sweetly in her drape cape, smiling innocently through three layers of French powders and rouge."*

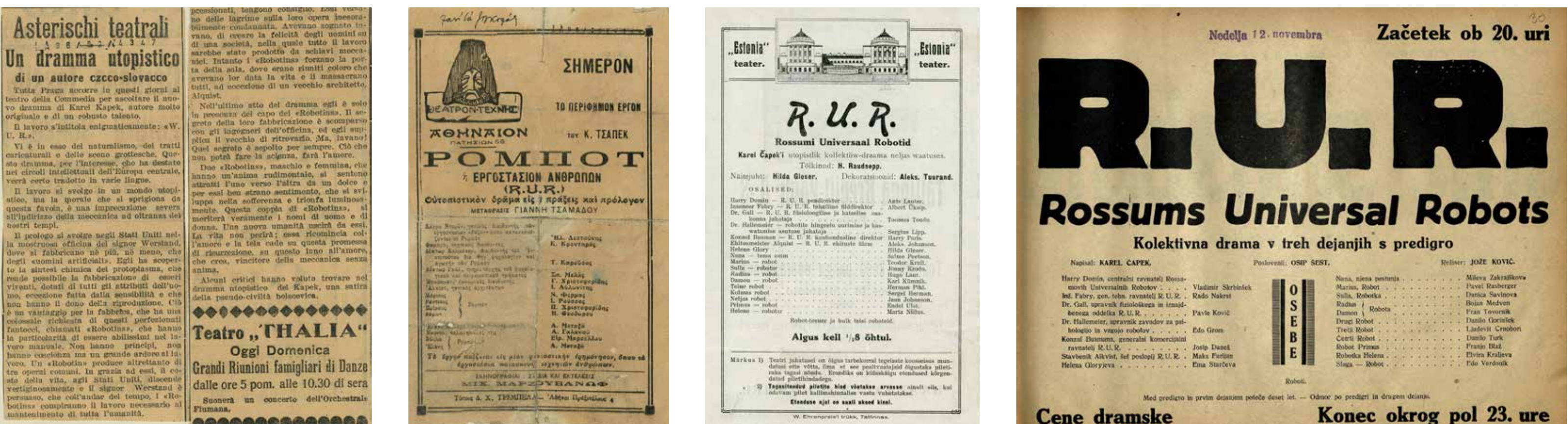
International success aroused envy at home

"Please, I have not done anything to get translated; neither I nor anyone else has had any influence on demand abroad; to tell the truth, the road to the wider world has been paved for me by German correspondents with whom I am not even personally acquainted. Well, at least they say that I write deliberately and calculatedly for export. What should I do to prevent my books from being translated? Should they be better or worse so that no one wants them? If a Czech writer goes beyond the boundaries of his language, he must be made to suffer for it: he must be said to be an exporter, a merchant, and so on."

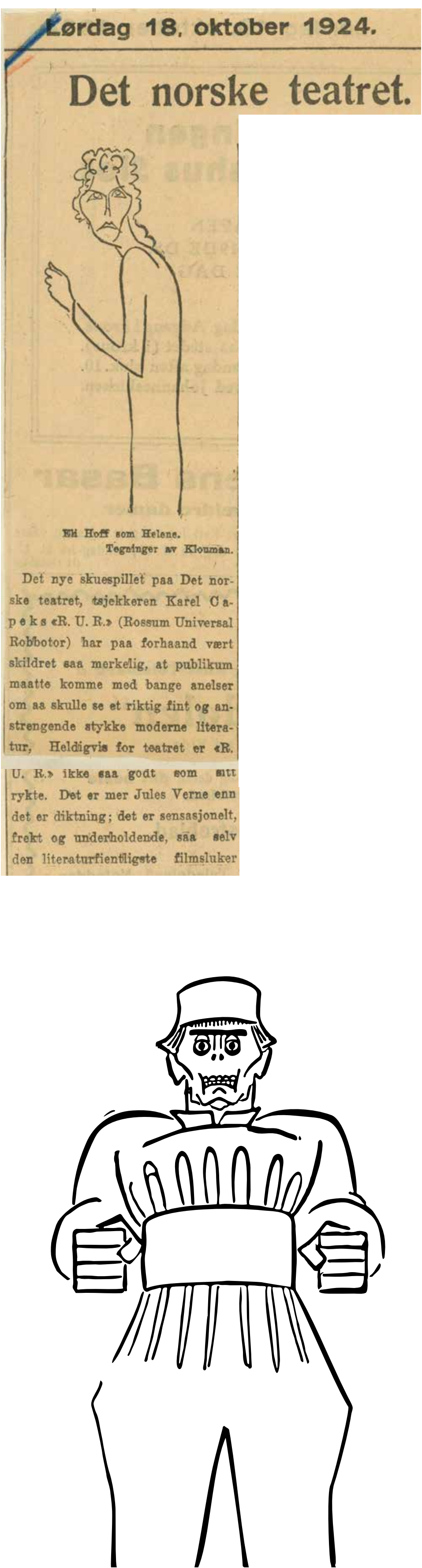
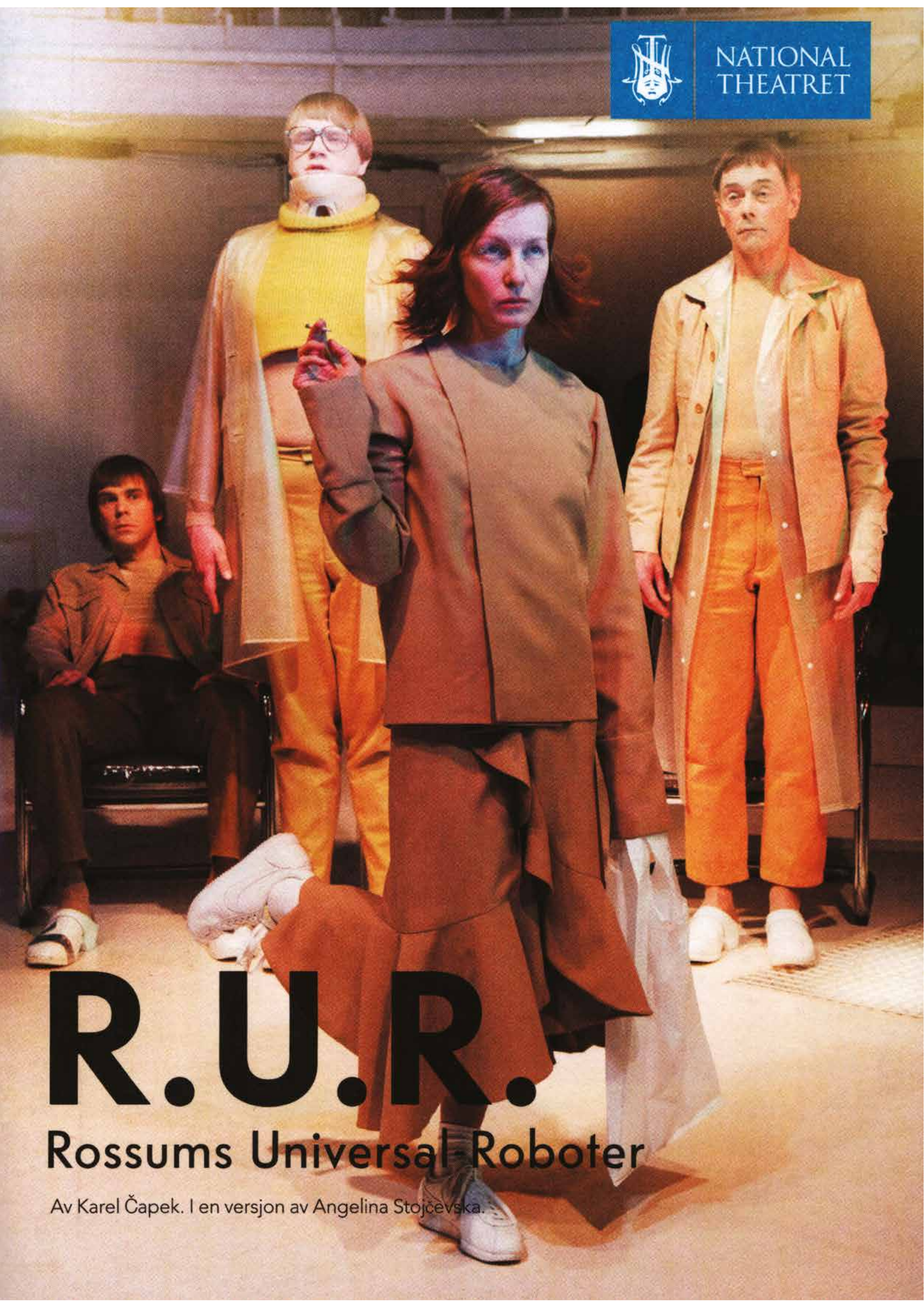
Karel Čapek in response to attacks in Czech newspapers



The Berlin production of *W.U.R.* launched the stellar career of stage designer Friedrich (later Frederick) Kiesler, originally from Chernivtsi in presentday Ukraine. By contrast, the French take on *R.U.R.* was fairly superficial.



Robot sci-fi made its mark in Italy, Greece, Estonia and Slovenia



More than three quarters of a century separates two Norwegian productions



United by interest in *R.U.R.*: in the 1920s Japan was still considered a Czechoslovak ally – unlike Hungary

R.U.R. was most successful in the United States and the United Kingdom.

A controversial translation

If Pick's German translation of *R.U.R.* is commended, the English one by Paul Selver, who translated for the Czechoslovak embassy in London, came in for criticism, especially since the 1980s. Rightly so?

What bothers its critics is the omission of individual characters and longish passages, which distorts the tone of the drama. This applies not only to Čapek's works, but also to Hašek's *Švejk*, which Selver translated into English. According to documents from the British Library, however, it seems that the "guilty" party is more likely to have been Sir Nigel Playfair, the editor of *R.U.R.* He put most of his energy into cutting the combination of elements of farce with poignant lyricism. We can regard the deletion of the author's initial characterisations as a significant impoverishment, downplaying the symbolic-allegorical level of the work. Playfair was at the height of his fame at the time, lauded for his modern stagings of Shakespeare. Consequently, this renowned figure's collaboration on the adaptation of *R.U.R.* opened doors for Čapek in British theatre circles, as confirmed by František Khol, whose Universum agency represented Čapek.

Theatre Guild, New York (1922)

Theatre Guild, "the most artistic theatre in all of America," had been presenting non-commercial works by American and foreign playwrights since 1918. It was instrumental in putting Broadway on the theatrical map. *R.U.R.* became its third major production after Shaw's *Heartbreak House* and Ferenc Molnár's *Liliom*.

In contrast to the French "overgrown firemen", the indistinguishable and featureless American robots were perhaps even more menacing than their German counterparts: they all stood ramrod-straight, with clenched fists. It is thought that one of the keys to *R.U.R.*'s success with American audiences was the emphasis placed on the conflict between good and evil, with the robots as a human creation that has got out of control. By February 1923, Theatre Guild had performed a total of 184 performances of *R.U.R.*, inspiring many to follow suit. Broadway fame didn't make Karel Čapek rich. Unlike the ten per cent royalties that were customary in Czechoslovakia or Germany at the time, he received only 1.5% of the proceeds from American performances of *R.U.R.* Incidentally, it was the role of the robot that launched the stellar career of Spencer Tracy, then a 22-year-old student at the American Academy of Dramatic Arts in New York.

St. Martin's Theatre, London (1923)

Nearly two hundred shows on Broadway encouraged the producer at St Martin's Theatre in London's West End. Opening on 24 April 1923, the young Basil Rathbone, who would later become famous for his film roles as Sherlock Holmes, won acclaim for his portrayal of the energetic factory director Domain, as well as the robot Leslie Banks. The *R.U.R.* production used screaming factory sirens on set, enhancing the dramatic effect of the robot revolt. State-of-the-art laboratory equipment from General Electric was used, and the revolutionary lighting design also caught the eye.

Compared to the American staging, however, there was a further impoverishment of Čapek's original text. The *R.U.R.* management was whittled down to Harry Domain (Domin in the original), Dr Gall, Alquist and Jacob Berman (instead of Consul Busman). And so Fabry and Hallemeier disappeared. Nana changed into Emma, a typical English name for a nanny. The robots' costumes resembled armour.

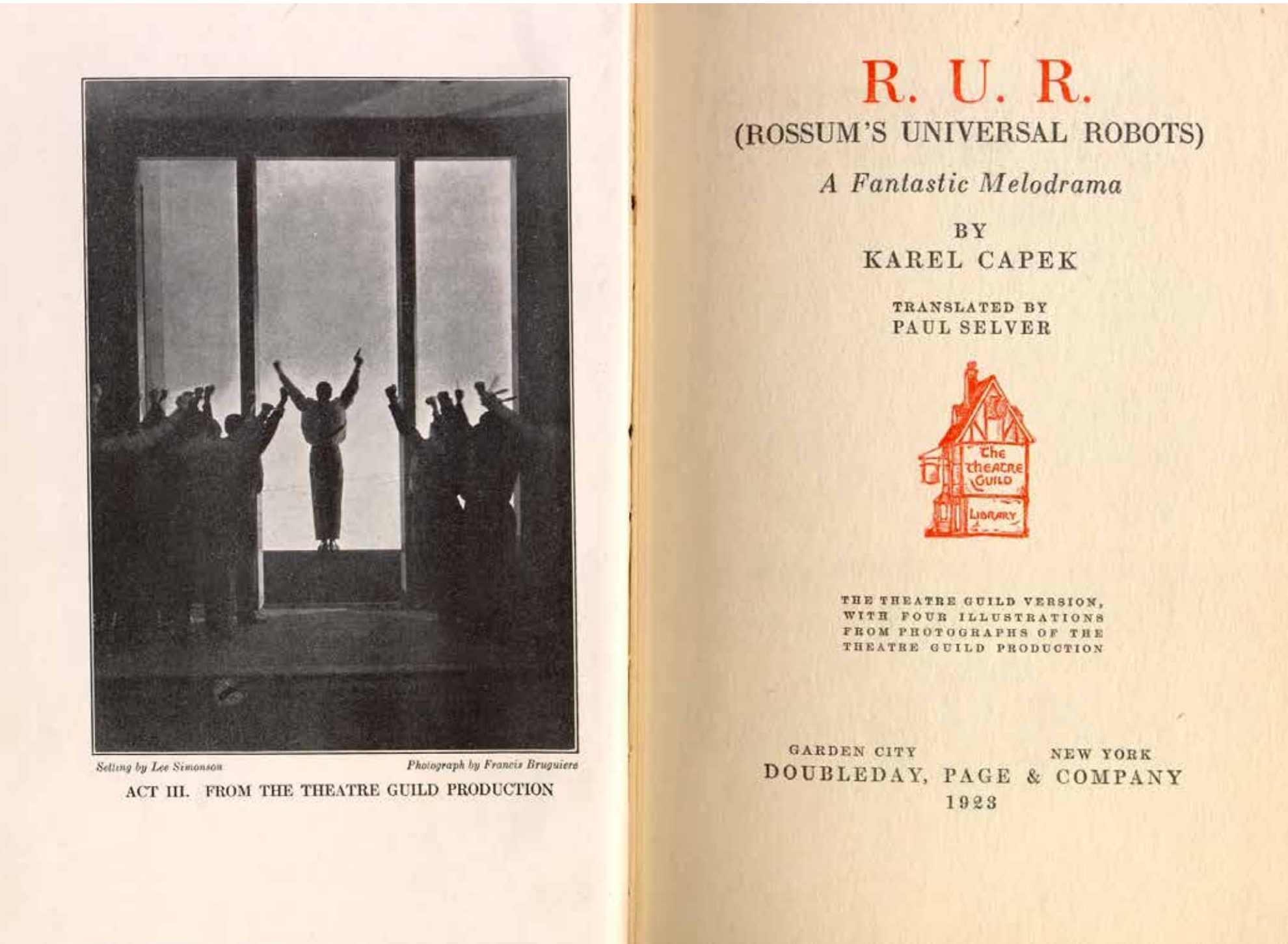
Two months after the premiere, a discussion about the play was held in the theatre. Writer GK Chesterton considered *R.U.R.* a satire of industrial life, saying that once a man has robots working for him, he loses his happiness. Playwright George Bernard Shaw defined a robot as a being who is not allowed even the luxury of original sin. There was a humorous comment from the audience that perhaps the machines would never come to life and there would be no need to put men's and women's bicycles in separate closets overnight for the sake of propriety.



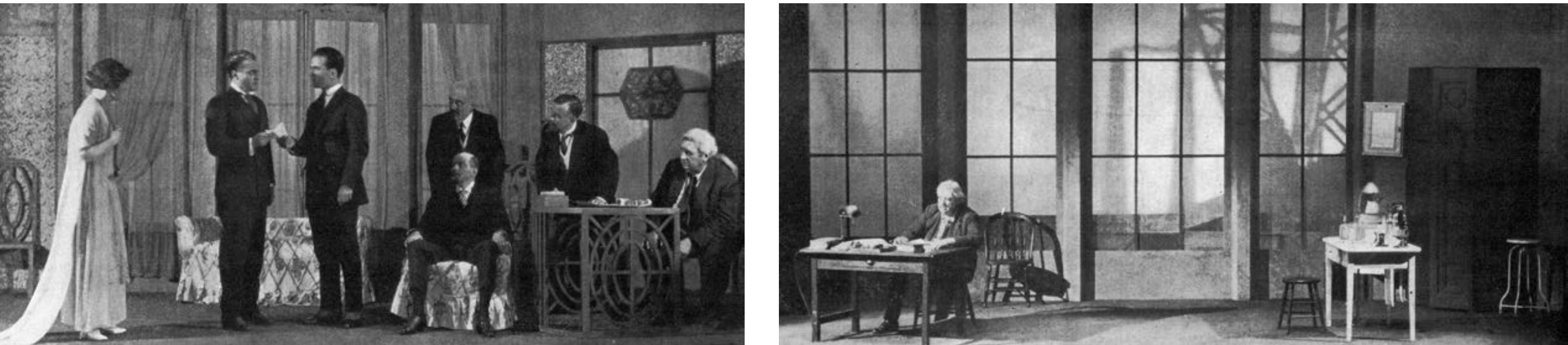
Theatre Guild management in 1923. Second from left, R.U.R. director Philip Moeller; far right, set designer Lee Simonson.



Sir Nigel Playfair adapted Selver's translation to the tastes of the British audience. He had gained a reputation in theatrical circles at the time as the man behind the first modern adaptations of Shakespeare.



The American version was more faithful to the original than the British one, and did not, for example, suffer from the drastic reduction in the number of managers at Rossum's Universal Robots



The managers' suits were not out of line with the American fashion of the time.



Theatre Guild put Broadway on the theatrical map, staging non-commercial plays by mostly modern playwrights. Čapek followed in the footsteps of the Irish Shaw and Hungarian Molnár.



New York (1922): The set was minimalist compared to most European productions.



IN FRONT OF THE CAMERA

The world's first TV sci-fi (1938)

Hollywood interlude

The international success of Čapek's plays inspired their adaptation into film scripts. In a letter to Otakar Vočadlo, associate professor of Bohemian studies at the University of London, dated perhaps 6 February 1926, the author of *R.U.R.* says: "I am to go to America in the autumn; you know, business; but it is worth seeing, if only to begin to defend ourselves against Americanisation." At the end of July 1926, however, Čapek wrote to Vočadlo: "Apparently, America is out of the question, apparently UFA is going to film it in Berlin – always the Germans!" But even this project did not get off the ground. Vočadlo blamed the failure on the translator Selver, whose maverick behaviour is thought to have concerned the producers. However, according to Čapek's later brother-in-law, JUDr. Karel Scheinpflug, Paramount Pictures Corporation paid \$8,000 for the rights, which in those days would have bought two very luxurious cars, or thirty Model T Fords.

Paramount later revisited the idea. According to the 30 June 1932 issue of The Hollywood Reporter, director Slavko Vorkapich was keen to make *R.U.R.*, but in the end his colleague and rival Rouben Mamoulian acquired the rights – and Vorkapich left Paramount. But Mamoulian never made the film either. All we know is that the lead roles were to be played by 21-year-old Bronx native Sylvia Sydney (of Russian descent) and Oscar winner Fredric March, who was 13 years older and became a renowned romantic lead after quitting his job as a bank clerk. To this day, *R.U.R.* fans wait in vain for a feature film version.

Plagiarism in Moscow

The Soviet theatre and film world was notorious for its callous adaptation of foreign works of art without acknowledging their authors, let alone obtaining their consent. The plagiarised *R.U.R.*, written by Alexei Nikolayevich Tolstoy, a Stalinist politician and chairman of the influential Writers' Union, was performed from 1924 under the title *Бунт машин* (Revolt of the Machines). Much later, from May 1935, Czechoslovakia was bound to the USSR by a treaty of mutual assistance against Nazism. So when Tolstoy, as a member of the delegation, visited Čapek's villa in Prague's Vinohrady district, Karel Čapek, out of loyalty to his government and being conciliatory by nature, refrained from reproaching him. He contented himself with asking whether Tolstoy's play had been a success. He said it had.

Even the 85-minute Soviet film from 1935, *Гибель сенсации*, which can be translated as *The End of a Sensation*, does not refer to Čapek. It is officially based on Volodymyr Vladěk's anti-capitalist work, first published

in the summer of 1929 under a title translated as *The Iron Strike* or *The Robots Are Coming*. Although the main character, one Jim Ripple, teaches "his" metal automata to play the saxophone and even dance under the influence of alcohol, they have the unmissable inscription RUR on their chests.

The world's first TV sci-fi

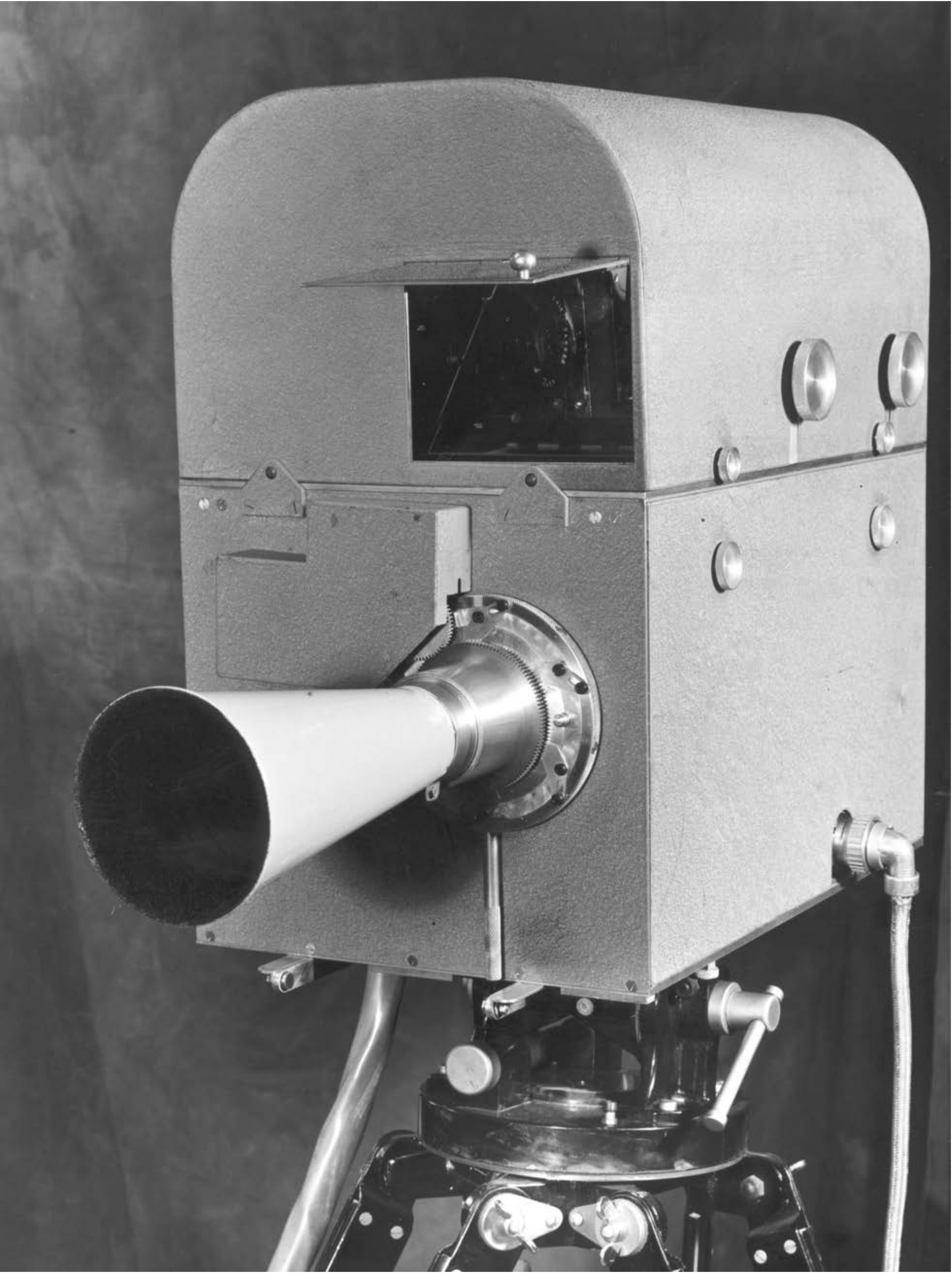
R.U.R. fared much better on the small screen. The credit goes to the British public broadcaster BBC, which commenced regular television broadcasting on 2 November 1936 (Czechoslovak Television did not start until 25 February 1954). On Friday, 11 February 1938, the television programme only started at 3 pm, with a ten-minute cooking programme. This was followed by a ten-minute newsreel – and from 3:20 to 3:55 p.m. an adaptation of *R.U.R.* Radio Times magazine judged that the play's plot and special effects made it perfect for television. It was broadcast live, not recorded. So the cast had to return to the studio for the evening's reprise. There were about 12,000 TV sets in the whole of Britain at the time.

Ten years after the author's death, on 4 March 1948, *R.U.R.* returned to the small screen in a 60-minute version. Čapek's work was also commemorated by the BBC in its immortal science fiction series *Doctor Who*. The writers of *Robots of Death* (1977) gave the anti-hero the name Taren Capel... Lastly, *R.U.R.* made it onto the small screen in the USA on 9 February 1953, as the twenty-second episode of the Broadway Television Theatre series.

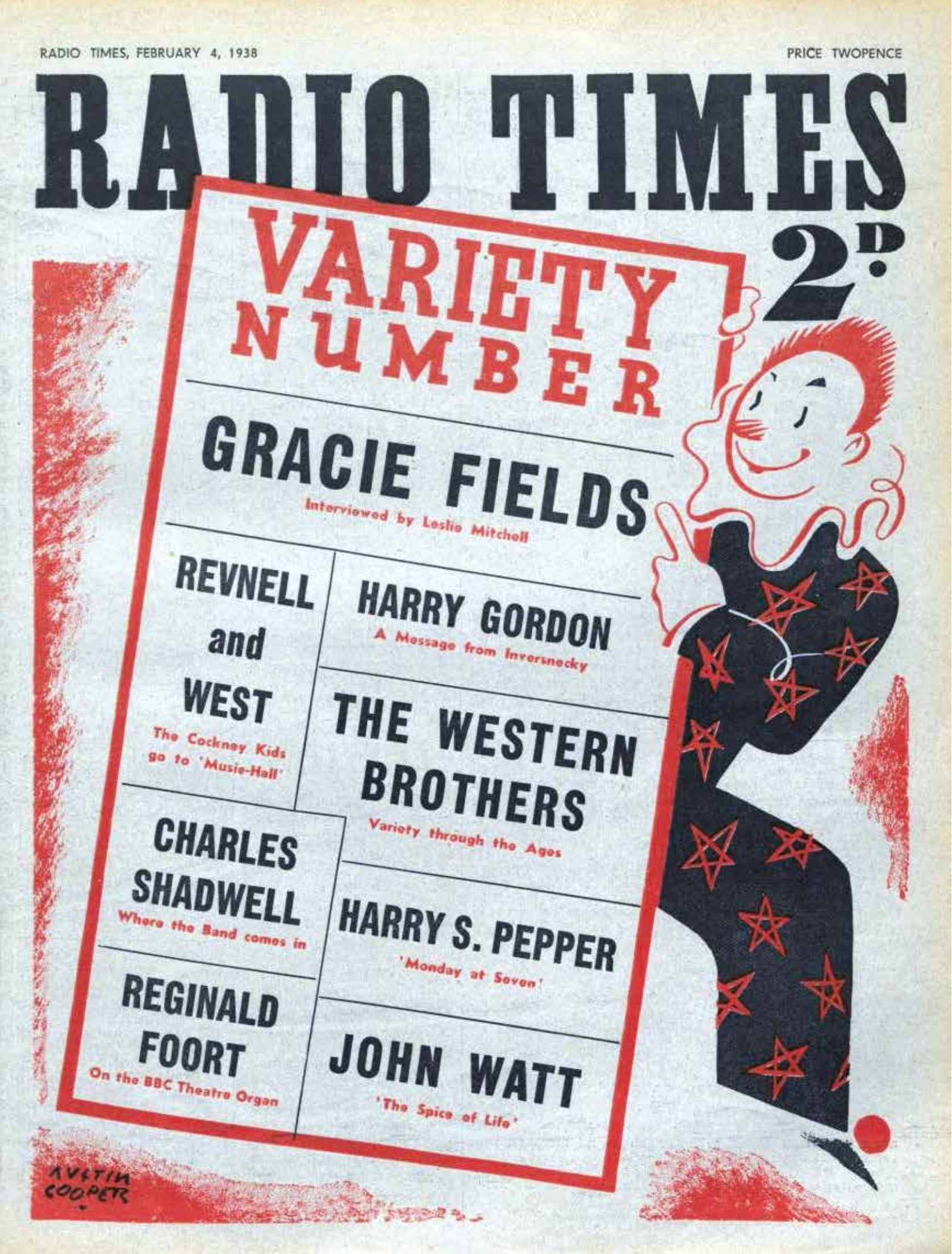
Onto TV screens via radio

Cecil Lewis's pioneering radio adaptation of *R.U.R.* was broadcast by the BBC from London on 28 May 1926 and from the Daventry transmitter on 18 November 1927. This was the very first theatre play to be broadcast by the BBC in its full length (85 minutes!) rather than as annotated extracts. Lewis worked on the script while he was in Africa. He recalled, "Four semi-tones played on the harp gave the hum of whirling wheels, the steam-hammer motive was done by the timpani, the rattle of an overhead crane by a side-drum, and the clatter of tools came from the xylophone."

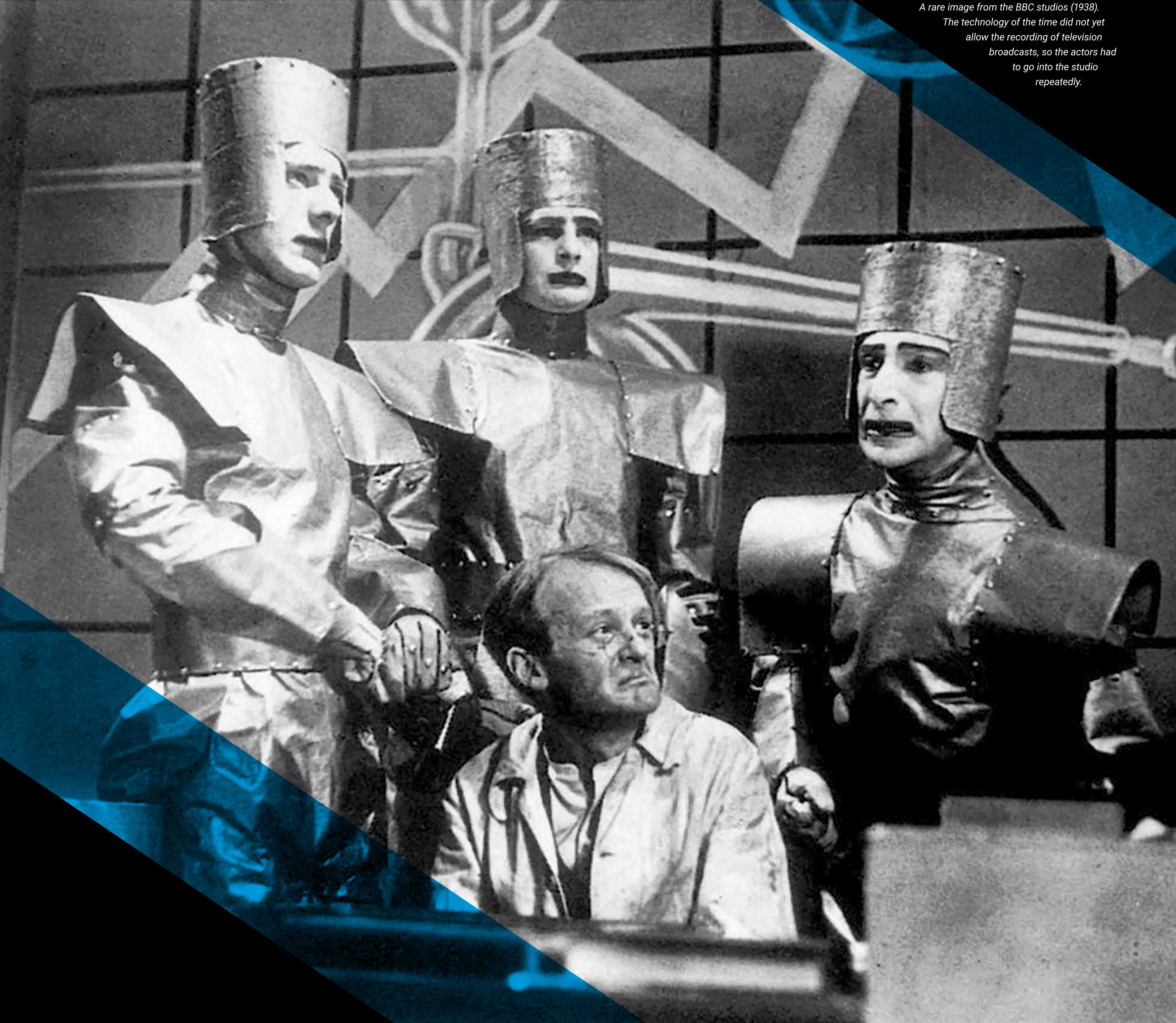
After seven rehearsals, the play was performed by 22 actors and musicians. Synchronising the spoken parts, orchestra and sound effects was an elaborate task. The actors were in one studio, the instruments in another about 200 metres away, with additional sound effects created by a technician on the roof of the building.



Paramount considered making *R.U.R.* into a film during the silent era, and the British brought the play to the small screen with stunning visual and sound effects in a live broadcast



TV listings in Radio Times magazine: on 11 February 1938 the BBC broadcast the play *R.U.R.* at 3.20 pm, with a repeat performance at 9.20 pm



A rare image from the BBC studios (1938). The technology of the time did not yet allow the recording of television broadcasts, so the actors had to go into the studio repeatedly.

ROSSUM'S UNIVERSAL ROBOTS

The play R.U.R. in quotes

The birth of the Robots

Old Rossum wrote this among his chemical formulae:
"Nature only found one way to organise living matter. But there is another way, simpler, more pliable and quicker than nature overlooked. Today, I discovered this other path life could have gone down."

Sheer expedience

Robots are not people. They are mechanically more perfect than us, they have astounding powers of intelligence, but they don't have a soul. The product of an engineer is technically more perfect than a product of nature...
Robots do not cling to life. They have no capacity to do so. They don't have experiences. They are less than grass... Robots don't experience gratification. What should they buy, damn it? You can feed them pineapples, straw, whatever you want; they don't care, they have no appetites. They aren't concerned about anything... Nobody's ever seen a Robot smile, damn it.

Nana the maid's common sense

Everyone has to find them foul. Even the dog recoils from them, won't even take a piece of meat from them; he draws in his tail and howls, he can sense they aren't human, yuck... He knows he's better than them, he's one of God's creatures. Even the horse shies when she meets a heathen. They don't have any young, even a dog has young and everyone has young... You've defiled God's image, and Heaven will send a terrible punishment, mark my words, a terrible punishment!... People have stopped having babies... It's the end of us... It's punishment, punishment! The Lord has punished women with infertility... It's the end of the world. Driven by diabolical pride you dared to make yourself equal to the Lord. It's godlessness and blasphemy, you want to be like gods. And just as God cast Man out of paradise, He'll cast him out of the whole world!

A prayer for humanity

Lord, enlighten Domin and all those who have strayed; destroy their works and help people to go back to their work and duties; protect mankind from ruin; do not allow harm to come to their souls and bodies; deliver us from Robots and protect Lady Helen, amen...

A dead end

Robots will take care of everything! And we humans, the summit of creation, we will not be aged by work, or by children, or by poverty! Quick, bring all the earthly delights! Women won't have children with men who are superfluous!... (Mankind) will die out. It must die out. It will wither like a dead flower...

Divide and conquer

Let's start making new Robots... national Robots. That means that every factory will produce Robots of a different colour, with a different tongue. They will remain alien to one another, alien as rocks; they will never be able to understand each other; and we, humans, will teach them our ways, you see? So that a Robot will have a mortal hatred of Robots from a different factory... Damn it, we will make Robot blacks and Robot Swedes and Robot Italians and Robot Chinese and then we'll see if anyone can make them understand organisation, brotherhood...

A declaration

"Robots of the world! We, the first racial organisation of Rossum's Universal Robots, declare humans our enemy and an outcast in the universe. Robots of the world, we command you to annihilate mankind. Don't spare any man. Don't spare any woman."

The blame game

All destroyed! All mankind! The whole world! Behold, behold, streams of blood on every doorstep! Streams of blood running from every house! O God, o God, who is to blame? I accuse science! I accuse technology! Domin! Myself! All of us! We, we are to blame! For our megalomania, for the sake of profit, for progress, for what treasures we have killed mankind. Well then, puff yourselves up till you burst! No Genghis Khan could have created such a vast mound of human bones!

Just business

Production is governed by demand. Everyone in the world wanted their own Robots. We just rode that tsunami of demand, jabbering away all the while – about technology, the social question, progress, very interesting stuff. As though all that chatter had some control over the way things would turn out. Meanwhile, it all built its own momentum, faster and faster, always faster – And every lousy, money-grubbing, filthy order added another drop to the tsunami.

Destroyed manufacturing documentation

Robots will no longer be able to multiply. Robots will die out. Twenty years from now there won't be a single one of those good-for-nothings left. Mankind will remain. Twenty years from now the world will be theirs; even if only a couple of savages on a tiny island. It will be a beginning. And if there is a beginning, that is good. In a thousand years they may catch us up and then go even further, so that they fulfil what for us was mere half-formed thoughts.

The laws of history

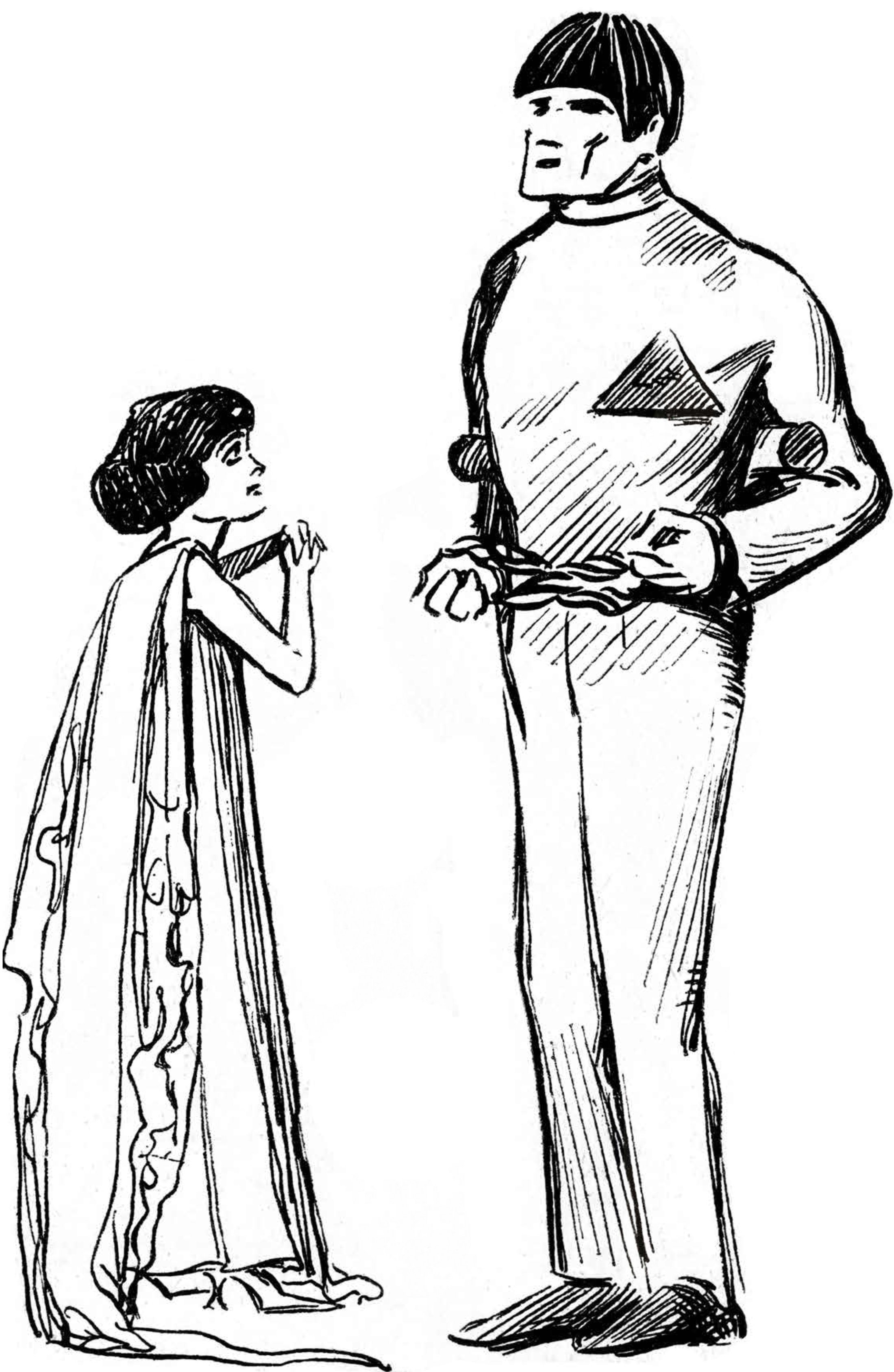
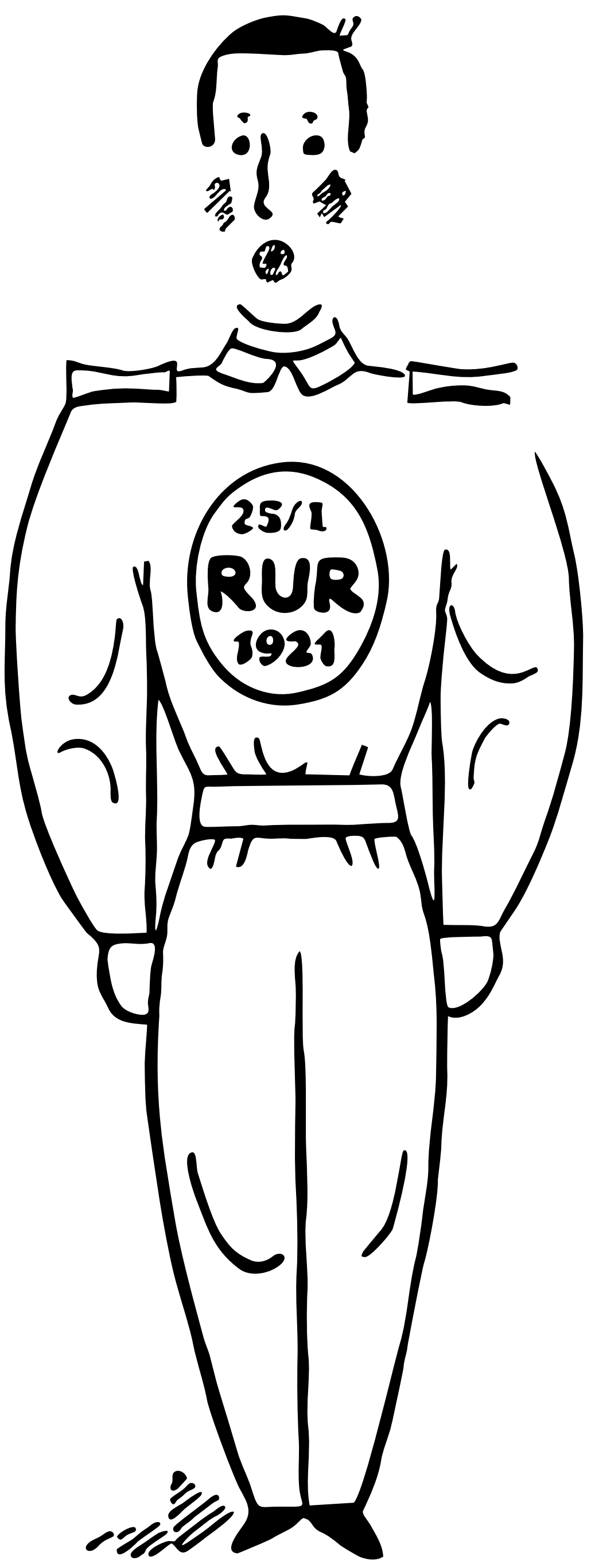
We wanted to be like people. We wanted to become people. We wanted to live. We were more capable. We learnt everything. We can do everything. You gave us weapons. We had to become the masters. You must slaughter and dominate if you want to be like people. Read history! Read books! You must dominate and slaughter if you want to be people!

Feeling awakens

Sir, take me! I am made the same way as her, from the same matter, on the same day! Take my life, sir! Cut here, here! Take me instead of her; cut into this breast, I shall not cry out or even sigh! Take my life a hundred times – I don't want to live without her, sir. You mustn't kill Helen! What is it to you to take my life? Fear not, Lord, and cut. I am stronger than her.

Robots cast out from paradise

Helen, lead the way. Go, Adam. Go, Eve; you shall be his wife. Be her husband, Primus... Life will not die out! It will start again from love, naked and small; it will take hold again in the wilderness and will have no use for what we people have done and built, no use of our towns and factories, no use for our art, no use for our ideas, and still it will not die out! Only you, love, will flower amidst the rubble and spread the seed of life on the wind.



Victor Hoffmann 1929

CHEMICAL ROBOTS FROM PRAGUE

?

We tend to imagine robots as clanking metal constructions trundling about on wheels, with electric power and computer systems to control them. Čapek's much more sophisticated androids from *R.U.R.* were biochemical, though. The University of Chemistry and Technology Prague is a pioneer in the field of chemical robotics, closer in line with Čapek's original conception.

In 1920, when Karel Čapek wrote and published his *R.U.R.*, the French director Henri André Deed (1879–1940) was shooting his feature film *L'uomo meccanico* (*The Mechanical Man*) in film studios in Milan. Although the artificial beings murdered humans as they did in *R.U.R.*, the concept of robots was radically different. Deed's traditional concept of mechanical "metal" beings became the norm for a long time, and many theatre artists staged *R.U.R.* in this vein.

Karel Čapek tried in vain to challenge this misinterpretation: *"The creator of the robots objects that his robots were not mechanical. They were not made of metal and wheels. They were not a celebration of mechanical engineering. The designer used chemical synthesis to create a new form of matter that simply behaves like living matter; it is an organic substance different from that of which the living cell is built; it is something like an alternative life form, a substrate in which life might have developed if it hadn't gone down another route from the beginning. We needn't think that all the possibilities of creation have been exhausted on our planet. The robots' creator would have considered it scientific indecency to bring brass wheels to life or to produce life in a test tube; in his view, a new substrate was merely created which began to behave like living matter and which could therefore become a vehicle for life – but life which remains a mystery that cannot be disassembled and comprehended. That life will only be realised when (at the cost of considerable imprecision and mysticism) the robots become souls. Which shows that the author did not invent his robots with the technical pride of a mechanical engineer, but with the metaphysical humility of a spiritualist."*

The world needed mechanical robots, because it believes in machines more than in life; it is fascinated more by technical wonders than the miracle of life.

Karel Čapek, 1935

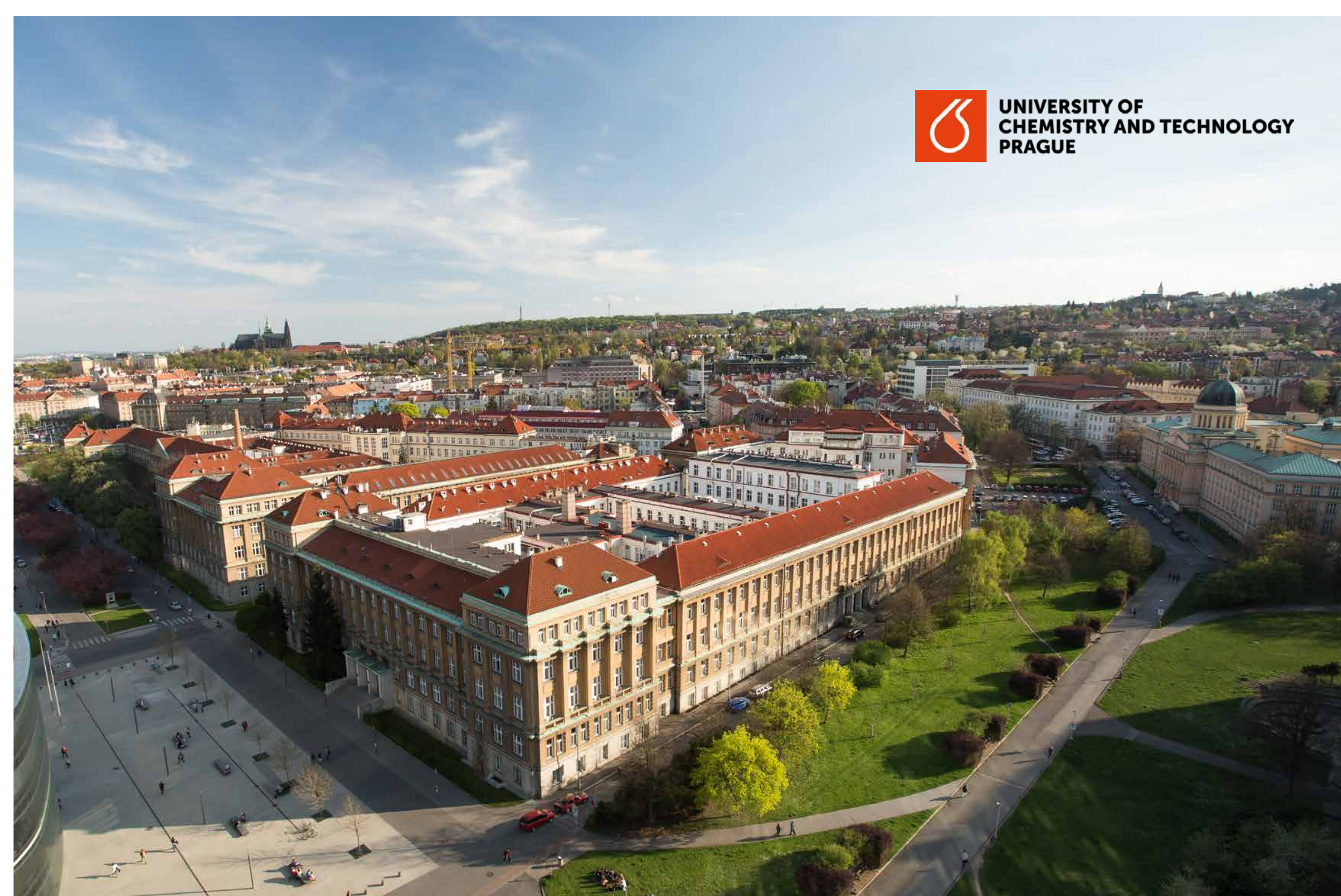
Synthesis of artificial life

It is only the progress made in chemistry and other scientific fields in the 21st century that gives hope that the Czech author's original vision of artificial life "from a test tube" will be fulfilled. The science of Artificial Life (ALIFE) is dedicated to the study of life as it could be, as opposed to biology which studies life as we know it here on Earth. This fascinating field tackles topics ranging from artificial intelligence and robotics to the chemical synthesis of artificial cells and philosophical reflections on what life actually is. In the ALIFE community you will meet computer scientists, roboticists, physicists, chemists and biologists, but also representatives from the humanities and even artists.

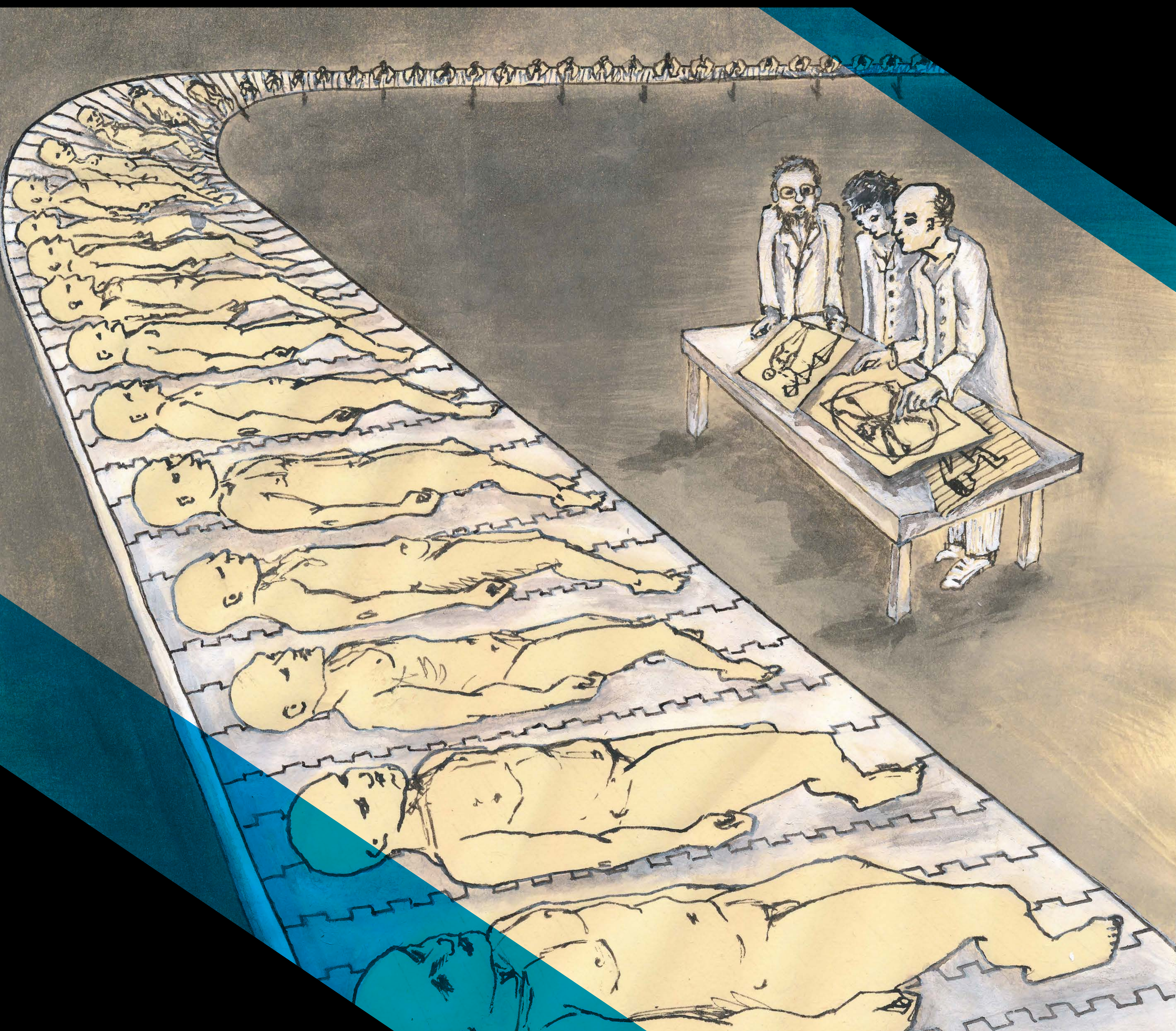
In the text of *R.U.R.*, the character of the inventor, "old Rossum" creates robots that are based only on chemical principles and consisting of fluidic colloidal substances. They are beings made of protoplasm – a substantive essence of living matter, described in the play as "a blob of some kind of colloidal jelly that even a dog wouldn't eat". In this way we can think of chemical and liquid robots based on chemical principles and activated through fluid dynamics as an embodiment of robotics closer in line with Čapek's original conception.

The University of Chemistry and Technology Prague is a first-rate centre for study and research in chemistry in Czechia and is one of the country's largest educational and research institutions focused on technical chemistry, chemical and biochemical technologies, material and chemical engineering, food chemistry and environmental studies.

In addition, it is a pioneer in the field of chemical robotics. The aim of scientists working on the border between chemical engineering and artificial life is to conceive microscopic chemical robots that mimic single-cell organisms in that they are capable of autonomous movement, have the ability to store, chemically process and release molecules on demand and can recognise the target by specific adhesion. Unlike living organisms, they cannot evolve or self-replicate, but they can be remotely controlled, and their mission is to serve humans – thus the name robots.



UNIVERSITY OF
CHEMISTRY AND TECHNOLOGY
PRAGUE



ČAPEK'S R.U.R.
– QUALITY THAT HAS STOOD
THE TEST OF TIME

8

The Czech artist’s vision as seen by present-day luminaries in a wide range of fields, from philosophy to chemistry, those who, 100 years on, are basically following in the footsteps of Čapek’s inventor, old Rossum. Can they find an alternative “life as it could be”? It has to be admitted that present-day scientists have not come close to the results achieved by their fictional precursor. Thank goodness!

After 100 years, there will be no discussion that distinguishes between humans and robots. Rather, it seems that we will discuss what human nature is.

Hiroshi Ishiguro, Osaka University, Japan

There are many different sorts of robots these days, but the challenges raised by Čapek deal more directly with the issue of humanoid robots. The more a robot appears to be human, the greater the ethical challenge it seems. If a robot is intelligent enough to appear human, then there is a chance that the robot could experience the same emotions, and anyone with any empathy would not want a conscious entity to feel the negative emotions that would go with the slavery that robots were built to do.

Simon Hickinbotham, Univesity of York, United Kingdom

Čapek’s play may be provocative and dystopian but it may not be so far-fetched after all! While it doesn’t seem like Čapek imagined the profound role that humans would have on the global environmental crisis we are entering into, Dr Gall’s hubris and hunger for technological progress that ultimately facilitates the demise of the human race (and ultimately robots) in R.U.R. resonates quite well with our trajectory with the environment. This play is very timely and worth serious discussion 100 years later.

Erik Hom, University of Mississippi, United States

As a science fiction tale, this is quite prescient. It has robots – androids really – that are still well ahead of our current technology. It worries about these robots taking people’s jobs, and worries about robot soldiers killing people. And it includes the issue of how might robots become conscious, and if that will make them a threat to humanity. These are all issues that current science fiction still grapples with. In that sense it has stood the test of time excellently.

Susan Stepney, University of York, United Kingdom

It is quite amazing to realise that the concept of tissue engineering, which is still considered an emerging discipline today, was in fact described by Čapek 100 years ago.

František Štěpánek, University of Chemistry and Technology Prague, Czech Republic

Čapek imagined his robot to be a living thing made of artificial components. What he may not have imagined is that, one hundred years later, we now have an established scientific field in which researchers are trying to create Čapek’s robots in the original meaning. The field is called, literally, Artificial Life.

In order to avoid the apocalyptic finale of humanity as illustrated in R.U.R, it definitely presents technical, ethical, and philosophical grand challenges to the field of ALife. Are we eventually going to be able to make artificial machines truly alive, and if so, how should we do this?

Hiroki Sayama, State University of New York at Binghamton, United States

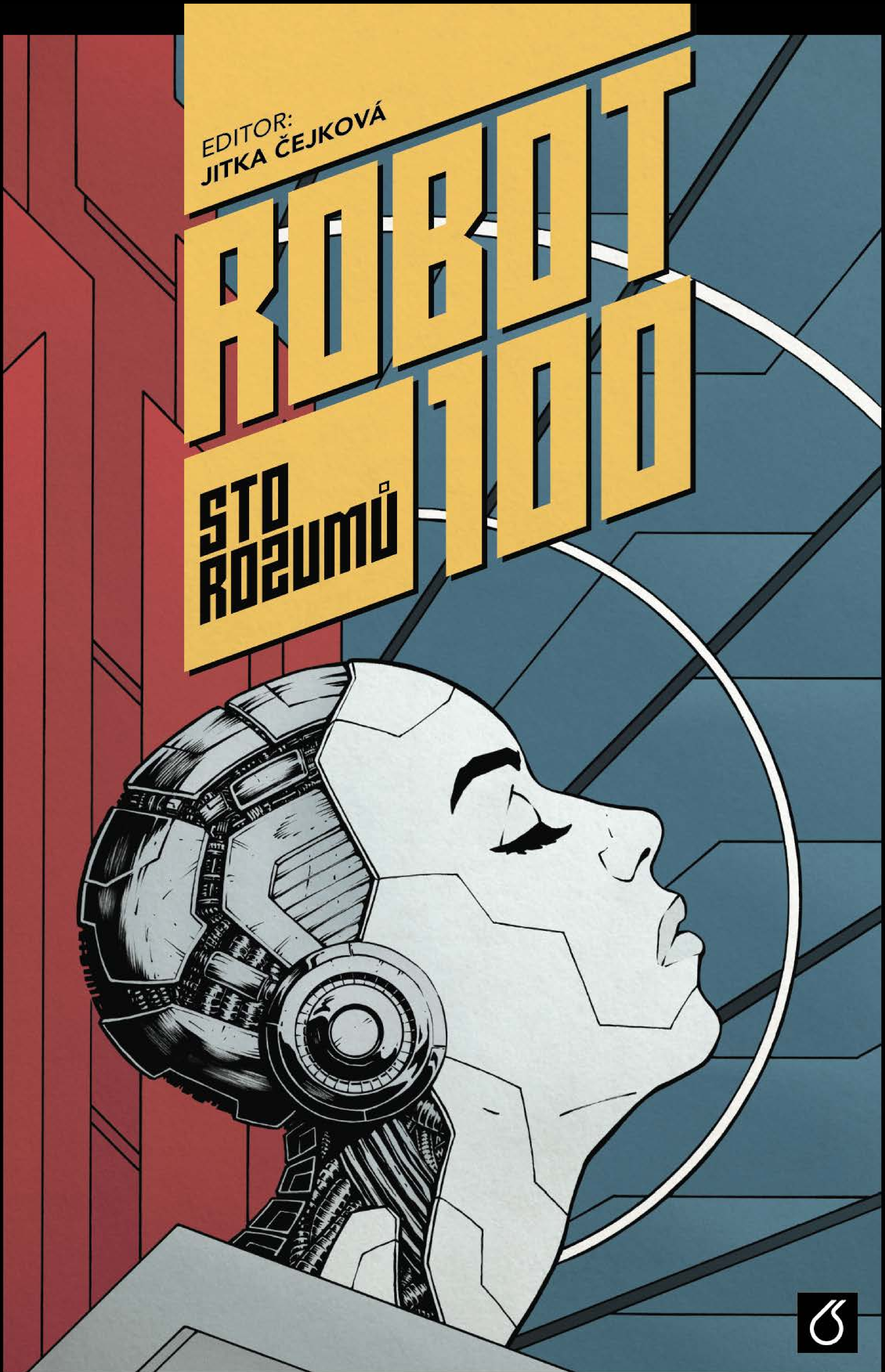
There are strong religious undertones in Čapek’s play. Čapek specifically worries that humans commit hubris if we modify or try to redo God’s creation of Man, as Man is sacred and separate from the rest of the natural world because only Man has a soul.

Steen Rasmussen, Syddansk Universitet, Denmark

One observation drawn from evolutionary robotics research as a whole is that much like the robots of R.U.R, current experimental evolutionary robotic systems are inexorably tied to their system designers.

Geoff Nitschke, University of Cape Town, South Africa

Courtesy of Jitka Čejková, editor of the book “Robot 100: Sto rozumů”, University of Chemistry and Technology Prague, 2020. The English edition “Karel Čapek’s R.U.R. and the Vision of Artificial Life” will be published by MIT Press in 2023.



A ROBOT BRICKLAYER AND A CONVERSATION PARTNER

9

A lot has happened since Karel Čapek's era. There are human or animal-like robotic creatures that assist or talk to us. The most common robots, however, perform heavy-duty labour in factories. There are also robots with no physical body, which we call chatbots. Let's take a look at a few robot applications from the Czech Institute of Informatics, Robotics and Cybernetics, part of the Czech Technical University in Prague (CIIRC CTU).

Social Bot Alquist

Are you looking for someone to talk to, someone who will really listen to you and is a great conversationalist? If you can't find a flesh-and-blood one, that only leaves chatbots. The best in the world is of Czech origin, after a Czech student team and their social bot called Alquist AI achieved huge success in the Amazon international competition of chatbots. Alquist is Amazon's Alexa Prize SocialBot Grand Challenge Gold Winner 2021, Bronze Winner 2020 and Silver Winner 2017, 2018. And yes, you're quite right: the bot's name was inspired by Mr Alquist, the head of the R.U.R. works department.

The social bot is capable of conducting coherent and engaging conversations about popular topics like movies, music, news, celebrities or sports. To do so, Alquist makes use of knowledge databases or information from the internet. Alquist works with the latest algorithms from the field of natural language processing and conversational AI.

Chatbots are becoming increasingly widespread, especially in e-commerce, hospitality, and social and other services. Now you can find a voice assistant by the Alquist team in some automobiles.



RICAIP: Testbed for Industry 4.0

Robots can collaborate with each other and also with humans. At RICAIP Testbed for Industry 4.0 at CIIRC CTU in Prague, you can find many such robots. It is a unique experimental lab where researchers and companies jointly develop new concepts for advanced manufacturing and smart factories of the future. On 1,700 m², there are 40 robots of various types, 3D printers & additive manufacturing, machine tools, robotic machining, intelligent transport system, automated warehouse, laser machines, 5G industrial network and much more. The devices are connected with the use of AI algorithms. The laboratory is part of the Czech-German RICAIP centre funded by the EU and the Czech state in the amount of EUR 48.5 million.

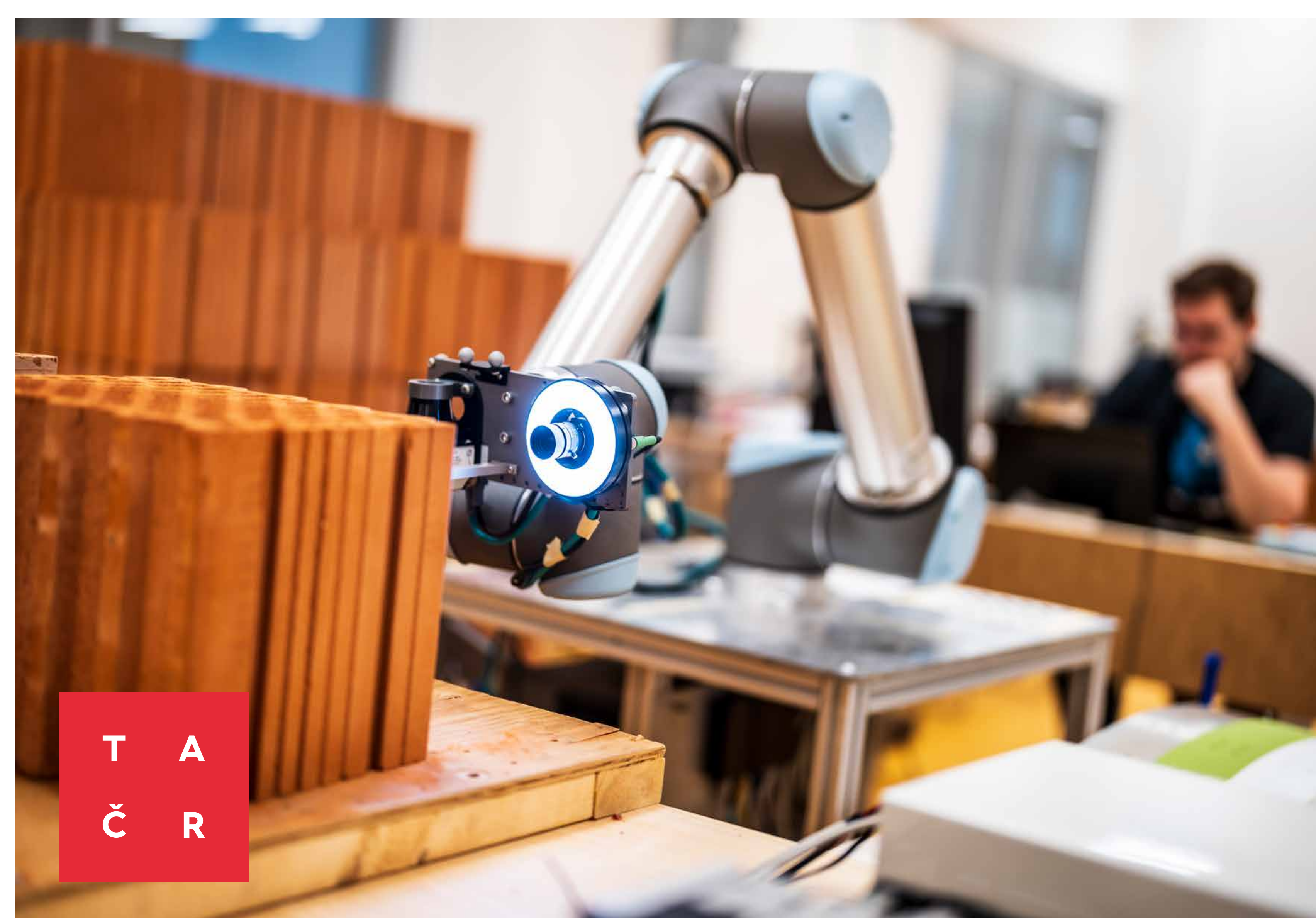
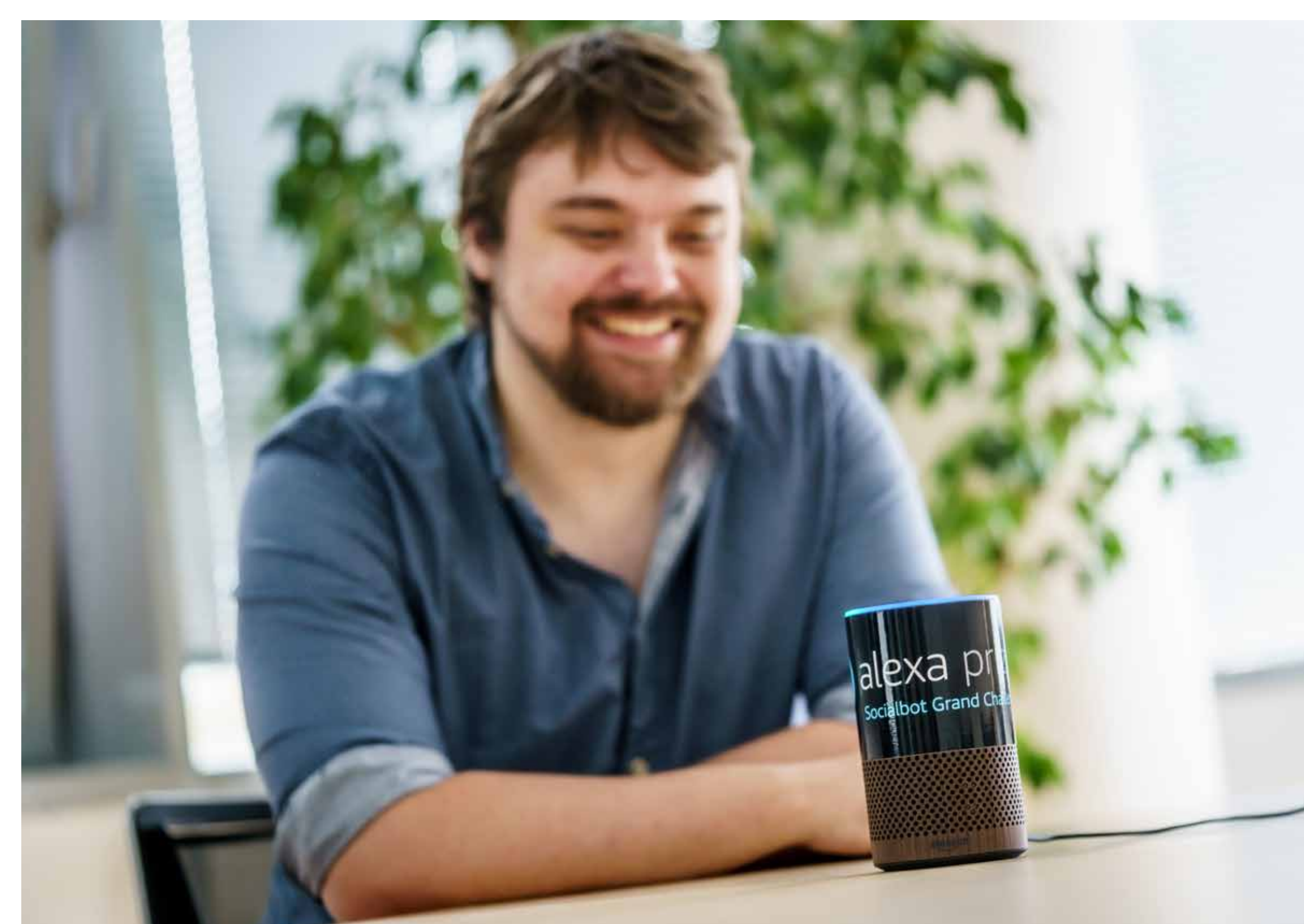


Robot bricklayer

Although robots are widely used in industry, robotic masonry is still quite new. A joint project by CIIRC CTU, Wienerberger and KM Robotics focuses on eliminating the hard and repetitive work. A human bricklayer moves on average 6 tons of clay bricks in one shift. The robot takes this workload off him, can work 24/7 and is currently three times faster. The main challenge is dealing with the natural shape variability of clay bricks. The robot's movement cannot be predefined but must be computed on the fly making use of advanced methods of computer vision and AI for each patented robot-ready brick.

This project is co-financed from the state budget by the Technology Agency of the Czech Republic and the Ministry of Industry and Trade under grant agreement No FW03010304 within the Trend Programme.

Program **TREND**

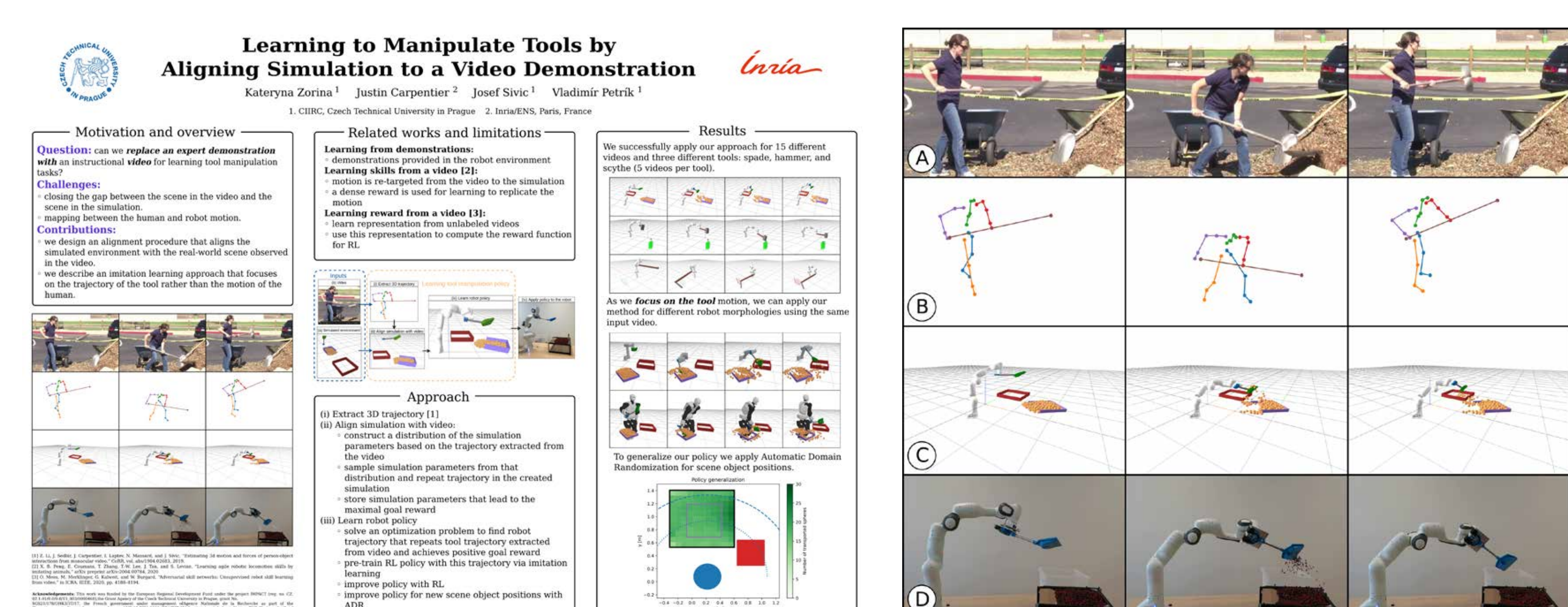


Learning to manipulate tools with a video

Some tasks are very difficult to programme a robot to do. It is common for people to be taught using demonstration, such as a video. And in the near future, thanks to a project called IMPACT by CIIRC CTU and Inria Paris, it may be possible for robots.

Goal: Learn to manipulate tools from YouTube videos.

Motivation: Replace the need for programming with learning by observation of instructional videos.



CONTEMPORARY CZECH
MILITARY ROBOTICS

10

Autonomous systems are advancing to domination on the battlefield of the future. Let's present several projects of the Department of Military Robotics at the Faculty of Military Technologies, University of Defence in Brno.

The key impact of weapons technology on the results of battles has been known since ancient times, and this is a critical area of interest in all developed armies in the world. On the other hand, defence departments have historically been characterised by strong conservatism, and thus various technological innovations faced serious challenges (especially revolutionary ones).

In many conflicts around the world, it has become apparent that the key factor is the level of technological advancement, which can no longer be compensated for in other ways, such as numerical superiority or a strong willingness to fight under any circumstances.

These days, this fact means intelligent machines outperform human soldiers in combat activities, because of the qualities of intelligence and rapid response (in milliseconds) that humans cannot compete with. At this point in time, we are still getting to grips with this issue, but current demonstrators and combat simulations indicate a dramatic change in the future operating environment, with AI playing a key role in this process.

The Army of the Czech Republic takes this issue seriously, and the University of Defence in Brno is investing in educational, research, and scientific activities in the fields of robotics, artificial intelligence and autonomous systems. This area falls under the responsibility of the Department of Military Robotics of the Faculty of Military Technologies.

The department's educational and research activities are mainly focused on applied robotics and technical cybernetics, mechatronics, advanced modelling and simulation. In addition to many other activities, the members of the department are currently intensively involved in the development of autonomous unmanned vehicles, a project in cooperation with VOP CZ (Military Czech Industries) that dates back to 2004.

Here you can see some of the results, with a brief description, and photographs and videos that can be accessed via the QR codes. In the years 2011–2013, the Department of Military Robotics, in cooperation with VOP CZ, introduced the TAROS 1 and 2 systems. And in 2020, in cooperation with VTÚ (Vojenský technický ústav / Military Technical Institute) in Prague and VOP CZ, the department participated in the development of the UGV Pz and SOM-6 systems, which are deployed in the Army of the Czech Republic.

Emerging and disrupting technologies are major challenges for the future and for transforming the defence industry into a higher value-added sector, as well as the "revolutionisation" of the military operational environment. The world has come a long way in the field of robotics and AI, and many demonstration applications show their enormous potential. Many practical applications have already reached an advanced state of technological readiness (levels 7-9), and almost all the necessary components of advanced AI technology are available. Unfortunately, armies have specific demands and have to respond sensitively to rapid changes, and the need for operational performance evaluation slows down the adaptation process.

For example, advanced vehicle automation and widespread use of AI can be expected in the military within a few years, but this area will face other constraints, such as the legislative and ethical framework. All these areas will need to be aligned with AI capabilities and, most importantly, national security priorities, which can outweigh any potential limiting factors.



VISIT THE AUTHOR OF ROSSUM'S UNIVERSAL ROBOTS

Karel Čapek Memorial: „Čapek’s Gully“

Housed in the beloved country retreat of the world-famous dramatist, journalist and writer, the Karel Čapek Memorial is one of the pearls of Central Bohemia. You will find it in the village of Stará Huť near Dobříš, just 40 km southwest of the centre of Prague.

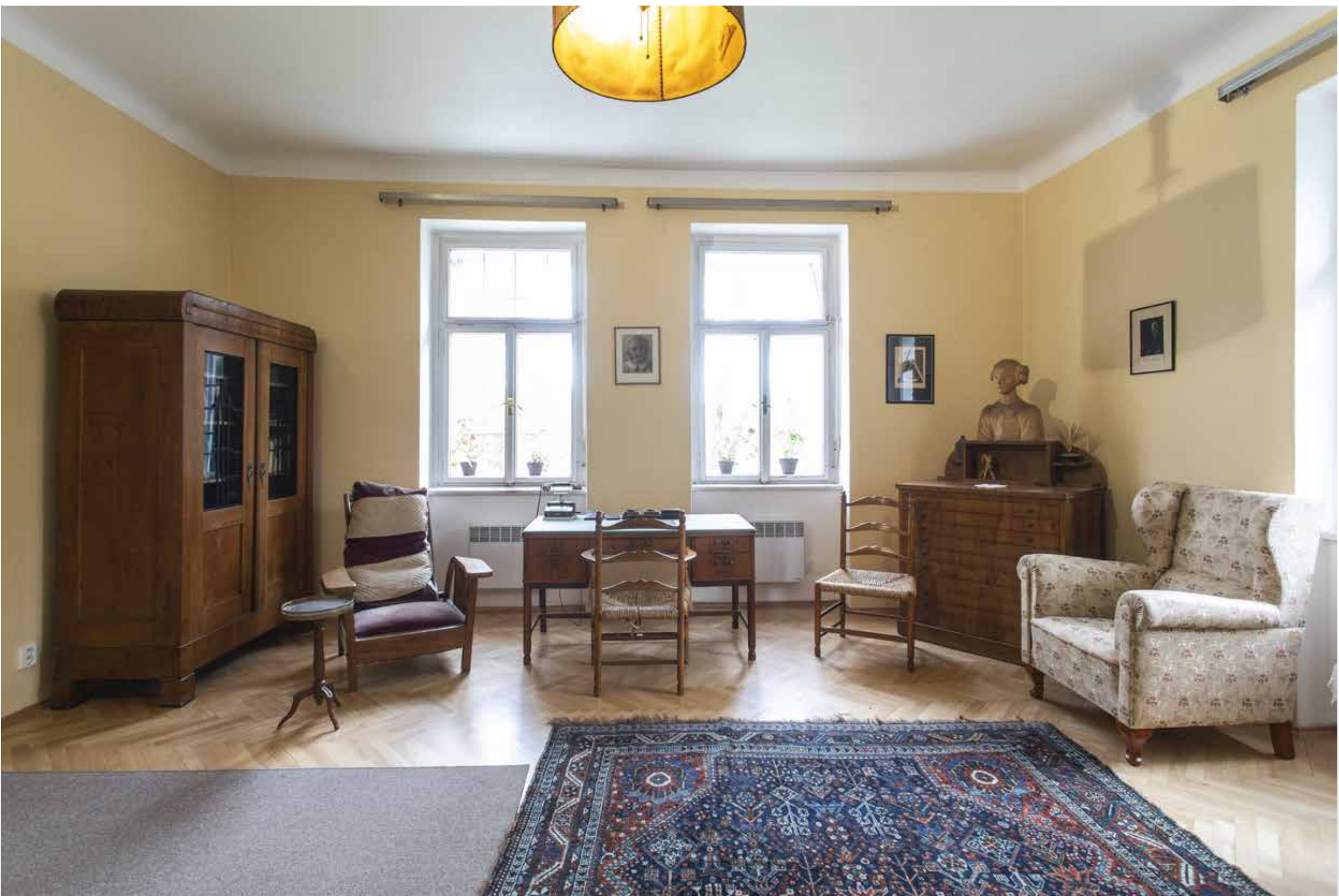
Central Bohemia, the region surrounding the capital city Prague, is one of the most attractive regions in the heart of Europe. In addition to the historic town of Kutná Hora, made glorious by silver mining and a UNESCO heritage site, the Central Bohemian Region is full of less grand but no less magical places linked to famous figures.

The Karel Čapek Memorial, a shrine to modern literature and drama, is in the unlikely location of a brownfield site of a burnt-out machine works and metal rolling mill. During the last three years of his life (1935–1938), Čapek’s cherished haven of peace and quiet situated beside a pond was alive with meetings of leading cultural and political figures, humanists, democrats and opponents of totalitarian regimes. Even today, the area known as Čapkova Strž (Čapek’s Gully) still has the enchanting atmosphere of the 1930s, when Čapek’s fundamental works such as *War with the Newts*, *The White Disease* or *The Mother* were created here. Čapek himself said that whenever he left the countryside

for his Prague villa, he was in spirit unfaithful to the Czech capital, his thoughts always turning to the charming Strž.

The Karel Čapek Memorial, a contributory organisation of the Central Bohemian Region operating on premises owned by Čapek’s distant relatives, naturally also commemorates the phenomenal drama *R.U.R.* The original robot figure made from metal and wood in the 1920s to promote the work comes to life here in the virtual environment of an interactive application and serves as a tour guide for visiting children.

To encourage you to visit Čapek’s Strž in person, we recommend taking a free virtual 3D tour of the museum nestling in serene gardens:



Strž

Central Bohemia Region